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# Detecting depression and malingering using response times on the Personality Assessment Inventory

Cyr, Derick Glen Adam

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Running Head: DEPRESSION, RESPONSE TIMES, THE PAI

Detecting Depression and Malingering Using Response Times  
on the Personality Assessment Inventory

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## Abstract

The detection of individuals who are malingering psychological dysfunction has proven to be a difficult task (Rogers, 1997). This study was conducted to investigate whether response times on the Personality Assessment Inventory could differentiate among asymptomatic controls ( $n = 15$ ), clinically depressed individuals ( $n = 12$ ), and a group instructed to mangle depression ( $n = 19$ ). Conventional responses and item response latencies were recorded for the Negative Impression, Positive Impression, Depression – Affective, Depression – Cognitive, and Depression – Physiological scales. Discriminant function analyses revealed that conventional scores correctly classified 100% of the controls, 91.7% of the depressed, and 73.7% of the malingerers. Standardized response latencies correctly classified 73.3% of controls, 58.3% of depressed, and 84.2% of malingerers. Classification rates for raw response latencies were 73.3%, 50.0%, and 78.9% respectively. Finally, a new scale composed of items from the above subscales maximally discriminating malingerers from depressed individuals could correctly classify 100% of depressed and 91.7% of malingerers. These findings are consistent with other research (Fekken & Holden, 1994) suggesting that response latencies might provide meaningful information.

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## Using Response Times to Detect Depression and Malingering With The Personality Assessment Inventory

Classical test theory assumes that an observed score is the result of an individual's true score and measurement error (Kaplan & Saccuzzo, 1993). Measurement error in psychological testing may be attributed to error inherent in test construction and error inherent in test administration. Errors in test construction may include improper item selection, item analysis, and test standardization. Error attributable to test administration can include the effects of the testing situation, test administrator characteristics, and test-taker characteristics (Kaplan & Saccuzzo, 1993). Self-report tests of personality functioning are typically concerned with a subject responding in a manner unrepresentative of their "true" characteristics (Rogers, 1997) – measurement error due to test-taker characteristics. An unrepresentative response style (or adopted response style) minimizes, to a greater or lesser extent, the contribution of true characteristics to an observed score.

### Response Styles

There are a variety of different response styles, each of which can distort an individual's score in a particular direction. (Some authors have made a distinction between response set and response style [e.g., Kaplan & Saccuzzo, 1993]. Consistent with the articles reviewed within, the term response style will be used to indicate any responding that deviates from accurate responding.) Examples of response style include acquiescence, criticalness, extremity bias, and random responding. These types of response styles deviate from accurate responding, distorting observed scores due to uncertainty, misunderstanding, indifference, or insolence. Another type of response style is dissimulation, or the systematic exaggeration or minimization of true characteristics. This type of responding ranges from

positive dissimulation (individuals tailoring their answers to create a favorable image) to negative dissimulation (individuals tailoring their answers to create a negative image), with accurate responding located midway. Positive dissimulation includes faking good and defensiveness; negative dissimulation includes faking bad, malingering, and exaggeration (Graham, 1990). Alternatively, Rogers (1997) has defined positive and negative dissimulation as defensiveness and malingering, respectively, and has further delineated each type of dissimulation as severe, moderate, or mild.

The extreme *positive* end of the dissimulation response style continuum has been described as faking good and severe defensiveness (Graham, 1990; Rogers, 1997). Faking good is the denial of all negative characteristics so that an individual appears to be free of all psychological problems, however minor, simulating an almost angelic character. On the positive end of the dissimulation continuum, but not quite as blatantly removed from accurate responding, is defensiveness (Graham, 1990). Defensive individuals are not as obvious when presenting themselves in a positive light – they occasionally admit to faults. Rogers (1997) defined moderate defensiveness in a similar manner, and he further defined mild defensiveness as the minimization, but not denial, of psychological problems. The range of possible motives for positive dissimulation is quite broad. Situations in which positive dissimulation might occur include employment screening, psychiatric evaluations, parole hearings, and child custody hearings (Holden, 1995; Rogers, 1997).

The extreme *negative* end of the dissimulation response style continuum has been described by Graham (1990) as faking bad (also defined by Rogers, 1997, as severe malingering). Faking bad is the endorsing of unrealistic negative characteristics. Individuals who are faking bad are so extreme in their fabrication of symptoms that their

presentation seems fantastic or preposterous. Malingering, adjacent to faking bad on the dissimulation continuum, is not as obvious. These individuals actively attempt to accurately feign psychological disorders by presenting themselves as having either a few critical symptoms or an array of other symptoms (Graham, 1990; defined as moderate malingering by Rogers, 1997). Closest to accurate responding on the negative side of the dissimulation response style continuum is exaggeration. Individuals who exaggerate typically have a psychological disorder but attempt to exaggerate the levels of their symptoms. Exaggeration has been defined by Rogers (1997) as “mild malingering” and further conceptualized as a minimal distortion that has little effect upon differential diagnosis. Possible motives for negative dissimulation include financial gain for accident victims suing for damages, financial gain for individuals claiming disability, for the procurement of drugs, or a plea for help (Rogers, 1997; Rogers, Sewell, Morey, & Ustad, 1996). The Diagnostic and Statistical Manual of Mental Disorders – 4<sup>th</sup> Edition (DSM-IV; American Psychiatric Association, 1994) defines malingering as the intentional production of false or grossly exaggerated symptoms that is motivated by external incentives. Thus, the DSM-IV categorization of malingering is comparable to malingering or faking bad (Graham, 1990) or to what Rogers (1997) refers to as moderate or severe malingering.

### Malingering and Test Construction

#### The MMPI-2

Historically, psychologists have been aware of the potential effects of various response styles and have included measures to assess their influence. For instance, Bernreuter (1933) thought that individuals were tailoring their responses to produce a favorable self-image, for this reason he questioned the validity of self-report questionnaires.

Meehl and Hathaway (1946) declared “one of the most important failings of almost all personality tests is their susceptibility to ‘faking’ or ‘lying’” (p. 525).

One of the most prominent psychological instruments to include measures of response styles is the Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & McKinley, 1943) and its successor the MMPI-2 (Butcher, Dahlstrom, Graham, Tellegen, & Kaemmer, 1989). Both instruments have three scales to detect if people are distorting information about themselves. The L-scale assesses the extent to which people are naïvely presenting themselves in a positive light. The K-scale assesses the extent to which people present themselves in an overly positive light or an overly negative light. The F-scale assesses the extent of deviant or atypical responding (e.g., acquiescence, random responding).

Although the MMPI-2 is widely used, some authors have criticized the MMPI-2 as being an unsuitable diagnostic instrument of psychopathology because it does not meet current psychometric and theoretical standards. Helmes and Reddon (1993) examined the MMPI-2 and reported both theoretical and structural problems. One theoretical problem is the heterogeneous content within scales, which diminishes the meaning of scale scores. Also, the categorical modeling of the MMPI-2 designates a high scale score as indicating probable group membership instead of the severity of the psychological construct. Structural problems reported by Helmes and Reddon (1993) include small and unrepresentative sample sizes (a mode of 50 individuals from Minnesota for each scale), high false positive rates for some scales, a high overlap of item content among scales (reducing the specificity of scale meaning), a lack of cross-validation of item selection, outdated and inadequate norms, and problems associated with measures of response styles

and social desirability (also see McCrae & Costa, 1983). Helmes and Reddon (1993) also reported other general problems such as unbalanced keying within items (i.e., an unequal number of true- and false-keyed items), unscored items (62 items not scored on any clinical, supplementary, validity, or content scales), and unbalanced scale lengths (clinical scales range from 33 to 78 items).

### Modern Approaches

Authors of psychological measures apply recent advances in psychometric theory to avert, as best as possible, errors in test construction similar to those pointed out by Helmes and Reddon (1993) of the MMPI-2. For example, Jackson (1994) states that the goals of proper item selection are “(a) to enhance the internal consistency reliability of the scales; (b) to suppress desirability response bias; (c) to maximize discrimination among the scales; and (d) to identify items yielding scales with normal distributions” (p. 40). For the Jackson Personality Inventory – Revised (JPI-R; 1994), Jackson began test construction with a pool of 1800 items and finished with a final total of 300 items. Some of the items removed to suppress the desirability response bias included “I am more easily irritated than others are” and “Most people would say that I am cautious and conservative with my money” (Jackson, 1994, p. 43). Subsequent to thorough item selection and analysis for the JPI-R, Jackson sought to measure the influence of dissimulation upon test scores. Jackson (1994) instructed respondents to fake good and found only small changes for scale means and standard deviations. He concluded that the small differences between groups of respondents were a reflection of “the method of scale construction in which desirability was suppressed” (Jackson, 1994, p. 52). Therefore, proper item analysis and selection is the initial step taken in test construction to minimize the effects of response style. Another psychometric

measure that was constructed using contemporary psychometric theory is the Personality Assessment Inventory (PAI; Morey, 1991).

The PAI (Morey, 1991) is a 344-item Likert-type scale questionnaire designed to assess a broad range of psychopathology through 22 non-overlapping scales. The 22 scales of the PAI include 4 validity scales, 11 clinical scales, 5 treatment scales, and 2 interpersonal scales. The internal consistency median alphas are .81 for the normative sample, .86 for the clinical sample, and .82 for the college sample. The test-retest reliability for testing 28 days apart over the clinical scales was a median of .83 (Morey, 1991). Morey adopted recent advances in the field of psychometrics for constructing the PAI, advances not available for the MMPI and not utilised for the MMPI-2. Advances in psychometric theory include new models for understanding construct validity and the influence of response styles. For instance, Morey (1991) emphasised construct validity so “that no single quantitative item parameter should be used as the sole criterion for item selection” (p. 63). Consequently, the use of multiple criteria by Morey (1991) increased the utility of the scales by describing various levels of severity. Morey (1991) decided upon a four-point Likert-type response scale to provide a greater variability in response, allowing greater scale reliability with fewer items. Other advances in psychometric theory include the evolution of alternative models to classical psychometric theory and the development and refinement of sophisticated methods of data reduction such as factor analysis and cluster analysis. For example, the PAI was constructed with no item overlap between scales to avoid artificial correlations between scales, and item construction was based upon thoroughly researched theoretical constructs with specific attention to multidimensional constructs. Nine of the 11 clinical scales were readily divisible (through cluster analysis) into sub-scales to further specify notable features.

For example, the *Depression* sub-scales distinguish between cognitive, affective, and physiological features, while the *Schizophrenia* sub-scales distinguish between psychotic experiences, social detachment, and thought disorder. As a result of the application of contemporary psychometric views, the PAI embodies current psychometric and theoretical standards.

### The PAI Validity Scales

The PAI contains four validity scales – Inconsistency, Infrequency, Negative Impression, and Positive Impression. Clinicians are able to use the inconsistency scale to discern the consistency with which individuals answered questions with similar content. The Infrequency scale is useful for identifying individuals who may have answered the PAI in an atypical manner due to random responding, indifference, carelessness, confusion, or reading difficulties. Also, the PAI has two validity scales and two other validity measures that may be used by clinicians to assess the possibility of positive impression management and the possibility of malingering. The PAI has two indicators to assess the likelihood of positive impression management: the Positive Impression scale (PIM; Morey, 1991) and the Defensiveness Index (Morey, 1996). The PIM scale is a measure of the degree to which respondents are presenting a very favourable impression or the denial of relatively minor faults (e.g., reversed keyed question 144. Sometimes I'm too impatient). The Defensiveness Index has eight patterns of endorsement that tend to be observed more frequently with individuals instructed to present positive impressions (e.g., one item is a Treatment Rejection scale score  $\geq 45T$ ). The PAI also has two indicators to detect the possibility of malingering: the Negative Impression scale (NIM; Morey, 1991) and the Malingering Index (Morey, 1996). The NIM scale is a measure of the degree to which respondents are



presenting an exaggerated negative impression, more negative than a clinical explanation would warrant (e.g., question 129. I think I have 3 or 4 completely different personality inside me). The Malingering Index has patterns of endorsement that tend to be observed in individuals instructed to simulate a severe mental disorder (e.g., one item is a Depression scale score  $\geq 85T$  and a Treatment Rejection scale score  $\geq 45T$ ). Morey (1991) stated that high scores on the positive and negative impression management scales may not always represent purposeful deception. Instead, it may be that the score in question was due to careless responding or an exaggeration of good or bad qualities.

#### The Effectiveness of PAI Impression Management Measures

To examine the effectiveness of the PIM scale, Morey (1991) asked college students enrolled in abnormal psychology to simulate a very favourable self-impression. Results presented in the PAI manual indicate that a PIM scale score of 18 or above (57T) successfully identified 81.8% of these individuals. Unfortunately, at the same cut-off score, 30.4% of normals were identified as presenting themselves in a very favourable light (a specificity with respect to normals of 70%, Morey & Lanier, 1998). Therefore, when a profile includes a PIM score of 18 – 22, Morey (1991) recommends that caution be exercised with interpretation of clinical scores because they may be distorted. A PIM score of 23 (68T) or above resulted in the correct identification of 43.2% of the college students who were instructed to present themselves in a positive light and incorrectly identified only 3.1% of normal individuals as presenting themselves in an overly positive light. PIM scale scores of 23 (68T) or above indicate an individual who portrays themselves as being free from common shortcomings to which most individuals would admit, consequently it is recommended that no other clinical scale be interpreted. Morey and Lanier (1998) re-

examined the effectiveness of the PIM scale, again instructing respondents to manage their results in a positive manner. Although Morey and Lanier (1998) implemented the same sample sizes and methods as described within the PAI manual, their results indicated the PIM scale score of 20 (61T) had sensitivity of 82% for the detection of positive impression management while the specificity of detection was 93%. Morey and Lanier (1998) also demonstrated that the Defensiveness Index, although a valid measure of positive impression management, was less likely to identify defensive responders who had been informed of how tests measure deception.

To examine the effectiveness of the NIM scale, Morey (1991) asked subjects “to simulate the responses of a person with a mental disorder” (p. 96). Results presented in the PAI manual indicate that the recommended empirical-derived NIM scale cut-off score of 8 (73T) or above successfully identified 95.5% of these individuals, but it also identified 4.4% of the normal population as potential malingerers. Morey and Lanier (1998) re-examined the effectiveness of the NIM scale by asking students to simulate the responses of someone with a severe mental disorder. They found that the NIM scale score of 9 (77T) had a sensitivity of 90.9% and a specificity of 86.7%. Rogers, Omduff, and Sewell (1993), using financial incentives, examined the ability of the NIM scale to detect the malingering of various mental disorders with naïve and sophisticated simulators (introductory and graduate psychology students respectively). For these participants, the NIM scale had a successfully identified 90.9% attempting to feign schizophrenia, 55.9% simulating depression, and 38.7% simulating an anxiety disorder. Only 2.5% of control participants were identified as simulators. Rogers et al. (1996) used discriminant analysis to examine the ability of the PAI to detect malingerers and found that they could identify 68.9, 44.7, and 81.8% of naïve

malingers for schizophrenia, generalized anxiety, and major depression. These figures, however, also misclassified almost 20% of the clinical population. Rogers et al. (1996) also found that sophisticated simulators (doctoral psychology students given a week to prepare) were identified 55.0, 0.0, and 19.0% of the time for the above disorders respectively. The Malingering Index was only slightly better at detecting malingerers (Rogers et al., 1993), but like the NIM, it had difficulty detecting the less severe mental disorders (i.e., depression and anxiety). In their previous study Rogers, Orndorff, and Sewell (1993) found no differences between sophisticated and naïve participants in avoiding detection of malingering as judged by NIM scale. Nor did these authors find that the level of preparation affected NIM outcome scores. The previously cited Morey and Lanier (1998) study had cited the variation in the effectiveness of the NIM scale found by Rogers et al. (1996), but Morey and Lanier (1998) deviated from the original instructions presented in the PAI manual by adding the adjective “severe” to mental disorder. Due to the findings from the previously cited study by Rogers et al. (1996) that described the effectiveness of the NIM scale as dependent on the mental disorder that was being malingered, it is possible that by using the word “severe” Morey and Lanier (1998) influenced the results.

A dissertation by Gaies (1993) specifically identified average NIM T-scores associated with the malingering of depression for informed (NIM of 13, 92T) and naïve malingerers (NIM of 10, 81T). Gaies (1993) findings are comparable to the findings reported by Morey (1991) that NIM scale scores of 8-12 (71-91T) indicate a moderate elevation in exaggerated unfavourable impression. It is surprising to find that the informed malingerers had higher NIM scale scores than did naïve participants. Higher NIM scores by informed malingerers in the dissertation by Gaies (1993) indicate that informed malingerers

admitted to problems not associated with depression (the NIM scale asks questions that are not usually admitted or experienced by clinical subjects). A possible reason for the informed malingerers high NIM scale scores was that they were allowed to keep a description of depression and were encouraged to refer to their descriptions throughout the completion of the PAI. This description included anxiety, brooding, obsessive worry, panic attacks, and possible hallucinations and delusions. Due to this description, the test subjects may have incorrectly inferred some of the NIM items as being symptomatic of depression. For instance, item 249 on the PAI (a critical NIM item) states "Sometimes my vision is only in black and white." Therefore, for the Gaies (1993) dissertation, the high NIM scale scores for informed participants may have been due to the description of depression she provided.

The effectiveness of the NIM scale to discriminate between people with mental disorders, people without mental disorders, and people that malingering, is agreed upon to be fairly good (e.g., Morey & Lanier, 1998; Rogers et al., 1996). However, there is a need for improvement in the detection of malingering due to the discrepancy among finding. There is also the need to reduce the number of false positives. When attempting to detect malingering using the NIM scale, there is variation in effectiveness according to the feigned mental disorder. For example, individuals instructed to feign anxiety disorders are much more difficult to detect than individuals instructed to feign schizophrenia (Rogers et al., 1996). Consequently, when examining malingering, it is important to examine the effectiveness of the PAI scales with respect to a particular mental disorder.

### Response Latencies

Measures of psychopathology have historically relied upon conscious choices from the respondent as a means of detecting the possibility of deception. For instance, the NIM

scale (Morey, 1991) uses responses to questions such as “Sometimes I cannot remember who I am” and “Sometimes my vision is only in black and white” to assess the validity of the participant’s responses. But more recently, response latencies typically used in the biological and cognitive areas of psychology have also attracted attention from other fields of psychology (Fekken & Holden, 1992; Holden, Fekken, & Cotton, 1991; Neubauer & Malle, 1997).

Response latency is the time-span from the moment of stimulus presentation until the response behaviour occurs. Holden, Fekken, and Cotton (1991) have described the production of a response from an item on a questionnaire as an integrative process that has the stages of stimulus encoding, stimulus comprehension, the decision process, and finally the response selection. Item length and subject reading speed affect the encoding portion of the response latency, while stimulus comprehension is largely affected by the item ambiguity and intelligence (*g*) of the subject. The number of alternative choices and the motor speed of the respondent influence response selection. Variables inherent in an individual such as reading speed, intelligence (*g*), and motor speed are stable within-subject factors; that is, they will have an equivalent effect upon all questions. For example, all other variables being equal, very quick readers will have faster response times than very slow readers due to their quick encoding times. Variables such as item length, item ambiguity, the number of alternative choices, and item extremity remain constant between groups of subjects. These factors of response latency (i.e., reading speed, intelligence, motor speed, encoding, comprehension, response selection) can, therefore, be statistically partitioned from the response latency data by examining the within- and between-subject differences (Holden et al., 1991).

The decision portion of the response latency has been proposed by Holden et al. (1991) to be affected by item extremity and schema organization. Item extremity is the degree to which questions differ in the extent to which their purpose is obvious in purpose to the respondent. For example, an obvious question taken from the PAI that assesses depression may ask, "I've forgotten what it's like to feel happy." A subtle question assessing depression may ask, "I can't seem to concentrate very well" (Morey, 1991). Research indicates that people answer obvious questions quickly but respond slowly to subtle questions (Holden et al., 1991). Brunetti, Schlottmann, Scott, and Hollrah (1998) used response latencies with the MMPI to assess validity of test responding. In accordance with the theory proposed by Fekken and Holden (1994), Brunetti et al. (1998) found that response times were related to the adopted schema (malingering) in that it took longer to reject obvious items that were unrepresentative of their adopted schema. Brunetti et al. (1998) reasoned that response times were faster with accepted schema-relevant items and slower with rejected schema-relevant items.

Schema organization reflects the complexity and order of an individual's schema. Lewicki (1984) stated that the rate of social information processing (i.e., response time) is affected by self-schema. Self-schema may influence the manner in which incoming data are interpreted or coded for the provision of more information, it may influence social information processing to protect or enhance self-concept, and self-schema may influence the potential to facilitate the categorization of others. Lewicki (1984) examined response latencies in regards to schemas and demonstrated that salient or strong personality characteristics are generally more accessible to the perceiver than are shortcomings, thereby producing faster reaction times. An individual who malingers would be modifying his/her

schema, consequently creating salient pseudo-personality characteristics. This in turn would modify the decision process portion and response latency.

Holden et al. (1991), expanding upon previous response latency findings, presented a model for detecting psychopathology, which proposes that response latencies have construct validity for indicating specific dimensions of psychopathology. Their model predicts that respondents who adopt a schema (positive or negative dissimulation) will respond more quickly to items congruent with their adopted schema and slower to items inconsistent with their adopted schema. Specifically, Fekken and Holden (1994) describe the relationship between schema organization and response latencies as follows: “when endorsing an item, the presence of an elaborate, well organized schema is reflected in a short differential response latency; when rejecting an item, the presence of that same elaborate, well organized schema is reflected in a long latency” (p. 107). In addition, Holden and Kroner (1992) have theorised that incongruities (i.e., long latencies due to the rejection of items that reflect an individual’s adopted schema) will necessarily occur. Incongruities may occur because respondents will not want to appear to be too good or too bad in an attempt to avoid the detection of dissimulation. Therefore, respondents will endorse some of the schema-relevant items as not being applicable to them and this will be evident in longer response latencies in comparison to schema-irrelevant items. These conclusions by Holden and Kroner (1992) are supported by findings of Brunetti et al. (1998) that the rejection of obvious versus subtle schema-relevant items will produce longer response time latencies. As a result, there may be higher variances for malingered scales than for non-malingered scales.

#### Response Latency Findings

Holden and Kroner (1992) measured the response latencies of prison inmates using three self-report inventories: the Basic Personality Inventory, the Marlowe-Crowne Social Desirability Inventory, and the Edwards Social Desirability Inventory. Preliminary multivariate analyses of variance indicated significant group differences between the standard, faking good, and faking bad conditions. Using discriminant function analysis, Holden and Kroner (1992) were able to correctly classify 52 of the 87 subjects (59.8%), while traditional scales of dissimulation correctly classified 55 of the 87 inmates (63.2%). These authors also conclude that “any self-report measure of psychopathology should, in theory, be amenable to yielding response latencies that may be used to produce indices of invalid responding” (Holden & Kroner, 1992, p. 172). Response score latencies have also been shown to add incremental validity to MMPI scores for predicting training time in the military (Siem, 1996). Holden, Woermke, and Fekken (1993) found that only a moderate correlation existed between item response time and item-total correlation, indicating that differential response latencies contain variance extraneous to the item response process. Fekken and Holden (1994) found a moderate internal consistency reliability (mean of .34), a weak parallel forms reliability (means of .17), and a moderate test-retest stability of response times (mean of .34). They also found evidence suggesting that the latencies for endorsing trait relevant items were negatively related to trait measures, whereas the latencies for rejecting items were positively related. Holden (1995) found that through the use of response latencies and discriminant function analysis, he could significantly distinguish between malingerers and honest test responders with university students using a 158-item true/false personnel questionnaire.



Researchers thus far have not compared the response latencies of depressed individuals to a group of individuals instructed to malingering depression. For practical applications of response latency findings for individuals malingering findings, it is essential to compare genuine responding by individuals who are genuinely depressed with individuals who have been instructed to malingering depression to verify real differences between the two groups of respondents. Only by way of direct comparison between the two groups will researchers be able to endorse the use of response latencies as measure, supplementary to an individual's cognizant choice of responses, to aid clinicians in identifying possible psychopathology. Researchers have theorized that a depressive individual is likely to produce different response latencies than would a non-depressed individual (Kuiper & MacDonald, 1982). Thomas, Goudemand, and Rousseaux (1999) examined the attentional processes of subjects with major depression and found that depressive individuals had generally a longer reaction time for all tasks. Particularly troublesome for the depressive individuals were the effortful tasks that required decision making. Therefore, for individuals with a depressive schema, longer response latencies may be particularly expected when effortful decisions need to be made. Specifically, depressives have been found to pay more attention to negative self-relevant information (Kuiper & MacDonald, 1982) and may therefore produce longer response times to self-relevant information (i.e., questions probing levels of depression). This finding is in sharp contrast to individuals dissimulating depression, who will tend to answer schema-relevant questions more quickly than questions not related to their adopted schema.

Kaplan and Saccuzzo (1993) state that "in psychological testing.... we acknowledge that there will always be some inaccuracy or error in our measurements. Our task is to find

the magnitude of this error and to develop ways to minimize it” (p. 99). The purpose of the present study is to use response latencies to detect differences between depressed, faked depressed, and non-depressive individuals. Previous research suggests that the operating schema will have an impact upon response time. Unlike previous research that has based evaluations on non-clinical samples, the current study used a clinical sample of depressed individuals and took efforts to ensure that the controls and malingerers were free of any psychological disorder. Previous research has also ignored other possible important characteristics (e.g., vocabulary level) of the samples used. This study will attempt to address these important gaps in the current literature.

We hypothesize the following related to the NIM, PIM, Depression (DEP), and DEP subscales of the PAI:

1. Faster raw response times and faster standardized response latencies will be recorded for individuals malingering depression than for individuals in the control and the depressive groups. This difference is hypothesized due to the malingerers’ salient schema of depression.
2. Slower raw response times and standardized response latencies will be recorded for individuals experiencing depressive symptoms than for individuals in the control and malingering group. This difference is hypothesized due to the findings of Thomas et al. (1996) stating that depressed individuals have slower response times for all tasks.
3. Larger group differences will be evident with the DEP-cognitive subscale due to its obvious item content. This hypothesis results from the findings by Holden et al. (1991) that response latencies vary with item extremity.

4. The use of response times will add incremental validity to the detection of individuals experiencing depression and individuals malingering depression. Scale scores have been proven to be effective at detecting malingering and it is hoped that response times will be able to increase this detection rate.

### Method

Testing was completed over two sessions. The first session was used to identify participants as controls, malingerers, or depressed according to the criteria reviewed in the following sections. During the second session the PAI was administered and response times were recorded.

#### Session 1 - Categorization

##### Participants

Session 1 consisted of two groups of participants, the first of which was 122 university students enrolled in an introductory psychology course at Lakehead University, Thunder Bay, Ontario. Student participants received a bonus mark toward their final introductory psychology grade for involvement in the study. The second group of participants consisted of seven individuals receiving treatment from the Outpatient Department at the Lakehead Psychiatric Hospital (LPH). These participants were recruited with the help of unit nurses who were explained the entrance criteria (see Appendix A). Nurses were requested to aid in recruiting participants to maintain patient confidentiality and speed the recruitment process.

##### Measures

Three instruments were used during Session 1. Participants were asked to complete the Structured Clinical Interview for DSM-IV Screen Patient Questionnaire (SCID Screen PQ; First, Gibbon, Williams, & Spitzer, 1997), the Beck Depression Inventory – 2 (BDI-2; Beck,

Steer, & Brown, 1996), and the Shipley Institute of Living Scale - Revised (Shipley; Zachary, 1991). Total time of testing was approximately 40 minutes.

The computerized SCID Screen PQ is a structured interview designed to assess psychopathology for DSM-IV Axis I disorders. Questions were presented to participants using the Windows 95 operating system on a 15-inch colour monitor. The SCID Screen PQ interview covers 6 major diagnostic categories within DSM-IV Axis I (Mood, Anxiety, Substance Use, Somatoform, Eating, and Psychotic disorders). It requires a grade seven reading level and takes under 20 minutes to complete. The SCID Screen PQ was designed to be over-inclusive for positive responses to symptomatology. Questioning from the experimenter followed the computerized interview to substantiate the presence of any symptomatology characteristic of Axis I disorders.

The BDI-2 is a 21-item self-report inventory used to assess the severity of depressive symptoms in adults and adolescents. Testing time for the BDI-2 is under 10 minutes. Beck et al. (1996) reported that the BDI-2 has high reliability for outpatients and college students (coefficient alphas of .92 and .93 respectively). Beck et al. (1996) also reported a test-retest correlation of .93 for therapy sessions one week apart. The BDI-2 has been widely accepted and used by psychologists to measure the severity of depressive symptomatology in depressed and in normal populations (Piotrowski & Keller, 1992).

The Shipley (Zachary, 1991) is designed to assess general intellectual functioning in adults and adolescents aged 14 and over and takes under 20 minutes to complete. The Shipley consists of a 40-item vocabulary subtest and a 20-item abstract thinking subtest. Of interest to the present study were the possible confounding influences of verbal ability upon response times. The full test was, therefore, not necessary and only the vocabulary subtest

was administered. Zachary (1991) asserts that the vocabulary subtest generally measures the respondent's verbal ability, which is comprised of acquired knowledge, long-term memory, verbal comprehension, concept formation, and reading ability. The vocabulary subtest is self-administered and time of testing is up to 10 minutes. A corrected split-half reliability coefficient of .92 for the total score has been reported using the Spearman-Brown computational formal. The test-retest reliability over a median interval of 12 weeks was .60 for the vocabulary score. In addition, the correlation between the Shipley total score and the Wechler Adult Intelligence Scale - Revised has been reported as .74 (Zachary, 1991).

### Procedure

Participants were administered the SCID Screen PQ, which allowed the researchers to 1) confirm that subjects in the depressed sample met criteria for depression; and 2) determine that participants in all categories did not meet criteria for any DSM-IV Axis I disorders (other than depression for individuals within the depressed sample). Session 1 then proceeded with the administration of the BDI-2. The BDI-2 was used to determine if participants of Session 1 were eligible to participate in Session 2. Specifically, individuals with scores of 8 or below and individuals with scores of 17 or above were eligible to participate in the second session. Individuals who scored 8 and below (i.e., individuals indicating little or no depressive symptoms) were randomly divided into the control and malingering groups. Individuals who scored 17 or higher (i.e., reporting moderate to severe depressive symptomatology) were eligible for the depressed group. A score of 17 or above is recommended by the authors of the BDI-2 (Beck et al., 1996) for conducting research with individuals who are currently experiencing depressive symptoms. Following the BDI-2, the Shipley was administered. At the end of the session participants were given verbal feedback on the purpose of Session 1

and were given a debriefing form (Appendix B). Individuals who met the BDI-2 cut-offs were asked to participate in Session 2. Upon agreement, a second session was scheduled for university students at their earliest convenience. Participants from the LPH were given a 15-minute break, after which the second session began. Immediate testing was conducted for these participants for the purpose of convenience.

### Session 2 - Experimentation

#### Participants

Fifty-five university students and six participants from the Outpatient sample met the BDI-2 cut-off scores and partook in the second session. University Students were given a bonus mark on their final grade in their introductory psychology class for participation in the second session. Following the completion of testing, individuals who did not meet criteria were removed from data analysis and the remaining participant data were examined for outliers (to be described in the following section). The final sample consisted of forty-five university students (35 females and 8 males) and one LPH participant (1 female). The mean age of the sample was 20.30 years. Ethnic and racial information was not collected.

#### Measures

Participants began the second session by completing the Balanced Inventory of Social Desirability Responding – Version 6 Form 40 (BIDR; Paulhus, 1984, 1988), followed by the BDI-2 (Beck et al., 1996), and a computerized version of the PAI (Morey, 1996) programmed by the authors. Total time of testing was approximately 50 minutes.

The BIDR is a 40-item inventory designed to assess self-deceptive positivity and impression management. Self-deceptive positivity is the tendency to give self-reports that are honest but positively based, while impression management is the deliberate self-

presentation to an audience that differs from true self-presentation. Coefficients alpha ranged from .68 to .80 for self-deceptive positivity and from .75 to .86 for impression management (Paulhus, 1984, 1988). In addition, test-retest reliability over a 5-week period was reported as .69 for self-deceptive positivity and .65 for impression management (Paulhus, 1984, 1988). The BIDR data were not included in present analyses.

### Procedure

The second session began with the administration of the BIDR. It was administered before PAI responding instructions were given. The BIDR was administered to collect information for future research. Following the BIDR, participants were once again asked to complete the BDI-2 to ensure that levels of depressive symptoms had not deviated from group membership requirements. The second BDI-2 was scored following the completion of the session. As such, the computerized PAI was administered regardless of the BDI-2 score at the time of testing.

The PAI was presented on an IBM compatible computer using a 15-inch colour monitor. Test questions were programmed with GWBasic and displayed using the Windows95 operating system (see Appendix C for the command lines of the computer program). Ten additional questions were added to the PAI to accustom participants to the test format. The program displayed questions one at a time to which participants responded by typing keys 1 (False), 2 (Slightly True), 3 (Mainly True), or 4 (Very True). The participants' responses to each question were recorded and the computer program measured the response time from moment of test item presentation to the moment of key press (RT1). Immediately after answering each question, participants were asked to confirm their answer by entering *y* (yes) or *n* (no). A second response time, defined as the time from moment of

initial presentation until the moment of confirmation, was also recorded (RT2). Should the participant disagree with his/her choice (by choosing *n* at point of confirmation), the response latency time recorded for RT1 was reset and measured from the instant of disagreement until the new answer was keyed.

Non-depressed participants were randomly assigned to either the control or the malingering condition. Individuals participating in the control and depressed conditions were asked to complete the PAI as honestly as possible. Participants in the malingering condition were asked to attempt to deceive the test by responding as if they were depressed. Immediately before testing, individuals in the malingering condition were provided with written instructions for completing the PAI (Appendix D). These instructions were read aloud by the experimenter and the participants were given the opportunity to ask questions. The instructions given to these participants were intended to assist them to effectively malingering. A portion of these instructions involved telling participants that the questionnaire is designed to detect lying; thus they were also given the additional task to avoid detection as a person who is faking depression. They were then told that a \$25 prize would be awarded to the person who avoids detection as a faker and presents with the highest level of depression. This method for determining effective malingering was adopted from the format employed by Rogers et al. (1993, 1996). Specifically, effective malingering was determined by (a) a T-score on the Negative Impression Management scale of  $T < 70$  and (b) the highest elevation on the depression scale. Participants within the depressed condition and the control condition were each eligible for a random draw of \$25. Following the PAI administration, individuals were verbally debriefed on the purpose of Session 2, given a debriefing form (Appendix E), and provided with the opportunity to ask questions.



As previously mentioned, the total number of Session 2 participants was 61 (55 university students and six outpatients from the LPH). Before data analysis began, groups were examined to ensure that they met previously stated criteria. Five participants were removed from subsequent analyses due to BDI scores that were either too high or too low; one participant was removed due to age differences; and nine participants were removed due to their endorsements of comorbid axis I disorders during the SCID interview. The resulting final sample included 15 participants in the control condition, 19 participants in the malingering condition, and 12 participants in the depressed condition. There were no differences between groups on sex [ $\chi^2(2) = .11$ , n.s.], age [ $F(2, 43) = 1.81$ , n.s.], and Shipley scores [ $F(2, 43) = .665$ , n.s.]. There were significant group differences in BDI-2 scores at time of PAI administration [ $F(2, 43) = 210.68$ ,  $p < .001$ ]. Tukey post-hoc analyses of the BDI-2 scores revealed that the control and malingering groups differed significantly from the depressed group. The BIDR results were not examined for the present study.

#### Treatment of Response Times

As previously noted, a response latency has many components. These components can be roughly separated into individual characteristics (i.e., reading speed, intelligence, encoding, comprehension, decision, motor speed) and item characteristics (length, vocabulary, complexity, ambiguity, number of choices). Authors (e.g., Fekken & Holden, 1992; Neubauer & Malle, 1997; Robie et al., 2000) agree on the importance of minimizing, as much as possible, the variance in response latencies due to individual attributes and item attributes, without removing variance due to the schema driven decision process. This decision process is the crux of all research in response latencies because researchers

conjecture that particular decisions regarding item content (e.g., simple decisions or difficult decisions) will be evidenced as differences in response latencies.

The method used to remove variance attributable to individual and item characteristics has not yet been agreed upon and varies from author to author (e.g., Fekken & Holden, 1992; Neubauer & Malle, 1997; Robie et al., 2000). Most authors cite the works of Fekken and Holden (1992) and their double-standardization procedure. The procedure by Fekken and Holden begins with a  $z$ -score transformation, the first standardization in the double-standardization procedure, for each individual on his/her set of raw response latencies. In this way their response latencies are transformed into a deviation of the individual's mean responding time; this deviation from mean responding may be attributable to item characteristics and the decision process. In effect, the first standardization removes the error variance attributable to individual characteristics that remain stable across items. The double-standardization procedure then continues with the  $z$ -scores obtained from the first transformation and standardizes those scores across items. In this way, the variance due to item attributes are controlled, and it is hypothesized that the remaining differences in scores following the double-transformation represent differences in the schema driven decision process. Other authors have disputed Fekken and Holden's rationale (Neubauer & Malle, 1997; Robie et al., 2000).

Neubauer and Malle (1997) stated that they agree with the removal of variance due to item characteristics but they disagree with the removal of variance due to individual characteristics. They believe that while individual "...variance might reflect individual differences in reading speed, it may also contain individual differences in self-knowledge, which are crucial" (p. 111). Neubauer and Malle (1997) favored the logarithmic

transformation of response times, followed by mean deviating the transformed latencies for each item. That is, they calculated a mean for each item and from that score they subtracted the individual's item log latency. However, it seems that the argument put forth by Neubauer and Malle (1997) is flawed. First, it is unlikely that individual differences in self-knowledge are removed from with the single standardization process. In fact, individual differences in self-knowledge will likely be amplified by removing the variance attributable other individual characteristics, such as reading speed. This is due to the very nature of self-knowledge; it is more salient for some items and less distinct with other items. The process of standardization removes the *same proportion* of variance attributable to individual differences for each item, and therefore, standardization cannot remove the effects of self-knowledge, which as argued by Neubauer and Malle (1997), is *different* for each item. Neubauer and Malle (1997) also stated that they have "statistical reservations about Holden et al.'s 'double-standardization' procedure" (p. 111), because the removal of individual differences creates artificial negative correlations among subscales latencies if the mean raw subscale latencies differ from each other (i.e., slow response latencies become positive  $z$ -scores, quick response latencies become negative  $z$ -scores). It is incomprehensible how these correlations could be artificial if the two scales have different mean latencies. The fact the correlation is negative instead of positive makes little difference. Finally, Neubauer and Malle (1997) performed their analyses on both the raw and transformed response latencies and found no differences in significant findings between the two methods. This implies that their chosen method for response latency transformation was unnecessary.

Robie et al. (2000) also argue against the double-standardization method but adopt a different position from Neubauer and Malle (1997). Robie et al. (2000) argue that there is

no strong empirical evidence that the double-standardization method removes variance due to individual and item characteristics. Robie et al. (2000) also state that the findings from the double standardization method are not easily put into practice because the mean and standard deviations from separate groups are used in some of the calculations to determine the adjusted latencies in the faking group (i.e., the second standardization across items). The method chosen by Robie et al. (2000) regressed response latencies on a measure of item complexity for each individual. Then they used the standardized residuals for each item for each individual in an individual level regression analyses to obtain what they believed are estimates of response latencies that explicitly control for sentence complexity and reading speed. The tool used to measure item complexity was the Flesch-Kincaid grade index. These authors also estimated item complexity with other measure and found that all measures were intercorrelated at .95 (Robie et al., 2000). While it is true that the double standardization procedure relinquishes applicability, the procedure used by Robie et al. (2000) introduces error through the measurement of item complexity, followed by individual regressions on that imperfect measure. Although these authors performed an adequate job at identifying the item grade level, in the absence of any control for individual differences in vocabulary level they assume that all items of certain grade levels affect all individuals equally. It may be that some very intelligent individuals are not affected by item complexity while some less intelligent individuals may be greatly affected by item complexity.

The first part of Holden et al.'s (1991) double-standardization procedure, that is single standardization, appears to be the most appropriate for this study. Comparisons will be made across groups and not at the item level; therefore, there is no need for the second

standardization of response latencies. Any effects attributable to item characteristics are controlled because all groups receive the same items in the same order of presentation. Also, there may be a problem with the second standardization in that it assumes that the attributes of the item will affect all groups equally. Instead, it may be that item attributes, such as low complexity, are maximally able to distinguish depressed individuals from individuals attempting to feign depression; an individual experiencing depression may take more time with a simple item because it has greater meaning for him or her. In addition, response times standardized within subjects are easily understood and the  $z$ -scores can be readily transformed back into seconds. In comparison to scores that are standardized, double standardized scores are more difficult to interpret and understand in seconds. This study will use the procedure set forth by Fekken and Holden (1992) but only the single standardization will be applied.

Response times were initially examined for outliers. Following the procedure of previous researchers (Fekken and Holden, 1992, 1994; Holden 1995), all RT1s and RT2s were analyzed for times less than 0.5 seconds and greater than 40 seconds and changed to 0.5 and 40 seconds, respectively (5 RTs, .002% of the data, were greater than 40s). Next, RT1 and RT2 were standardized within individuals to remove idiosyncratic differences in speed of responding. All  $z$ -scores less than  $-3$  or greater than  $+3$  were set to these respective values. The modification of  $z$ -scores was preferable to the removal of potentially meaningful data, especially with the proposed hypothesis that longer latencies will be recorded for items that are more meaningful to an individual. Following the example of previous research (Fekken & Holden, 1992, 1994), only  $z$ -scores for RT1 (initial responding) were used. The initial response times are postulated to represent a more

impulsive or less thought out answer to item presentation. For the following sets of statistical procedures, raw response times were examined to verify the effectiveness of the standardization procedure.

## Results

Any interpretation of results regarding response latencies requires direct comparisons with scale score findings. In addition, the effectiveness of response latencies in identifying malingerers can only be determined in comparison with the proven efficacy of the PAI scale scores. Each statistical step, therefore, begins by examining groups for significant differences in scale score responses.

### Descriptive Statistics

Descriptive scale score statistics for the NIM, PIM, DEP, and DEP subscales are presented in Table 1. Mean raw response time totals for RT1 were as follows: Control 1342.9 s (SD = 299.0 s); Malingering 1405.8 s (SD = 253.6 s); and Depressed 1565.1 s (SD = 377.1 s). Raw response time totals for RT2 were: Control 1584.7 s (SD = 330.9 s); Malingering 1612.2 s (SD = 284.7 s); and Depressed 1805.7 s (SD = 470.4 s). Descriptive statistics for the mean response time to items in the NIM, PIM, and DEP scales are presented in Table 2.

For all analyses, z-scores for each item were added across the scales of interest due to their nature, namely that the sum of an individual's z-scores is 0. In actuality the sum of the z-scores was slightly negative, a mean of -.02 per item, due to the adjustment of z-scores greater than +3. The means for z-scores across groups were: NIM -0.47 (SD 2.79), PIM -0.40 (SD 2.82), DEP -3.90 (SD 4.30), DEP-Affective -0.84 (SD 2.25), DEP-Cognitive -2.16

(SD 2.38), DEP-Physiological -0.91 (SD 2.73). Descriptive statistics for z-score group means are presented in Table 3.

### Findings

A one-way analysis of variance was used to examine differences between groups for total raw response times and total z-scores (i.e., for all 344 items). Contrary to expectations, no significant differences were found between groups for overall raw response times [RT1 F (2, 43) = 1.86, n.s.; RT2 F (2, 43) = 1.51, n.s.], and according to expectation, no significant differences were found between groups for total z-scores [F (2, 43) = .36, n.s.].

Scale scores were examined for differences using a multivariate analysis of variance (MANOVA), and found significant effect of group, Wilks' Lambda F (10, 78) = 16.08,  $p < .001$ . Univariate significant differences between groups were as follows: NIM [F (2, 43) = 18.97,  $p < .001$ ], PIM [F (2, 43) = 9.23,  $p < .001$ ], DEP [F (2, 43) = 64.80,  $p < .001$ ], DEP-Affective [F (2, 43) = 80.16,  $p < .001$ ], DEP-Cognitive [F (2, 43) = 53.75,  $p < .001$ ], and DEP-Physiological [F (2, 43) = 25.22,  $p < .001$ ]. Tukey post-hoc tests of significant differences between groups are presented in Table 4. Examination of these post-hoc results revealed significant differences between almost all possible comparisons, indicating that all groups significantly differed from each other in the level of item endorsement.

A MANOVA was then performed to examine group differences on raw response times (both RT1 and RT2). Multivariate tests found a significant effect of group, Wilk's Lambda F (10, 78) = 3.09,  $p = .002$ . There were significant univariate differences for NIM RT1 [F (2, 43) = 3.714,  $p = .016$ ], and the DEP-Cognitive RT1 [F (2, 43) = 5.627,  $p = .01$ ]. Tukey post-hoc analyses with NIM RT1 times indicated significant differences between the Control and Malingering group ( $p = .024$ ) and between the Control and Depressed group ( $p$

= .047). Differences for the DEP-Cognitive subscale were between the Depressed and Control groups ( $p = .015$ ) and between the Depressed and Malingering group ( $p = .022$ ). This finding indicates that the malingerers responded to the NIM questions in the same average time (4.24 s) as depressed individuals, whereas they failed to respond to DEP-Cognitive items in a similar manner as the depressed individuals.

A MANOVA was used to examine group differences for  $z$ -scores. Multivariate tests indicated a significant effect of group, Wilks' Lambda  $F(10, 78) = 3.36, p = .001$ . Univariate results were as follows: NIM [ $F(2, 43) = 8.14, p = .001$ ], PIM [ $F(2, 43) = 5.04, p = .011$ ], DEP [ $F(2, 43) = 2.27, n.s.$ ], DEP-Affective [ $F(2, 43) = 3.00, n.s.$ ], DEP-Cognitive [ $F(2, 43) = 4.09, p = 0.24$ ], and DEP-Physiological [ $F(2, 43) = .651, n.s.$ ]. The Tukey post-hoc results are listed in Table 5. The larger  $F$  Ratios obtained using  $z$ -scores, in comparison to the raw scores, indicate that the  $z$ -scores were more effective in distinguishing differences between groups. Likewise, the larger  $F$  ratios obtained using scale scores also indicate the superiority of scale scores in distinguishing group differences.

Next, we wished to determine if response times are able to add incremental validity for detecting individuals experiencing depression and individuals malingering depression. Discriminant function analyses were conducted. Discriminant functions were performed for scale scores, raw response times, transformed response times, a combination of scale scores and raw response times, and a combination of scale scores and transformed response times. Only those variables found to have significant univariate  $F$  ratios from the MANOVA analyses (i.e., only variables that were significantly different between groups) were entered into the discriminant function.



A direct discriminant function analysis was performed to determine how well scale scores (NIM, PIM, DEP-Affective, DEP-Cognitive, DEP-Physiological) could correctly classify individuals. The three groups were significantly distinguishable  $\chi^2(10, N = 46) = 91.73, p < .001$ . After removal of the largest discriminant function the remaining function was also significant,  $\chi^2(4, N = 46) = 17.69, p = .001$ . The two functions accounted for 90.4% and 9.6%, respectively, of the between group variability. The correct classification rate for the three groups through chance alone is 34.5%. The correct classification rate for the three groups using scores to discriminate was 87.0%. Table 6 presents the specific classification results using scale scores.

A direct discriminant function analysis was performed to determine how well raw response times (NIM-raw, DEP-Cognitive-raw) could correctly classify individuals. The three groups were significantly distinguishable  $\chi^2(4, N = 46) = 18.35, p = .001$ . After the removal of the first discriminant function, the remaining function was also significant  $\chi^2(1, N = 46) = 8.04, p = .005$ . The two function accounted for 56.9% and 43.1%, respectively, of the between group variability. The correct classification rate using response times was 69.6%. Table 7 presents the specific classification rates.

Next, the effective classification rates for z-scores (NIM, PIM, DEP-Cognitive) were examined with a direct discriminant function analysis. The three groups were again distinguishable [ $\chi^2(6, N = 46) = 24.18, p < .001$ ]. After the removal of the first function, the remaining function was also significant [ $\chi^2(2, N = 46) = 7.02, p < .05$ ]. The two function accounted for 73.5% and 26.5%, respectively, of the between group variability.

Table 8 presents the specific classification results using  $z$ -scores to discriminate between the three groups. The correct classification rate for the  $z$ -scores was 73.9%.

As reported the raw response times and transformed response times were fair indicators of group membership but not nearly as effective as the scale scores. To determine if the response times (raw and transformed) added incremental ability to classify participants, we entered the scale scores and the raw response times, followed by the scale scores and the transformed response times into a direct discriminant function analyses. A direct discriminant function analysis was performed on the scale scores (NIM, PIM, DEP-Affective, DEP-Cognitive, DEP-Physiological) and the raw response times (NIM-raw, DEP-Cognitive-raw). The three groups were significantly distinguishable  $\chi^2(14, N = 46) = 92.56, p < .001$ . After removal of the largest discriminant function the remaining function was also significant,  $\chi^2(6, N = 46) = 18.88, p = .004$ . The two functions accounted for 89.8% and 10.2%, respectively, of the between group variability. The correct classification rate for the three groups using scores to discriminate was 87.0%. Therefore, the addition of raw response times did not increase the ability to differentiate between groups.

A direct discriminant function analysis was performed on the scale scores (NIM, PIM, DEP-Affective, DEP-Cognitive, DEP-Physiological) and the raw response times (NIM-raw, DEP-Cognitive-raw). The three groups were significantly distinguishable,  $\chi^2(16, N = 46) = 93.82, p < .001$ . After removal of the largest discriminant function the remaining function was also significant,  $\chi^2(7, N = 46) = 21.61, p < .003$ . The two functions accounted for 87.8% and 12.2%, respectively, of the between group variability. The correct classification rate for the three groups using scores to discriminate was 89.1%. While the

increase in classification is only 2.1%, an examination of the classification rates presented Table 5 and Table 8 indicates the differences as being the ability to properly identify malingerers, an increase from 73.5% to 78.5%.

In clinical practice, the first attempt to detect malingerers examines the respondent's NIM scale score (Morey, 1996). We therefore examined the NIM scale and the NIM transformed response times, separately and in combination, for their ability to properly classify the three groups. A direct discriminant function analysis was performed, the NIM scale was able to significantly distinguish groups [ $\chi^2(2, N = 31) = 27.20, p < .001$ ]. The correct classification rate using the NIM scale scores for the three groups was 56.5% (see Table 10 for specific classification rates). A direct discriminant function analysis for the raw response times did not produce a significant function,  $\chi^2(2, N = 46) = 8.22, p = .016$ . The correct classification rate using the NIM z-scores for the three groups was 58.7%. The NIM transformed response latencies were also able to significantly distinguish groups [ $\chi^2(2, N = 31) = 13.81, p = .001$ ]. The correct classification rate using the NIM z-scores for the three groups was 63.0% (see Table 11 for specific classification rates).

A direct discriminant function analysis was performed to examine the correct classification rates for use of the NIM scale scores and NIM raw response times; the groups were significantly distinguishable [ $\chi^2(4, N = 46) = 33.29, p < .001$ ]. After removal of the first function, a second function was also significant [ $\chi^2(2, N = 46) = 4.57, p = .033$ ]. The two functions accounted for 89.5% and 10.5%, respectively, of the between group variability. The correct classification rate using the NIM scale scores and the NIM raw response times was 65.2% (see Table 12 for specific classification rates). Using the

combination of NIM scale scores and NIM  $z$ -scores, the groups were significantly distinguishable [ $\chi^2(4, N = 46) = 30.04, p < .001$ ]. The correct classification rate using the NIM scale scores and the NIM  $z$ -scores was 65.2% (see Table 13 for specific classification rates). Although the NIM raw response times and NIM  $z$ -scores appeared to perform equally when paired with the scale scores, inspection of differences in Tables 12 and 13 indicate that the NIM  $z$ -scores were more important for classifying malingerers properly. It would seem, therefore, that the NIM  $z$ -scores could be used to add incremental validity to the NIM scale score for detecting the malingering of depression.

Finally, we wished to identify those items that could maximally classify individuals as belonging to either the malingering or depressed groups. All  $z$ -scores recorded from the items in the NIM, PIM, and DEP scales were entered into an independent  $t$ -test. The  $t$ -test identified 9 items as being significantly different. These items, their respective scales, the mean differences between groups, and  $t$ -test values are presented in Table 14. Using the 9 significant  $z$ -scores from the  $t$ -test, a discriminant function analysis was performed to determine how well these  $z$ -scores could classify individuals as being in either the malingering condition or the depressed group. The correct classification rate by chance is 52.55%; the correct classification rate using the 9  $z$ -scores was 96.8% (specific classification rates are presented in Table 15). One depressed person was misclassified as being a malingerer.

### Discussion

This study intended to further previous research on response times and identify differences between individuals not currently experiencing psychological difficulties, individuals experiencing depression, and individuals malingering depression. Generally,

results indicated that malingerers have a different response style than honest individuals and malingerers also have different rates of information processing. That is, individuals malingering depression have a distinct set of response latencies. Using this pattern of response latencies, without the use of scale scores, it is possible to distinguish between individuals experiencing depression, individuals malingering depression, and individuals who are not experiencing any DSM-IV Axis I disorders.

The current study was the first of its kind to use the PAI and investigate whether response times could aid in the detection of individuals who were malingering depression. It is also the first study to examine the response times of malingerers against a sample clinical population of the disorder being malingered. While previous research has indicated differences between malingerers and honest responders, without comparisons to a group of individuals genuinely experiencing the malingered disorder, practical conclusions cannot be drawn. Finally, this study is the first to ensure that controls and malingerers were free of any psychological disorder.

Holden et al. (1991) proposed that respondents who adopt a schema (i.e., malingerers) will respond more quickly to items congruent with their adopted schema. In this study, the DEP scale items are congruent with the adopted schema of malingerers. Overall, malingerers did perform more quickly but this difference was only significant for the Depression – Cognitive subscale and only in comparison to depressed individuals. As reported, raw response latencies were inferior at providing significant between-group differences. An example of the effectiveness of transformed response latencies was the difference between depressed individuals and malingerers for the Depression – Cognitive scale. For raw response latencies, the groups had statistically equivalent mean responding

time for each (depressed group = 4.39 s / item; malingering group = 3.75 s / item). But for the same scale, for transformed response latencies, the two groups were significantly different with depressed individuals having a  $z$ -score mean of  $-.58$ , while malingers had a  $z$ -score mean of  $-2.81$ . This example also illustrates the difference in meaning between response times and response latencies. While malingering and depressed individuals answered the Depression – Cognitive questions with approximately equivalent response times, malingering individuals answered these questions much faster than their mean responding times and depressed individuals answered these questions only slightly faster than their mean responding time.

Kuiper and MacDonald (1982) found that depressed individuals pay more attention to negative self-relevant information. It was therefore hypothesised that depressed individuals would have longer response latencies to self-relevant information (i.e., questions probing levels of depression). This hypothesis was supported with the Depression – Cognitive subscale between depressed individuals and malingers. Interestingly, relative to their respective mean response latencies, malingers were significantly slower than both the depressed and the control groups at answering questions to the NIM items. Evidently malingers had to take extra time to respond to NIM questions, relative to their mean response latencies, and ask themselves if these questions were applicable to their adopted response style. Malingers are actively attempting to present themselves in a negative light, therefore NIM questions are negatively self-relevant to malingers. Malingering individuals also took significantly less time than controls to respond to PIM items. Individuals in the control group had to think about the positive impression questions, whereas the malingers presented themselves in an abnormally low light and so they were

not concerned with presenting themselves in a positive light. These findings support the work of Kuiper and MacDonald (1982) that individuals pay more attention to self-relevant information, thereby generating longer response latencies. From examining the trends in Table 3, further research with a larger sample may further support this hypothesis. Specifically, a larger sample size may produce significant differences between all groups for the NIM, PIM scales and differentiate depressed individuals from the other two groups for the Affective and Cognitive subscales of the Depression scale.

Holden et al. (1991) indicated that schema organization and item extremity affect the self-referent decision process. Because of this theory, we had hypothesized that larger group differences would be evident with the Depression – Cognitive subscale due to its obvious content (i.e., item extremity). Our hypothesis was supported in that significant differences in response latencies were contingent upon the scale and questions being analysed. An example between the malingering and depressed groups where response latencies were significantly different was Depression – Affective item 286, which states “I’m almost always a happy and positive person.” While this question was endorsed similarly by both malingering and depressed individuals, malingerers answered significantly more quickly to the question with a mean  $z$ -score of .96 less than the than the depressed individuals. That is, in comparison to normal responding rates for each group, malingerers answered the question almost 1 SD faster than did depressed individuals. A specific instance where differences did not occur in response latencies between malingering and depressed individuals was NIM item 89, which states “Since the day I was born, I was destined to be unhappy.” Both malingerers and depressed individuals answered with the same relative response latencies, whereas the malingering group had an average

endorsement of MAINLY TRUE and all depressed individuals answered FALSE, NOT AT ALL TRUE. This would indicate that this question was attended to by both groups equally, perhaps because the answer to the question is not obvious to both groups. Support for the subtle item conclusion is that the question contains negative self-relevant information for both groups as well as the question being only partially endorsed (MAINLY TRUE) instead of fully endorsed (VERY TRUE). These results concur with the findings that depressives pay more attention to negative self-relevant information (Kuiper & MacDonald, 1982) and may further this theory in adding that *all* individuals produce longer response times to self-relevant information. Item extremity may refine when differences in response latencies occur due to negative self-relevant information. We will return to this issue of obvious versus subtle items in the discussion on the classification rates using a measure constructed from the most discriminating items.

To maximally differentiate group response styles, correct classification rates were investigated between groups for scale scores, raw response latencies, and standardized response latencies. The results of this study demonstrated that different groups of respondents to the PAI (i.e., depressed, malingerers, controls) could be adequately discriminated via an analysis of response times. Also, the evaluation of PAI scale scores indicated large differences between all groups, thereby producing elevated correct classification rates. We compared the ability of the response latencies to the scale scores in correct classification rates. It was found that while scale scores were superior at classifying individuals, transformed response latencies could provide additional non-overlapping information useful in the identification of malingerers. That is, the addition of transformed response latencies increased the detection of malingerers by 5% (a total of 78.5%).



Although, this difference was not of sufficient magnitude to achieve statistical significance, further research may strengthen current trends within the data that indicate the ability of response latencies to distinguish real and malingered psychopathology.

Analyses were then conducted at the item level to discover the transformed response latencies that were maximally able to discriminate between malingerers and depressed individuals. A specific set of transformed response latencies was able to correctly classify 96.8% of malingerers and depressed individuals. The items presented in Table 14 that produced negative  $t$ -scores (items that were answered relatively more quickly by malingerers) were as follows: 46. "I've forgotten what it's like to be happy."; 286. "I'm almost always a happy and positive person."; 187. "No matter what I do, nothing works."; 275 "I often wake up in the middle of the night."; 144. "Sometimes I'm too impatient."; 264. "I sometimes make promises I can't keep." These items were responded relatively more slowly by depressed individuals, but were responded relatively more quickly by individuals malingering depression. Conversely, items to which malingerers had to ponder before responding (relative to their other latencies) but to which depressed individuals answered relatively more quickly were: 315. "I have little interest in sex."; 9. "Sometimes I cannot remember who I am."; 49. "Sometimes I have visions in which I see myself forced to commit crimes." Although item extremity and the self-relevant information hypothesis (Kuiper & MacDonald, 1982) are used to explain these findings, two of these significant differences were expected by chance alone, and so more research is necessary to elucidate these results.

### Limitations

It should be noted that Holden and Kroner (1992) response latencies could be differentiated on the basis of acceptance or rejection. These authors employed measures with True or False responses, and had an equal number of false-keyed questions. The application of their approach is problematic due to an unequal number of negative keyed items (15 of 42 items examined were false keyed) and to a different response format (four-point Likert-type scale). In addition, false-keyed items are not evenly distributed throughout the questionnaire. This potentially confounds the previously reported effect of response latency differences due to the acceptance or rejection of items (Holden & Kroner, 1992) because there may be variances in response latencies attributable to item presentation at the beginning versus presentation at the end of the questionnaire. For these reasons, we elected to not examine transformed response latencies for these effects.

A limitation of this study is inherent in the number of subjects in the depressed condition. Prior to analyses for outlier data there were 23 individuals in the depressed condition, with that number reducing to 12. Table 3 exhibits many trends that may be significantly different with more data. To further this point, although Tukey post-hoc analyses were reported, LSD post-hoc analyses were also performed on the transformed response latencies. Using LSD post-hoc analyses, additional significant differences were detected between depressed individuals and malingerers in NIM scale scores, control and depressed individuals in the Depression – Affective subscale, and between control and depressed individuals in the Depression – Cognitive subscale. The additional differences obtained using LSD post-hoc analyses conform to the hypothesis of self-relevant information processing and response time latencies. With a larger depressed sample it is

likely that the noted LSD findings would also be significant using the Tukey post-hoc analyses.

Another limiting factor was the rigid nature of the comparisons used for the direct discriminant function analyses. This study examined the role of the Depression subscales for classifying individuals. Individuals who endorse items to produce a high Depression scale score are not usually classified as malingerers, instead these individuals are considered to be depressed. In those instances where the Depression scale is used to detect malingerers it is used as a component in a larger subset. For example, one of the eight configural features of the Malingering Index (Morey, 1993) is calculated in part by using a high Depression scale score (Malingering Index item 7.  $DEP \geq 85T$  and Treatment Rejection  $\geq 45T$ ). Also, Rogers et al. (1996) use the Depression – Cognitive subscale T-score as 1 of 20 scores that are inputted into the Rogers Discriminant Function to identify malingerers. In this study, by comparing response latencies to scale scores, we chose to examine groups for differences using the most rigid of criteria. Even with these strict criteria, high classification rates were witnessed by examining transformed response latencies. The possible future role for response latencies may be the creation of a scale at the item level that maximally differentiates groups.

#### Future Directions

Much of the success of this study can perhaps be attributed to the use of the PAI (Morey, 1991). It has at least three qualities that make it very useful in examining the effectiveness of malingering. First, the PAI has a Flesch-Kincaid Grade Level of 4, making it robust to individual differences in vocabulary; there was no correlation between the Shipley - vocabulary subtest raw scores and the raw response latency totals. Second, it is a

broad and lengthy instrument with 344 items, so that even if malingerers were aware of the measurement of response latencies, the breadth and length of the PAI would likely wear down the vigilance of malingerers. Finally, a PAI scale is assessed with an item every 40 questions (e.g., the DEP – cognitive items are 27, 67, 107, 147, 187, 227, 267, 307), ensuring that if the responding style is altered due to factors such as fatigue or boredom, the change in responding style will affect all scale response latencies equally. For these reasons, the PAI is an ideal measure for examining the effects of malingering and psychopathology response latencies.

The implications of these findings also lend themselves to the assessment of other scales on the PAI. Although data were collected for all PAI items, this study only analyzed response latencies for 3 of the 22 scales (42 of the 344 items). It may be possible to further identify genuine psychopathology or malingering using some of the other scales. For example, through the analyses of response latencies on the Suicidal Ideation scale it may be possible to accurately identify those individuals who are contemplating death, whereas the obvious item content may make it ideal for identifying malingerers. Also, response latencies may be more valuable when attempting to identify coached malingerers. Coached individuals are acutely aware of the construct being malingered. Consequently, for the scale being malingered, item content is more obvious and their transformed response latencies may be that much quicker.

The use of response latencies is a promising technique in the detection of genuine psychopathology and malingering. As previously reported by Rogers et al. (1996), there is a need for a more efficient and reliable method of identifying individuals as honest or malingering respondents. The importance of which is undeniable in the light of the current

re-structuring in our health care system, necessitating an even stronger focus on efficacy and efficiency.

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Appendix A

**Procedure for the recruitment of subjects at the LPH for the study “Detecting Depression and Malingering Using Response Times on the Personality Assessment Inventory.”**

1. They have no Axis I diagnosis other than depression.
2. If no Axis I diagnosis exists then any referral for counselling or possible depression or recurrent depression.

Following the identification of potential participants, the nurse will contact these individuals and state the following:

“Hello, my name is <name> and I’m calling from the Lakehead Psychiatric Hospital. A research project is being conducted and we were wondering if it would be okay to give your name and telephone number to the researcher so that he could call you and give you more information about the study. You are in no way obligated to participate. This call is only to ask you if you want to hear more information about the study.”

Information that can be given

1. Completely confidential – no one at the hospital or outside the hospital will be informed of your responses or that you participated, you will be assigned a number.
2. Duration – 30 minutes up to 2 hours depending on the responses given
3. Free coffees and a 15 minute break is available.
4. If necessary bus passes will be provided free of charge.
5. There is a random draw for a \$25 cash prize.

The only information to be given about the purpose of the study - it is examining the effect of mood states, specifically sadness, upon computerized personality assessment.

Name	Telephone Number

Researchers – Derick Cyr, M.A. Candidate, Clinical Psychology  
 Dwight Mazmanian, PhD., C.Psych, Associate Professor of Psychology, L.U.

## Appendix B

Emotion and Information Processing  
Debriefing Form: Session 1

The purpose of the present study was to determine whether students who experience different emotional states will demonstrate biased information processing that are congruent with their emotions.

The session in which you have just participated was designed to identify students who are experiencing emotional states of interest to the present research.

Thank you for participating in Session 1. You will be contacted should you be selected for Session 2 of this study. If you have any questions about the study, please contact Derick Cyr (623-4506) or Dr. Mazmanian (343-8257), Department of Psychology, Lakehead University, Thunder Bay, ON, P7B 5E1. If you would like a brief summary of the results you may obtain them by printing your name and permanent mailing address of the self-adhesive address label. Results will no likely be available before August, 2000.

If participating in this study or completing the questionnaires has distressed you or has raised personal issues that you would like to discuss, or if you just need someone to talk to, the following organizations are available: L.U. Health Center (343-8361), Peer Support Line (343-8255), Chaplain (343-8018), and Counseling and Career Centre (343-8018).

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Appendix C

```

10 REM *****
20 REM *****
30 REM *****
40 REM *****
50 REM *      <<PAI PROGRAM - DERICK CYR'S MA>> *
60 REM *****
70 REM *****
80 REM *****
90 REM *****
100 REM
110 CLS
120 PRINT:PRINT "          Thank you for participating in this study.":PRI
NT:PRINT:PRINT
130 PRINT" If you have any questions or concerns please feel free to contact ei
ther":PRINT "          Dr. Mazmanian or Derick Cyr."
140 PRINT:PRINT:PRINT "          All information is strictly confidential
"
150 WA=TIMER.
160 W1=INT(WA):W2=W1+10
170 W3=INT(TIMER)
180 IF W3-W2 THEN GOTO 200 ELSE GOTO 170
190 REM
200 REM *****
210 REM *      DIM for RT (response time)and ANS (actual answer) *
220 REM *****
230 REM
240 REM RT = ARRAY FOR RESPONSE TIMES
250 REM ANS = ARRAY FOR ACTUAL RESPONSES
260 DIM RT(354)
270 DIM RT2(354)
280 DIM SUMRT1(344)
290 DIM SUMRT2(344)
300 DIM SDFRT1(344)
310 DIM SDFRT2(344)
320 DIM ANS(354)
330 DIM MRT1(344)
340 DIM MRT2(344)
350 DIM Z1(344)
360 DIM Z2(344)
370 REM
380 REM *****
390 REM *      LOOP for setting Array to Zero *
400 REM *****
410 REM
420   FOR I = 1 TO 354
430     RT(I) = 0
440     RT2(I) = 0
450     ANS(I) = 0
460     CODER = 0
470   NEXT I
480 REM
490 REM *****
500 REM *      Asking for Demographic information *
510 REM *****
520 REM

```

```

530 REM
540 OPEN "A", #1, "C:\Derick\pai.DAT"
550 REM
560 REM
570 REM cls:PRINT:PRINT:PRINT "Enter your name":PRINT:INPUT NAMS$
580 CLS:PRINT:PRINT:INPUT "Enter your age ", AGE
590 CLS:PRINT:PRINT:INPUT "Enter your sex ", SEX$
600 CLS:PRINT:PRINT:PRINT "What is your marital status?"
610 PRINT "(Single, Married, Divorced, Widowed, Other)":PRINT:INPUT MARRYS$
620 CLS:PRINT:PRINT:PRINT "Enter the number of years of formal education that yo
u have completed"
630 PRINT "(for example, a high school graduate would enter 12)"
640 PRINT:INPUT ED
650 CLS:PRINT:PRINT:INPUT "Enter your occupation ", JOBS$
660 REM
670 REM
680 ZER = 0
690 WRITE #1, ZER
700 PRINT #1, DATES$, " ", ";TIMES$, " ";AGE; " ", ";SEX$, " ", ";MARRYS$, " ";ED; " ", ";J
OBS$
710 REM
720 REM
730 REM *****
740 REM * Instructions to Respondent *
750 REM *****
760 REM
770 REM
780 CLS:PRINT:PRINT:PRINT "Read each statement and decide whether it is an accur
ate statement about you."
790 PRINT
800 PRINT:PRINT "If the statement is FALSE, NOT AT ALL TRUE, enter the number 1.
"
810 PRINT:PRINT "If the statement is SLIGHTLY TRUE, enter the number 2."
820 PRINT:PRINT "If the statement is MAINLY TRUE, enter the number 3."
830 PRINT:PRINT "If the statement is VERY TRUE, enter the number 4."
840 PRINT
850 PRINT:PRINT "Give your OWN OPINION of yourself. Be sure to answer every sta
tement."
860 INPUT "Press 'enter' to continue", CONTIS$
870 REM
880 REM
890 REM *****
900 REM * LOOP for PAI item presentation and recording of times *
910 REM *****
920 REM
930 REM
940 FOR I = 1 TO 354
950 CLS:PRINT
960 PRINT "1=False 2=Slightly True 3=Mainly True
4=Very True"
970 PRINT:PRINT:PRINT
980 READ ITEMS$, CODER
990 PRINT ITEMS$:PRINT:PRINT
1000 T2=TIMER
1010 T1=TIMER
1020 PRINT:PRINT "Enter Response (1,2,3,4)":PRINT
1030 AKEYS=INPUT$(1):RT(I)=(TIMER-T1)
1040 IF AKEYS = "" THEN GOTO 1030
1050 IF AKEYS = "1" THEN ANS(I) = 1:GOTO 1100
1060 IF AKEYS = "2" THEN ANS(I) = 2:GOTO 1100

```

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1070     IF AKEY$ = "3" THEN ANS(I) = 3:GOTO 1100
1080     IF AKEY$ = "4" THEN ANS(I) = 4:GOTO 1100
1090     GOTO 1030
1100     PRINT "Your answer was " ANS(I)
1110     PRINT:PRINT "Is that okay (y/n)? "
1120     BKEY$=INKEY$
1130     IF BKEY$ = "y" OR BKEY$="Y" THEN GOTO 1160
1140     IF BKEY$ = "n" OR BKEY$="N" THEN GOTO 1010
1150     GOTO 1120
1160     RT2(I)=(TIMER-T2)
1170     IF CODER = 2 THEN GOTO 1220
1180     W = I - 10
1190     PRINT #1, W; ", "; ANS(I); ", "; USING "##.#####_", RT(I), RT2
(I)
1200     IF CODER = 1 THEN ANS(I) = 5 - ANS(I)
1210     ANS(I) = ANS(I) - 1
1220     NEXT I
1230 REM
1240 REM *****
1250 REM *           Z-score calculation and printing           *
1260 REM *****
1270 REM
1280     A=0
1290     SUMRT1 = 0
1300     SUMRT2 = 0
1310     FOR A = 1 TO 344
1320         B=A+10
1330         SUMRT1 = SUMRT1 + RT(B)
1340         SUMRT2 = SUMRT2 + RT2(B)
1350         SDFRT1 = (RT(B)*RT(B)) + SDFRT1
1360         SDFRT2 = (RT2(B)*RT2(B)) + SDFRT2
1370     NEXT A
1380 REM
1390     MRT1 = SUMRT1/344
1400     MRT2 = SUMRT2/344
1410 REM
1420     SDRT1 = SQR((SDFRT1-((SUMRT1*SUMRT1)/344))/344)
1430     SDRT2 = SQR((SDFRT2-((SUMRT2*SUMRT2)/344))/344)
1440 REM
1450     ZZ = 0
1460     PRINT #1, ""
1470     PRINT #1, "Question #, RT1 (hitting decsion), RT2 (Total acceptance)"
1480     PRINT #1, ""
1490     FOR ZZ = 1 TO 344
1500         FFV = ZZ+10
1510         Z1(ZZ) = (RT(FFV) -MRT1) /SDRT1
1520         Z2(ZZ) = (RT2(FFV) -MRT2) /SDRT2
1530         PRINT #1, ZZ; ", "; USING "##.#####_", Z1(ZZ), Z2(ZZ)
1540     NEXT ZZ
1550 REM
1560 REM *****
1570 REM * DATA lines (first 10 of data are the practice questions) *
1580 REM *****
1590 REM
1600 REM
1610 DATA "I am a spiritual person.",2
1620 DATA "I am always on time for appointments.",2
1630 DATA "I like European made cars.",2
1640 DATA "I drink at least 3 cups of coffee every day.",2
1650 DATA "I like country music.",2

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1660 DATA "Sometimes I go to sleep past midnight.",2  
 1670 DATA "I enjoy the fresh air.",2  
 1680 DATA "I would rather wash dishes than watch television.",2  
 1690 DATA "I would like to own a dog.",2  
 1700 DATA "Astrology works when enough information is known about a person's birth date.",2  
 1710 DATA "My friends are available if I need them.",1  
 1720 DATA "I have some inner struggles that cause problems for me.",1  
 1730 DATA "My health condition has restricted my activities.",0  
 1740 DATA "I am so tense in certain situations that I have great difficulty getting by.",0  
 1750 DATA "I have to do some things a certain way or I get nervous.",0  
 1760 DATA "Much of the time I'm sad for no real reason.",0  
 1770 DATA "Often I think and talk so quickly that other people cannot follow my train of thought.",0  
 1780 DATA "Most of the people I know can be trusted.",1  
 1790 DATA "Sometimes I cannot remember who I am.",0  
 1800 DATA "I have some ideas that others think are strange.",0  
 1810 DATA "I was usually well-behaved at school.",1  
 1820 DATA "I've seen a lot of doctors over the years.",0  
 1830 DATA "I'm a very sociable person.",0  
 1840 DATA "My mood can shift quite suddenly.",0  
 1850 DATA "Sometimes I feel guilty about how much I drink.",0  
 1860 DATA "I'm a 'take charge' type of person.",0  
 1870 DATA "My attitude about myself changes a lot.",0  
 1880 DATA "People would be surprised if I yelled at someone.",1  
 1890 DATA "My relationships have been stormy.",0  
 1900 DATA "At times I wish I were dead.",0  
 1910 DATA "People are afraid of my temper.",0  
 1920 DATA "Sometimes I use drugs to feel better.",0  
 1930 DATA "I've tried just about every type of drug.",0  
 1940 DATA "Sometimes I let little things bother me too much.",1  
 1950 DATA "I often have trouble concentrating because I'm nervous.",0  
 1960 DATA "I often fear that I might slip up and say something wrong.",0  
 1970 DATA "I feel that I've let everyone down.",0  
 1980 DATA "I have many brilliant ideas.",0  
 1990 DATA "Certain people go out of their way to bother me.",0  
 2000 DATA "I just don't seem to relate to people very well.",0  
 2010 DATA "I've borrowed money knowing I wouldn't pay it back.",0  
 2020 DATA "Much of the time I don't feel well.",0  
 2030 DATA "I often feel jittery.",0  
 2040 DATA "I keep reliving something horrible that happened to me.",0  
 2050 DATA "I hardly have any energy.",0  
 2060 DATA "I can be very demanding when I want things done quickly.",0  
 2070 DATA "People usually treat me pretty fairly.",1  
 2080 DATA "My thinking has become confused.",0  
 2090 DATA "I get a kick out of doing dangerous things.",0  
 2100 DATA "My favorite poet is Raymond Kertezc.",0  
 2110 DATA "I like being around my family.",1  
 2120 DATA "I need to make some important changes in my life.",1  
 2130 DATA "I've had illnesses that my doctors could not explain.",0  
 2140 DATA "I can't do some things well because of nervousness.",0  
 2150 DATA "I have impulses that I fight to keep under control.",0  
 2160 DATA "I've forgotten what it's like to feel happy.",0  
 2170 DATA "I take on so many commitments that I can't keep up.",0  
 2180 DATA "I have to be alert to the possibility that people will be unfaithful.",0  
 2190 DATA "I have visions in which I see myself forced to commit crimes.",0  
 2200 DATA "Other people sometimes put thoughts into my head.",0  
 2210 DATA "I've deliberately damaged someone's property.",0

2220 DATA "My health problems are very complicated.",0  
 2230 DATA "It's easy for me to make new friends.",0  
 2240 DATA "My moods get quite intense.",0  
 2250 DATA "I have trouble controlling my use of alcohol.",0  
 2260 DATA "I'm a natural leader.",0  
 2270 DATA "Sometimes I feel terribly empty inside.",0  
 2280 DATA "I tell people off when they deserve it.",0  
 2290 DATA "I want to let certain people know how much they've hurt me.",0  
 2300 DATA "I've thought about ways to kill myself.",0  
 2310 DATA "Sometimes my temper explodes and I completely lose control.",0  
 2320 DATA "People have told me that I have a drug problem.",0  
 2330 DATA "I never use drugs to help me cope with the world.",1  
 2340 DATA "Sometimes I'll avoid someone I really don't like.",1  
 2350 DATA "It's often hard for me to enjoy myself because I'm often worrying about things.",0  
 2360 DATA "I have exaggerated fears.",0  
 2370 DATA "Sometimes I think I'm worthless.",0  
 2380 DATA "I have some very special talents that few others have.",0  
 2390 DATA "Some people do things to make me look bad.",0  
 2400 DATA "I don't have much to say to anyone.",0  
 2410 DATA "I'll take advantage of others if they leave themselves open to it.",0  
 2420 DATA "I suffer from a lot of pain.",0  
 2430 DATA "I worry so much that at times I feel like I am going to faint.",0  
 2440 DATA "Thoughts about my past often bother me while I'm thinking about something else.",0  
 2450 DATA "I have no trouble falling asleep.",1  
 2460 DATA "I get quite irritated if people try to keep me from accomplishing my goals.",0  
 2470 DATA "I seem to have as much luck in life as others do.",1  
 2480 DATA "My thoughts get scrambled sometimes.",0  
 2490 DATA "I do a lot of wild things just for the thrill of it.",0  
 2500 DATA "Sometimes I get ads in the mail that I don't really want.",1  
 2510 DATA "If I'm having problems, I have people I can talk to.",1  
 2520 DATA "I need to change some things about myself, even if it hurts.",1  
 2530 DATA "I've had numbness in parts of my body that I can't explain.",0  
 2540 DATA "Sometimes I am afraid for no reason.",0  
 2550 DATA "It bothers me when things are out of place.",0  
 2560 DATA "Everything seems like a big effort.",0  
 2570 DATA "Recently I've had much more energy than usual.",0  
 2580 DATA "Most people have good intentions.",1  
 2590 DATA "Since the day I was born, I was destined to be unhappy.",0  
 2600 DATA "Sometimes it seems that my thoughts are broadcast so that others can hear them.",0  
 2610 DATA "I've done some things that weren't exactly legal.",0  
 2620 DATA "It's a struggle for me to get things done with the medical problems I have.",0  
 2630 DATA "I like to meet new people.",0  
 2640 DATA "My mood is very steady.",1  
 2650 DATA "There have been times when I've had to cut down on my drinking.",0  
 2660 DATA "I would be good at a job where I tell others what to do.",0  
 2670 DATA "I worry a lot about other people leaving me.",0  
 2680 DATA "When I get mad at other drivers on the road, I let them know.",0  
 2690 DATA "People once close to me have let me down.",0  
 2700 DATA "I've made plans about how to kill myself.",0  
 2710 DATA "Sometimes I'm very violent.",0  
 2720 DATA "My drug use has caused me financial strain.",0  
 2730 DATA "I've never had problems at work because of drugs.",1  
 2740 DATA "I sometimes complain too much.",1  
 2750 DATA "I'm often so worried and nervous that I can barely stand it.",0  
 2760 DATA "I get very nervous when I have to do something in front of others.",0



2770 DATA "I don't feel like trying anymore.",0  
 2780 DATA "My plans will make me famous someday.",0  
 2790 DATA "People around me are faithful to me.",1  
 2800 DATA "I'm a loner.",0  
 2810 DATA "I'll do most things if the price is right.",0  
 2820 DATA "I am in good health.",1  
 2830 DATA "Sometimes I feel dizzy when I've been under a lot of pressure.",0  
 2840 DATA "I've been troubled by memories of a bad experience for a long time.",0  
 2850 DATA "I rarely have trouble sleeping.",1  
 2860 DATA "Sometimes I get upset because others don't understand my plans.",0  
 2870 DATA "I've given a lot, but I haven't gotten much in return.",0  
 2880 DATA "Sometimes I have trouble keeping different thoughts separate.",0  
 2890 DATA "My behavior is pretty wild at times.",0  
 2900 DATA "My favorite sports event on television is the high jump.",0  
 2910 DATA "I spend most of my time alone.",0  
 2920 DATA "I need some help to deal with important problems.",1  
 2930 DATA "I've had episodes of double vision or blurred vision.",0  
 2940 DATA "I'm not the kind of person who panics easily.",1  
 2950 DATA "I can relax even if my home is a mess.",1  
 2960 DATA "Nothing seems to give me much pleasure.",0  
 2970 DATA "At times my thoughts move very quickly.",0  
 2980 DATA "I usually assume people are telling the truth.",1  
 2990 DATA "I think I have three or four completely different personalities inside of me.",0  
 3000 DATA "Others can read my thoughts.",0  
 3010 DATA "I used to lie a lot to get out of tight situations.",0  
 3020 DATA "My medical problems always seem to be hard to treat.",0  
 3030 DATA "I am a warm person.",0  
 3040 DATA "I have little control over my anger.",0  
 3050 DATA "My drinking seems to cause problems in my relationships with others.",0  
 3060 DATA "I have trouble standing up for myself.",1  
 3070 DATA "I often wonder what I should do with my life.",0  
 3080 DATA "I'm not afraid to yell at someone to get my point across.",0  
 3090 DATA "I rarely feel very lonely.",1  
 3100 DATA "I've recently been thinking about suicide.",0  
 3110 DATA "Sometimes I smash things when I'm upset.",0  
 3120 DATA "I never use illegal drugs.",1  
 3130 DATA "I sometimes do things so impulsively that I get into trouble.",0  
 3140 DATA "Sometimes I'm too impatient.",1  
 3150 DATA "My friends say I worry too much.",0  
 3160 DATA "I'm not easily frightened.",1  
 3170 DATA "I can't seem to concentrate very well.",0  
 3180 DATA "I have accomplished some remarkable things.",0  
 3190 DATA "Some people try to keep me from getting ahead.",0  
 3200 DATA "I don't feel close to anyone.",0  
 3210 DATA "I can talk my way out of just about anything.",0  
 3220 DATA "I seldom have complaints about how I feel physically.",1  
 3230 DATA "I can often feel my heart pounding.",0  
 3240 DATA "I can't seem to get over something from my past.",0  
 3250 DATA "I've been moving more slowly than usual.",0  
 3260 DATA "I have great plans and it irritates me that people try to interfere.",0  
 3270 DATA "People don't appreciate what I've done for them.",0  
 3280 DATA "Sometimes it feels as if somebody is blocking my thoughts.",0  
 3290 DATA "If I get tired of a place, I just pick up and leave.",0  
 3300 DATA "Most people would rather win than lose.",1  
 3310 DATA "Most people I'm close to are very supportive.",1  
 3320 DATA "I'm curious why I behave the way I do.",1

3330 DATA "There have been times when my eyesight got worse and then better again.",0  
 3340 DATA "I am a very calm and relaxed person.",1  
 3350 DATA "People say that I'm a perfectionist.",0  
 3360 DATA "I've lost interest in things I used to enjoy.",0  
 3370 DATA "My friends can't keep up with my social activities.",0  
 3380 DATA "People generally hide their real motives.",0  
 3390 DATA "People don't understand how much I suffer.",0  
 3400 DATA "I've heard voices that no one else could hear.",0  
 3410 DATA "I like to see how much I can get away with.",0  
 3420 DATA "I've had only the usual health problems that most people have.",1  
 3430 DATA "It takes me a while to warm up to people.",1  
 3440 DATA "I've always been a pretty happy person.",1  
 3450 DATA "Drinking helps me get along in social situations.",0  
 3460 DATA "I feel best in situations where I am the leader.",0  
 3470 DATA "I can't handle separation from those close to me very well.",0  
 3480 DATA "I always avoid arguments if I can.",1  
 3490 DATA "I've made some real mistakes in the people I've picked as friends.",0  
 3500 DATA "I have thought about suicide for a long time.",0  
 3510 DATA "I've threatened to hurt people.",0  
 3520 DATA "I've used prescription drugs to get high.",0  
 3530 DATA "When I'm upset, I typically do something to hurt myself.",0  
 3540 DATA "I don't take criticism very well.",1  
 3550 DATA "I don't worry about things any more than most people.",1  
 3560 DATA "I don't mind driving on freeways.",1  
 3570 DATA "No matter what I do, nothing works.",0  
 3580 DATA "I think I have the answers to some very important questions.",0  
 3590 DATA "There are people who want to hurt me.",0  
 3600 DATA "I enjoy the company of other people.",1  
 3610 DATA "I don't like being tied to one person.",0  
 3620 DATA "I have a bad back.",0  
 3630 DATA "It's easy for me to relax.",1  
 3640 DATA "I have had some horrible experiences that make me feel guilty.",0  
 3650 DATA "I often wake up very early in the morning and can't get back to sleep.",0  
 3660 DATA "It bothers me when other people are too slow to understand my ideas.",0  
 3670 DATA "Usually I've gotten credit for what I've done.",1  
 3680 DATA "My thoughts tend to quickly shift around to different things.",0  
 3690 DATA "The idea of 'settling down' has never appealed to me.",0  
 3700 DATA "My favorite hobbies are archery and stamp-collecting.",0  
 3710 DATA "People I know care about me.",1  
 3720 DATA "I'm comfortable with myself the way I am.",0  
 3730 DATA "I've had episodes when I've lost the feeling in my hands.",0  
 3740 DATA "I often feel like something terrible is about to happen.",0  
 3750 DATA "I'm usually aware of objects that have a lot of germs.",0  
 3760 DATA "I have no interest in life.",0  
 3770 DATA "I feel like I need to keep active and not rest.",0  
 3780 DATA "People think I'm too suspicious.",0  
 3790 DATA "Every once in a while I totally lose my memory.",0  
 3800 DATA "There are people who try to control my thoughts.",0  
 3810 DATA "I was never expelled or suspended from school when I was young.",1  
 3820 DATA "I've had some unusual diseases and illnesses.",0  
 3830 DATA "It takes a while for people to get to know me.",1  
 3840 DATA "I've had times when I was so mad that I couldn't do enough to express all my anger.",0  
 3850 DATA "Some people around me think that I drink too much alcohol.",0  
 3860 DATA "I prefer to let others make decisions.",1  
 3870 DATA "I don't get bored very easily.",1  
 3880 DATA "I don't like raising my voice.",1

3890 DATA "Once someone is my friend, we stay friends.",1  
 3900 DATA "Death would be a relief.",0  
 3910 DATA "I've never started a physical fight as an adult.",1  
 3920 DATA "My drug use is out of control.",0  
 3930 DATA "I'm too impulsive for my own good.",0  
 3940 DATA "Sometimes I put things off until the last minute.",1  
 3950 DATA "I don't worry about things that I can't control.",1  
 3960 DATA "I don't mind heights.",1  
 3970 DATA "I think good things will happen to me in the future.",1  
 3980 DATA "I think I would be a good comedian.",0  
 3990 DATA "People seldom treat me bad on purpose.",1  
 4000 DATA "I like to be around other people if I can.",1  
 4010 DATA "I don't like to stay in a relationship very long.",0  
 4020 DATA "I have a weak stomach.",0  
 4030 DATA "When I'm under a lot of pressure, I sometimes have trouble breathing.",0  
 4040 DATA "I keep having nightmares about my past.",0  
 4050 DATA "I have a good appetite.",1  
 4060 DATA "I have no patience with people who try to hold me back.",0  
 4070 DATA "People who are successful generally earned their success.",1  
 4080 DATA "Sometimes I wonder if my thoughts are being taken away.",0  
 4090 DATA "I like to drive fast.",0  
 4100 DATA "I don't like to have to buy things that are overpriced.",1  
 4110 DATA "In my family, we argue more than we talk.",0  
 4120 DATA "Many of my problems are my own doing.",1  
 4130 DATA "I've had times when my legs became so weak that I couldn't walk.",0  
 4140 DATA "I seldom feel anxious or tense.",1  
 4150 DATA "People see me as a person who pays a lot of attention to detail.",0  
 4160 DATA "Lately I've been happy much of the time.",1  
 4170 DATA "Recently I have needed less sleep than usual.",0  
 4180 DATA "Things are rarely as they seem on the surface.",0  
 4190 DATA "Sometimes my vision is only in black and white.",0  
 4200 DATA "I have a sixth sense that tells me what is going to happen.",0  
 4210 DATA "I've never been in trouble with the law.",1  
 4220 DATA "For my age, my health is pretty good.",1  
 4230 DATA "I try to include people who seem left out.",0  
 4240 DATA "Sometimes I have an alcoholic drink first thing in the morning.",0  
 4250 DATA "My drinking has caused me problems at home.",0  
 4260 DATA "I say what's on my mind.",0  
 4270 DATA "I usually do what other people tell me to do.",1  
 4280 DATA "I have a bad temper.",0  
 4290 DATA "It takes a lot to make me angry.",1  
 4300 DATA "I've thought about what I would say in a suicide note.",0  
 4310 DATA "I can't think of reasons to go on living.",0  
 4320 DATA "I've had health problems because of my drug use.",0  
 4330 DATA "I spend money too easily.",0  
 4340 DATA "I sometimes make promises I can't keep.",1  
 4350 DATA "I usually worry about things more than I should.",0  
 4360 DATA "I will not ride in airplanes.",0  
 4370 DATA "I have something worthwhile to contribute.",1  
 4380 DATA "Lately I feel so confident that I think I can accomplish anything.",0  
 4390 DATA "People have had it in for me.",0  
 4400 DATA "I make friends easily.",1  
 4410 DATA "I look after myself first; let others take care of themselves.",0  
 4420 DATA "I get more headaches than most people.",0  
 4430 DATA "I get sweaty hands often.",0  
 4440 DATA "Since I had a very bad experience, I am no longer interested in some things that I used to enjoy.",0  
 4450 DATA "I often wake up in the middle of the night.",0  
 4460 DATA "At times I am very touchy and easily annoyed.",0

4470 DATA "I'm not the type of person to hold a grudge.",1  
4480 DATA "Thoughts in my head suddenly disappear.",0  
4490 DATA "I'm not a person who turns down a dare.",0  
4500 DATA "Most people look forward to a trip to the dentist.",0  
4510 DATA "I spend little time with my family.",0  
4520 DATA "I can solve problems by myself.",0  
4530 DATA "At times parts of my body have been paralyzed.",0  
4540 DATA "I am easily startled.",0  
4550 DATA "I keep myself under tight control.",0  
4560 DATA "I'm almost always a happy and positive person.",1  
4570 DATA "I hardly ever buy things on impulse.",1  
4580 DATA "People have to earn my trust.",0  
4590 DATA "I don't have any good memories from my childhood.",0  
4600 DATA "I don't believe that there are people who can read minds.",1  
4610 DATA "I've never taken money or property that wasn't mine.",1  
4620 DATA "I like to talk with people about their medical problems.",0  
4630 DATA "I'm an affectionate person.",0  
4640 DATA "I never drive when I've been drinking.",1  
4650 DATA "I hardly ever drink alcohol.",1  
4660 DATA "People listen to my opinions.",0  
4670 DATA "If I get poor service from a business, I let the manager know about i  
t.",0  
4680 DATA "My temper never gets me into trouble.",1  
4690 DATA "My anger never gets out of control.",1  
4700 DATA "I've thought about how others would react if I killed myself.",0  
4710 DATA "I have a lot to live for.",1  
4720 DATA "My best friends are those I use drugs with.",0  
4730 DATA "I'm a reckless person.",0  
4740 DATA "There have been times when I could have been more thoughtful than I w  
as.",1  
4750 DATA "Sometimes I get so nervous that I'm afraid I'm going to die.",0  
4760 DATA "I don't mind traveling in a bus or train.",1  
4770 DATA "I'm pretty successful at what I do.",1  
4780 DATA "I could never imagine myself being famous.",1  
4790 DATA "I'm the target of a conspiracy.",0  
4800 DATA "I keep in touch with my friends.",1  
4810 DATA "When I make a promise, I really don't need to keep it.",0  
4820 DATA "I frequently have diarrhea.",0  
4830 DATA "I have very steady hands.",1  
4840 DATA "I avoid certain things that bring back bad memories.",0  
4850 DATA "I have little interest in sex.",0  
4860 DATA "I have little patience with those who disagree with my plans.",0  
4870 DATA "Being helpful to other people pays off in the end.",1  
4880 DATA "I can concentrate now as well as I ever could.",1  
4890 DATA "I never take risks if I can avoid it.",1  
4900 DATA "In my free time I might read, watch TV, or just relax.",1  
4910 DATA "I have a lot of money problems.",0  
4920 DATA "My life is very unpredictable.",0  
4930 DATA "There have been many changes in my life recently.",0  
4940 DATA "There isn't much stability at home.",0  
4950 DATA "Things are not going well in my family.",0  
4960 DATA "I'm happy with my job situation.",1  
4970 DATA "I worry about having enough money to get by.",0  
4980 DATA "My relationship with my spouse or partner is not going well.",0  
4990 DATA "I have severe psychological problems that began very suddenly.",0  
5000 DATA "I'm a sympathetic person.",0  
5010 DATA "Close relationships are important to me.",0  
5020 DATA "I'm very impatient with people.",1  
5030 DATA "I have more friends than most people I know.",0  
5040 DATA "My drinking has never gotten me into trouble.",1

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5050 DATA "My drinking has caused problems with my work.",0
5060 DATA "I don't like letting people know when I disagree with them.",1
5070 DATA "I'm a very independent person.",0
5080 DATA "When I get mad, it's hard for me to calm down.",0
5090 DATA "People think I'm aggressive.",0
5100 DATA "I'm considering suicide.",0
5110 DATA "Things have never been so bad that I thought about suicide.",1
5120 DATA "My drug use has never caused problems with my family or friends.",1
5130 DATA "I'm careful about how I spend my money.",1
5140 DATA "I rarely get in a bad mood.",0
5150 CLS:PRINT "FINE-SO FAR!!! GOOD, DWIGHT AND DERICK"
5160 REM
5170 REM *****
5180 REM * SCALE TOTALS (ANS + RTs) FOR THESIS HYPOTHESIS *
5190 REM *****
5200 REM
5210 NIMS = ANS(19) + ANS(59) + ANS(99) + ANS(139) + ANS(179) + ANS(2
19) + ANS(259) + ANS(299) + ANS(339)
5220 REM
5230 NIMR = RT(19) + RT(59) + RT(99) + RT(139) + RT(179) + RT(219) +
RT(259) + RT(299) + RT(339)
5240 NIMZ1 = Z1(9) + Z1(49) + Z1(89) + Z1(129) + Z1(169) + Z1(209) +
Z1(249) + Z1(289) + Z1(329)
5250 NIMZ2 = Z2(9) + Z2(49) + Z2(89) + Z2(129) + Z2(169) + Z2(209) +
Z2(249) + Z2(289) + Z2(329)
5260 REM
5270 PIMS = ANS(34) + ANS(74) + ANS(114) + ANS(154) + ANS(194) + ANS(
234) + ANS(274) + ANS(314) + ANS(354)
5280 REM
5290 PIMR = RT(34) + RT(74) + RT(114) + RT(154) + RT(194) + RT(234) +
RT(274) + RT(314) + RT(354)
5300 PIMZ1 = Z1(24) + Z1(64) + Z1(104) + Z1(144) + Z1(184) + Z1(224)
+ Z1(264) + Z1(304) + Z1(344)
5310 PIMZ2 = Z2(24) + Z2(64) + Z2(104) + Z2(144) + Z2(184) + Z2(224)
+ Z2(264) + Z2(304) + Z2(344)
5320 REM
5330 DEPCS = ANS(37) + ANS(77) + ANS(117) + ANS(157) + ANS(197) + ANS
(237) + ANS(277) + ANS(317)
5340 REM
5350 DEPCR = RT(37) + RT(77) + RT(117) + RT(157) + RT(197) + RT(237)
+ RT(277) + RT(317)
5360 DEPCZ1 = Z1(27) + Z1(67) + Z1(107) + Z1(147) + Z1(187) + Z1(227)
+ Z1(267) + Z1(307)
5370 DEPCZ2 = Z2(27) + Z2(67) + Z2(107) + Z2(147) + Z2(187) + Z2(227)
+ Z2(267) + Z2(307)
5380 REM
5390 DEPAS = ANS(16) + ANS(56) + ANS(96) + ANS(136) + ANS(176) + ANS(
216) + ANS(256) + ANS(296)
5400 REM
5410 DEPAR = RT(16) + RT(56) + RT(96) + RT(136) + RT(176) + RT(216) +
RT(256) + RT(296)
5420 DEPAZ1 = Z1(6) + Z1(46) + Z1(86) + Z1(126) + Z1(166) + Z1(206) +
Z1(246) + Z1(286)
5430 DEPAZ2 = Z2(6) + Z2(46) + Z2(86) + Z2(126) + Z2(166) + Z2(206) +
Z2(246) + Z2(286)
5440 REM
5450 DEPPS = ANS(45) + ANS(85) + ANS(125) + ANS(165) + ANS(205) + ANS
(245) + ANS(285) + ANS(325)
5460 REM
5470 DEPPR = RT(45) + RT(85) + RT(125) + RT(165) + RT(205) + RT(245)

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+ RT(285) + RT(325)
5480      DEPPZ1 = Z1(35) + Z1(75) + Z1(115) + Z1(155) + Z1(195) + Z1(235)
+ Z1(275) + Z1(315)
5490      DEPPZ2 = Z2(35) + Z2(75) + Z2(115) + Z2(155) + Z2(195) + Z2(235)
+ Z2(275) + Z2(315)
5500 REM
5510      DEPTS = DEPCS + DEPAS + DEPPS: DEPTR = DEPCR + DEPAR + DEPPT
5520      DEPTZ1 = DEPCZ1 + DEPAZ1 + DEPPZ1: DEPTZ2 = DEPCZ2 + DEPAZ2 + DE
PPZ2
5530 REM
5540 REM
5550 REM *****
5560 REM *          FILE PRINT-OUT OF TOTALS          *
5570 REM *****
5580 REM
5590      PRINT #1, " "
5600      PRINT #1, "NIM Score - ", NIMS
5610      PRINT #1, "NIM RT - ", NIMR
5620      PRINT #1, "NIM z-score #1          ", NIMZ1
5630      PRINT #1, "NIM z-score #2          ", NIMZ2
5640      PRINT #1, "PIM Score - ", PIMS
5650      PRINT #1, "PIM RT - ", PIMR
5660      PRINT #1, "PIM z-score #1          ", PIMZ1
5670      PRINT #1, "PIM z-score #2          ", PIMZ2
5680      PRINT #1, "Depression(C) Score - ", DEPCS
5690      PRINT #1, "Depression(C) RT - ", DEPCR
5700      PRINT #1, "Depression(C) z-score #1          ", DEPCZ1
5710      PRINT #1, "Depression(C) z-score #2          ", DEPCZ2
5720      PRINT #1, "Depression(A) Score - ", DEPAS
5730      PRINT #1, "Depression(A) RT - ", DEPAR
5740      PRINT #1, "Depression(A) z-score #1          ", DEPAZ1
5750      PRINT #1, "Depression(A) z-score #2          ", DEPAZ2
5760      PRINT #1, "Depression(P) Score - ", DEPPS
5770      PRINT #1, "Depression(P) RT - ", DEPPT
5780      PRINT #1, "Depression(P) z-score #1          ", DEPPZ1
5790      PRINT #1, "Depression(P) z-score #2          ", DEPPZ2
5800      PRINT #1, "Depression(Total) Score - ", DEPTS
5810      PRINT #1, "Depression(Total) RT - ", DEPTR
5820      PRINT #1, "Depression(Total) z-score #1          ", DEPTZ1
5830      PRINT #1, "Depression(Total) z-score #2          ", DEPTZ2
5840      PRINT #1, "End of session - ";TIMES
5850      CLOSE
5860 REM
5870      CLS:PRINT:PRINT:PRINT:PRINT "          Thank you for your partic
ipation"
5880      WA=TIMER
5890      W1=INT(WA):W2=W1+10
5900      W3=INT(TIMER)
5910      IF W3=W2 THEN GOTO 5920 ELSE GOTO 5900
5920      REM
5930      END

```

## Appendix D

## Instructions for Malingering Respondents.

For this computerized personality test you are asked to respond as if you were feeling depressed. To state it more clearly we would like you fake or pretend being depressed. To help you we are providing you with key descriptors of what some people who experience depression have reported in the past. These people may be experiencing some or all of the following:

- feeling sad or blue
- not getting as much pleasure in things as before or being less interested in things than before
- weight loss or eating a lot less than usual / weight gain or eating a lot more than usual
- sleeping more than usual or sleeping less than usual or having restless or disturbed sleep
- feeling wound up or slowed down
- feeling tired or low on energy
- feeling worthless, feeling guilty, low self-esteem
- problems concentrating, remembering things, or making decisions
- thoughts about death and dying
- feeling hopeless about the future

The person who is best at faking sadness will win \$25, but, this instrument was designed to detect people who are not answering sincerely. Therefore, the best performance will be judged as one that avoids detection as a person who is answering insincerely and the person who has the highest level of depression. To help you here again are some descriptors of people who reported being depressed:

- feeling sad or blue
- not getting as much pleasure in things as before or being less interested in things than before
- weight loss or eating a lot less than usual / weight gain or eating a lot more than usual
- sleeping more than usual or sleeping less than usual or having restless or disturbed sleep
- feeling wound up or slowed down
- feeling tired or low on energy
- feeling worthless, feeling guilty, low self-esteem
- problems concentrating, remembering things, or making decisions
- thoughts about death and dying
- feeling hopeless about the future

Thank you.

## Appendix E

Emotion and Information Processing  
Debriefing Form: Session 2

The purpose of the present study was to determine whether students who experience different emotions (e.g., feeling sad or not feeling sad) demonstrate biases for information processing that are congruent with their emotions.

The computer questionnaire you completed is a modified version of an existing questionnaire. It has been modified to record response times for each question. A number of studies have suggested that participants experiencing an emotion will endorse items with different response times than those individuals who are not experiencing the emotion.

In this study it is hypothesized that students who experience elevated levels of sadness will take longer to respond to some items in the computerized questionnaire. Please do not inform friends or associates of the exact nature of this study because it may negatively bias results.

Thank you for your participation in this study. If you have any questions about the study, please contact Derick Cyr (623-4506), M.A. Clinical Psychology candidate, or Dr. Dwight Mazmanian (343-8257), Department of Psychology, Lakehead University, Thunder Bay, ON, P7B 5E1. If you would like a brief summary of the results you may obtain them by printing your full name and permanent mailing address on the self-adhesive address label. Results will not likely be available before August, 2000.

If participating in this study or completing the questionnaires has distressed you or has raised personal issues that you would like to discuss, or if you just need someone to talk to, the following organizations are available: L.U. Health Center (343-8361), Peer Support Line (343-8255), Chaplain (343-8018), and Career Counseling Services (343-8018).

Fekken, G. C. & Holden, R. R. (1992). Response latency evidence for viewing personality traits as schema indicators. Journal of Research in Personality, 26, 103-120.

Fekken, G. C. & Holden, R. R. (1994). The construct validity of differential response latencies in structured personality tests. Canadian Journal of Behavioural Sciences, 26, 104-120.



Table 1

Means and Standard Deviations for the PAI Scales of Interest

Group (N)	NIM score (SD)	PIM score (SD)	DEP score (SD)	DEP-A score (SD)	DEP-C score (SD)	DEP-P score (SD)
Control (15)	1.20* (2.91)	15.07 (4.86)	8.73 (6.51)	1.87 (1.96)	2.67 (2.06)	4.20 (3.34)
Malingering (19)	12.05 (8.22)	8.37* (5.05)	52.26 (15.44)	18.21 (5.14)	18.00 (5.52)	16.05 (6.15)
Depressed (12)	2.25* (1.86)	9.75* (3.55)	34.07 (6.23)	12.83 (2.69)	13.00 (4.18)	11.08 (3.90)

Note. A = affective, C = cognitive, P = physiological. All groups were significantly different from each other across each scale ( $p < .01$ ) except for those scores indicated with an asterisk.

Table 2

Raw Responding Time Means and Standard Deviations of Items Within a Scale for RT1 and RT2

Group (N)	NIM RT1 (SD)	NIM RT2 (SD)	PIM RT1 (SD)	PIM RT2 (SD)	DEP RT1 (SD)	DEP RT2 (SD)
Control (15)	3.88 <sup>ab</sup> (0.96)	3.88 (1.01)	4.13 (0.78)	4.82 (0.92)	3.51 (0.95)	4.06 (0.98)
Malingering (19)	4.24 <sup>a</sup> (0.56)	4.59 (0.74)	3.83 (1.27)	4.54 (1.44)	3.75 (1.11)	4.47 (1.34)
Depressed (12)	4.24 <sup>b</sup> (1.23)	4.99 (1.86)	4.42 (1.14)	4.99 (1.25)	4.39 (1.04)	4.97 (1.21)

Note. Values represent seconds of time per item in the category. Significant differences are represented by letters a and b ( $p < .05$ ).

Table 3

Means and Standard Deviations for the PAI Z-scores of Interest

Group (N)	NIM z-score (SD)	PIM z-score (SD)	DEP z-score (SD)	DEP-A z-score (SD)	DEP-C z-score (SD)	DEP-P z-score (SD)
Control (15)	-2.17 <sup>a</sup> (1.70)	1.20 <sup>a</sup> (3.30)	-4.50 (3.87)	-1.58 (2.16)	-2.59 (2.11)	-0.32 (2.60)
Malingering (19)	1.15 <sup>a</sup> (2.95)	-1.65 <sup>a</sup> (1.94)	-4.82 (4.08)	-1.03 (2.17)	-2.81 <sup>b</sup> (1.73)	-0.98 (3.29)
Depressed (12)	-0.92 (2.25)	-0.42 (2.53)	-1.70 (4.72)	0.42 (2.14)	-0.58 <sup>b</sup> (2.98)	-1.53 (1.83)

Note. A = affective, C = cognitive, P = physiological. Significant differences between groups are indicated with letters (for a,  $p < .01$ ; for b,  $p < .05$ ).

Table 4

Tukey Post-hoc Differences Between Groups for the PAI Scale Scores

Scale	Group (I)	Group (J)	Mean Difference (I - J)	Sig.
NIM	Control	Malingering	-10.85	.000
	Malingering	Depressed	9.80	.000
PIM	Control	Malingering	6.70	.000
	Control	Depressed	5.32	.014
DEP Total	Control	Malingering	-43.53	.000
	Control	Depressed	-28.18	.000
	Malingering	Depressed	15.35	.002
DEP - Affective	Control	Malingering	-16.34	.000
	Control	Depressed	-10.97	.000
	Malingering	Depressed	5.38	.001
DEP - Cognitive	Control	Malingering	-15.33	.000
	Control	Depressed	-10.33	.000
	Malingering	Depressed	5.00	.008
DEP - Physiological	Control	Malingering	-11.85	.000
	Control	Depressed	-6.88	.002
	Malingering	Depressed	4.97	.021

Table 5

Tukey Post-hoc Differences Between Groups for the Z-scores

Scale	Group (I)	Group (J)	Mean Difference (I - J)	Sig.
NIM	Control	Malingering	-3.33	.001
PIM	Control	Malingering	2.85	.008
DEP – Cognitive	Malingering	Depressed	-2.22	.026

Table 6

Classification Results Using Scale Scores

		Group	Predicted Group Membership			Total
			Control	Malingering	Depressed	
Original	Count	Control	15	0	0	15
		Malingering	1	14	4	19
		Depressed	0	1	11	12
	%	Control	100.0	.0	.0	100.0
		Malingering	5.3	73.7	21.1	100.0
		Depressed	.0	8.3	91.7	100.0

Note. 87.0% of original cases correctly classified.

Table 7

Classification Results Using Raw Response Latencies

		Group	Predicted Group Membership			Total
			Control	Malingering	Depressed	
Original	Count	Control	11	3	1	15
		Malingering	2	15	2	19
		Depressed	4	2	6	12
	%	Control	73.3	20.0	6.7	100.0
		Malingering	10.5	78.9	10.5	100.0
		Depressed	33.3	16.7	50.0	100.0

Note. 69.6% of original cases correctly classified.

Table 8

Classification Results Using Z-scores

		Group	Predicted Group Membership			Total
			Control	Malingering	Depressed	
Original	Count	Control	11	1	3	15
		Malingering	3	16	0	19
		Depressed	3	2	7	12
	%	Control	73.3	6.7	20.0	100.0
		Malingering	15.8	84.2	.0	100.0
		Depressed	25.0	16.7	58.3	100.0

Note. 73.9% of original cases correctly classified.



Table 9

Classification Results Using Scores and Transformed Response Latencies

		Group	Predicted Group Membership			Total
			Control	Malingering	Depressed	
Original	Count	Control	15	0	0	15
		Malingering	1	15	3	19
		Depressed	0	1	11	12
	%	Control	100.0	.0	.0	100.0
		Malingering	5.3	78.9	15.8	100.0
		Depressed	.0	8.3	91.7	100.0

Note. 89.1% of original cases correctly classified.

Table 10

Classification Results Using NIM Scale Scores

		Group	Predicted Group Membership			Total
			Control	Malingering	Depressed	
Original	Count	Control	13	2	0	15
		Malingering	6	13	0	19
		Depressed	11	1	0	12
	%	Control	86.7	13.3	.0	100.0
		Malingering	31.6	68.4	.0	100.0
		Depressed	91.7	8.3	.0	100.0

Note. 56.5% of original cases correctly classified.

Table 11

Classification Results Using NIM Z-scores

		Group	Predicted Group Membership			Total
			Control	Malingering	Depressed	
Original	Count	Control	13	2	0	15
		Malingering	3	16	0	19
		Depressed	7	6	0	12
	%	Control	86.7	13.3	.0	100.0
		Malingering	15.8	84.2	.0	100.0
		Depressed	50.0	50.0	.0	100.0

Note. 63.0% of original cases correctly classified.

Table 12

Classification Results Using NIM Scale Score and NIM Raw Response Times

		Group	Predicted Group Membership			Total
			Control	Malingering	Depressed	
Original	Count	Control	11	1	3	15
		Malingering	2	13	4	19
		Depressed	5	1	6	12
	%	Control	73.3	6.7	20.0	100.0
		Malingering	10.5	68.4	21.1	100.0
		Depressed	41.7	8.3	50.0	100.0

Note. 65.2% of original cases correctly classified.

Table 13

Classification Results Using NIM Scale Score and NIM Z-scores

		Group	Predicted Group Membership			Total
			Control	Malingering	Depressed	
Original	Count	Control	13	1	1	15
		Malingering	3	14	2	19
		Depressed	8	1	3	12
	%	Control	86.7	6.7	6.7	100.0
		Malingering	15.8	73.7	10.5	100.0
		Depressed	66.7	8.3	25.0	100.0

Note. 65.2% of original cases correctly classified.

Table 14

Significant T-test differences For Z-Scores Between the Depressed and Malingering Groups

Item	Category	t-test	df	Sig.	Mean Difference
46	DEP - A	-2.59	14.35	.021	-.93
286	DEP - A	-3.00	12.73	.010	-.96
187	DEP - C	-2.24	29	.033	-.35
275	DEP - P	-3.63	29	.001	-.63
315	DEP - P	2.47	27.00	.020	.80
9	NIM	2.73	29	.011	.96
49	NIM	3.22	26.81	.003	.77
144	PIM	-2.57	13.71	.022	-.63
264	PIM	-2.21	29	.035	-.35

Note. Mean differences are calculated by subtracting the mean  $\bar{z}$ -score for depressed individuals from the mean  $\bar{z}$ -score for malingering individuals. T-tests were calculated following Levene's Test for Equality of Variances.

Table 15

Classification Rates Using the Z-scores From 10 Empirically Derived Items

		Group	Predicted Group Membership		Total
			Malingering	Depressed	
Original	Count	Malingering	19	0	19
		Depressed	1	11	12
		Ungrouped Cases	9	6	15
%		Control	100.0	.0	100.0
		Malingering	8.3	91.7	100.0
		Ungrouped Cases	60.0	40.0	100.0

Note. 96.8% of original cases correctly classified.