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Processing of Emotional Words in Psychopathic and Nonpsychopathic Young Offenders

by

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Abstract

The present study addresses the relationship between reaction times (RTs) on a series of three lexical decision making tasks, and psychopathy. The latter term refers to a set of persistent and maladaptive personality traits which predispose one to a variety of antisocial and criminal behaviors. Newman and Wallace (1993) have proposed that this condition may stem, in part, from functional deficits in automatic cognitive processing. Experiments 2 and 3 provided a formal test of this hypothesis by comparing both psychopathic and nonpsychopathic male young offenders on a semantic matching task.

In Experiment 2, subjects were required to make timed lexical decisions as to the relatedness of word pairs presented on a microcomputer screen. Prior research by Williamson, Harper, and Hare (1991) used a similar strategy and found a RT facilitation effect for emotional but not neutral words. This effect was observed in the data of nonpsychopaths, but not psychopathic subjects. Experiment 3 was similar to Experiment 2, but the target word in each pair was presented in reverse lettering to force controlled

processing, so as to interfere with the effect of priming. The cancellation of any priming effects, and therefore response facilitation, using this strategy would provide support for Newman and Wallace's (1993) hypothesis.

Experiment 1 was a replication of Williamson et al's (1991) study, intended to provide a bridge between their findings using adult subjects, and a group of young offenders.

No significant interaction effects emerged from any of the three experiments, nor were any between-group differences statistically significant. These results failed to replicate the findings of Williamson et al (1991), and offer no support for the automatic processing hypothesis.

Possible explanations for these findings are discussed, and the relevant literature from the areas of psychopathy and information processing are reviewed.

CHAPTER I

Introduction

This study addresses the relationship between language processing and psychopathy in male young offenders. Specifically, it describes experimental tests of the hypothesis that young psychopaths differ from non-psychopathic controls in their ability to process affective words and terms which make reference to emotional experience.

Some work has already been reported which examines the processing of emotional words in adult psychopaths. Of particular note is the finding of Williamson, Harpur, and Hare (1991) that adult male psychopaths are deficient in their recognition of words with non-neutral emotional value, as compared to their nonpsychopathic controls. Indeed this finding has yet to be extended to juvenile psychopaths, and this is one of the objectives of the present investigation. Apart from there being a need to generalize these findings to a younger population, the data reported by Williamson et al (1991) suggested that a portion of their group differences stemmed from a potentially significant interference effect active in their psychopaths when they processed emotional versus neutral words. As this

finding was not predicted, the authors did not test the effect for significance, and suggested that it be examined in future research. Interestingly, their findings invite speculation that psychopaths may tend to utilize affective information incorrectly while making lexical decisions, rather than failing to process it at all: If indeed psychopathic subjects show an interference effect, this can not be readily accounted for in terms of a failure to utilize affective information.

A new direction for research into the processes underlying psychopathy has recently been suggested by Newman and Wallace (1993), who introduced concepts from the information processing literature. Specifically, they invoked the distinction between automatic and controlled cognitive processing (Schneider, Dumais & Shiffrin, 1984) in an attempt to explain numerous prior research findings in terms of deficient automatic processing. They have, however, neither proposed nor provided any direct tests of this hypothesis.

A criticism one might make of the Williamson et al (1991) study, which is outlined in detail in Chapter II, is that the list of words they presented to their subjects was composed of nouns and concepts which are

arguably tangential to the range of affect presumed to be deficient in psychopaths (eg. Milk, Gate, Blood). While prior findings have indeed shown these words to be of non-neutral affective value in normals (Strauss, 1983), they allow only an indirect means of assessing affective processing in psychopaths. In other words, since Williamson et al's (1991) study did not utilize words with manifest affective connotations, and since no semantic matching was required of their subjects, they did not actually test for deficiencies in affective comprehension. Hence, a test of psychopaths' ability to relate words describing general emotional states, to words representing affective phenomena that accompany those states is still required. Before proceeding further, it is necessary to provide an overview of relevant concepts from the information processing literature.

Automatic and Control Processing

Schneider et al (1984; pp. 1-2) define automatic processing as a "fast, parallel, fairly effortless process that is not limited by short-term memory (STM) capacity, is not under direct subject control, and is responsible for the performance of well-developed skilled behaviors. Automatic processing typically

develops when subjects process stimuli consistently over many trials.... Control Processing [or Conscious Processing] is characterized as a slow, generally serial, effortful, capacity-limited, subject-regulated processing mode that must be used to deal with novel or inconsistent information." The authors also point out that these differences have three implications for the understanding of task performance. First, to the extent that performance on a given task is mediated by predominantly automatic processing, performance will occur more quickly. Second, if a task is repeated over many trials, the relative contribution of automatic processing will increase, and hence the task will be performed more quickly. Third, as processing shifts from controlled to automatic over successive trials, the ease with which controlled processing can be employed to alter ongoing task performance will decrease. In other words, established automatic processes can inhibit deliberate task performance.

In their original discussion of automatic processing Posner and Schneider (1975) listed two other important features. These are that it occurs unintentionally, and therefore consumes no conscious resources, and that it does not reveal itself to

introspection in the sense that one could retrace the steps taken in deliberate problem solving.

The earlier point regarding inhibition would provide an explanation of any emergent interference effects. That is, if when faced with affectively non-neutral words, psychopaths engage in automatic processing which is in some way incorrect rather than nonexistent, one would expect poorer performance than that shown by controls. If on the other hand stimulus words are presented in a way rendering them less familiar while at the same time preserving their semantic value, no between group differences should emerge unless the groups differ in their abilities to utilize semantic information.

Though never extended into the realm of emotional processing in psychopaths, a useful modification of the lexical decision making task was described by Meyer and Schvaneveldt (1971); rather than presenting strings of letters, word pairs are used. The task subjects are faced with is to determine whether or not each pair of words is related, and to press one of two keys according to their decision. Using this task, Meyer and Schvaneveldt (1971) found that on average, subjects could respond to related words, by depressing a button,

(eg. BREAD - BUTTER) in 855 ms whereas nonrelated words met with an average response time of 940 ms. Meyer and Schvaneveldt concluded that this data was consistent with the hypothesis that a priming effect had taken place in memory. According to Ashcraft (1989, pp. 125): "A word automatically activates or primes its meaning in memory, and as a consequence primes or activates meanings closely associated with it" upon presentation. Priming is an example of an automatic process.

To fully appreciate the concept of priming, one must refer to a semantic memory model, such as that outlined by Collins and Quillian (1972), which holds that the structure of semantic memory is akin to a network comprised of nodes representing distinct concepts that are interconnected by a series of pathways. The key to the network's operation is a process called spreading activation, by which the sequential excitation of one node by another takes place (Collins & Loftus, 1988). Semantic memory can be thought of as the totality of one's stored world knowledge, and is an attribute of long term memory (Tulving, 1972). In addition to spreading activation to adjacent nodes, exciting a given node will facilitate recall of other words and terms in that node, and

thereby facilitate their availability to retrieval from memory. This process translates into faster processing and hence faster reaction times in experimental settings. The closer two concepts or words are in semantic memory, the greater the facilitation effect of priming will be. Ashcraft (1978) referred to this as the semantic relatedness effect. A logical corollary to the semantic relatedness effect is that the organizing principle or dimension of semantic memory is conceptual relatedness. Other points to note are that spreading activation is a bidirectional process in that priming of adjacent nodes can occur either way. Also, consistent with this description of memory as a network, each node has multiple pathways to other nodes, and can therefore spread activation, or receive activation from several other nodes simultaneously. The greater the degree of activation, the more strongly the node's contents will be represented in consciousness.

An important variable is the length of time that transpires between the presentation of the prime, and the presentation of the target. This Stimulus Onset Asynchrony, or SOA, has consequences for the mode of processing underlying retrieval of the target from memory. An SOA of 250 milliseconds or less provides

adequate time for the effects of spreading activation, but not controlled, strategic searching which would allow the subject to preselect words against which the target could simply be compared on a same/different basis. Hence, to the extent that longer reaction times are noted following presentation of the target, the subject is more likely to be engaging in controlled processing. Conversely, faster responses require that decisions be made on the basis of the target being compared to a small subset of words primed in semantic memory.

Bower (1981, 1987) has recently extended the network model of memory to include mood. In this revision, basic emotional states are represented in nodes similar to those holding semantic concepts. When one is activated by spreading activation, emotion is subjectively experienced. Hence, stored memories may come to include an affective component through the same associative and excitatory processes operating on semantic nodes. As with semantic nodes, the strength of connections between points in the network increases as a function of use.

The most recent work in the area of semantic memory and mood has focused on the areas of mood

congruency and state dependency. Briefly stated, the hypothesis of mood congruency holds that the retrieval of semantic material from memory will be most readily achieved when one's emotional state is most consistent, or congruent with, the information to be recalled. This effect would be predicted by Bower's (1987) model because the activation of affective nodes would prime semantically relevant nodes. Hence the activation of those subsequent nodes would be increased, and their contents would more likely be processed. In addition to whatever activation came from an emotional node, further stimulation would arrive along pathways connected to other semantic nodes.

A competing view is that of state dependent learning theory which holds that the contents of memory are recalled most efficiently under emotional conditions most similar to those which were in place at the time of encoding. Hence, there is no requirement that one's mood at the time of recall be affectively relevant to the actual information to be recalled. In practice, the distinction between mood congruence and state dependency is often difficult to maintain because one's mood (emotional state) is likely to correspond closely to the informational characteristics of a given

situation. Hence, upon later recall, one cannot readily conclude that any observed facilitation is attributable to one or the other effect. To separate these two influences, experimental investigations have often sought to induce, or capitalize on pre-existing mood states, while comparing recall of information which is alternatively affectively congruent and incongruent. Such investigations have, however, met with mixed results.

Consistent with the predictions of the state dependency hypothesis, Bower (1987) cited a number of previously unpublished failures to produce a mood congruent effect in the laboratory. These studies typically attempted to manipulate subjects' mood through hypnotic means, and then find performance differences on measures ranging from tachistoscopic thresholds for identifying affective words, to speed on a modified Stroop task (described in detail in Chapter II) in which the subject had to name the ink color in which affectively non-neutral phrases were printed. In contrast to the laboratory findings, a number of investigations using clinical samples have returned results fully consistent with the mood congruency view. Burgess, Jones, Robertson, Radcliffe and Emerson (1981)

utilized a dichotic listening task in which subjects were required to simultaneously listen to different information presented on each channel of a stereo headset. In this paradigm, subjects are required to attend to information constantly presented through one channel, such as a poem, and to emit a behavioral response such as button press when a target word is presented in either the opposite ear, or the same one being attended to. Couched in the terms of information processing, a framework within which this method is often used, one would predict that response accuracy when the target is presented in the attended channel should be high, whereas the accuracy of responding should be lower when targets are heard in the other channel; that is, unless the process by which the target enters consciousness is an automatic one since such processing places little load on attentional resources. Moreover, in a phobic clinical group the baseline level of activation of nodes relevant to the objects of fear should be high. Target words relevant to one's object of fear should therefore be pre-primed. Consistent with these predictions, Burgess et al (1981) found that phobic patients more accurately detected target words presented on the unattended channel than

controls, whereas there was no difference in accuracy between the two groups when these words were presented in the attended to channel.

Using the modified Stroop task mentioned earlier, a number of researchers (eg. Watts, McKenna, Sharrock & Tresize, 1986; MacLeod, Andrews & Tata, 1986) found a significant interference effect when anxiety-producing words were printed in the color of ink to be named by their subjects. Although these findings are superficially consistent with the mood congruence hypothesis, it must be noted that the only reliable successes were achieved with clinical samples of subjects with longstanding preoccupations with certain moods or stimuli, and that procedures based on mood manipulation in normal populations were largely unsuccessful.

Regarding the status of the state dependency hypothesis, Bower (1987) noted that it is likewise mixed. On the whole, the phenomenon appears inconsistently in laboratory studies, but seems to emerge with greater reliability if subjects perceive an event to be the cause of their resulting emotional state, an effect which caused Bower (1987) to put forth the Causal Belonging Hypothesis. This effect, in turn

appears to promote mood dependent retrieval.

Another issue currently being debated in the literature concerns an attempt to explain priming effects in terms of behavioral principles, specifically whether or not the concept of spreading activation could be more parsimoniously explained in terms of compound cues acting as conditioned stimuli. Such cues contain information about the target as well as the context in which it occurs, and the performance improvement resulting from a compound cue is a function of its familiarity (how often the subject has previously encountered it; Ratcliff, 1978). The familiarity of the compound cue is a function of the familiarity of its components.

The appeal of this model is that it takes advantage of the naturally correlated appearance of certain objects in one's environment (eg. Table - Chair). So just as spreading activation would predict, more effective priming should take place when the prime and target are conceptually related then when they are unrelated. McNamara (1992, 1994) has addressed this issue in depth, and concluded that the current data are more consistent with a spreading activation model. For example, McNamara (1992) published a study that

capitalized on the difference in predictions made by each model with respect to three-step priming, where a seemingly unrelated prime and target are presented, eg. Gift - Pie (McNamara, 1994). Despite the apparent unrelatedness of the prime and target, they are carefully chosen to be conceptually separated by only a few steps, such that presentation of the prime should indirectly activate the target. In the above example, this might be as follows: Gift - [Birthday - Cake] - Pie. Hence, spreading activation theory would predict a relatively small, but existent priming effect, which did indeed emerge (McNamara, 1992). Non-spreading activation theories do not predict priming under these circumstances.

As priming is an automatic process, it may relate to deficits in psychopaths' processing of words referencing affective phenomena in one of two ways: First, it may reflect a fundamental difference in the arrangement of the semantic network amongst psychopaths, as compared to controls; or second, it may reflect a more general failure in the priming and/or retrieval processes themselves. Dagenbach and Carr (1994) have recently offered a theory which has implications for this question. These investigators

dealt with the question of how new nodes are added to a semantic network. They identified two problems which any answer to this question must address: 1) A semantic network must strike a balance between stability and flexibility. If it is too rigid, new information can not be adequately accommodated, and learning will not take place. If it is too flexible, a single negative instance would undermine the arrangement of the network pathways which collectively represent past experience. 2) Since newly formed nodes will be weaker in their baseline level of activation than older ones, owing to a more mature system of interconnections with other points in the network, some mechanism must be in place to prevent their contents from interfering with the expression of newer, more weakly connected nodes.

Dagenbach and Carr (1994) went on to suggest that there are four ways this could occur. First, priming could be asymmetrical in that old nodes might activate new ones, but not vice versa. Second, new information might simply exist at a higher level of initial activation. Third, new information may not be made available through the usual mechanism of spreading activation. Specifically, its retrieval could depend more on controlled processing. Last, there could be a

mechanism by which closely related, but nonequivalent, information is actively inhibited, thereby reducing the risk of interference. The authors proposed a center surround model to this end. In this model, there is a zone of inhibition surrounding a central facilitation point centered on the semantic code to be retrieved. Data consistent with this model were provided by Dagenbach, Carr and Barnhardt (1990) who found that priming well-learned information with newly learned information resulted in mixed effects: For those priming words subjects were able to accurately define, there was a significant facilitation effect, whereas an inhibition effect was noted when subjects could not recall the definitions of primes.

With these findings in mind, one might speculate that a similar mechanism could explain any interference effects found in the responses of psychopaths to emotional words. In other words, they may store affective information in a manner reflecting greater semantic relatedness (and hence lesser specificity) than their controls. This would place related concepts within a zone of inhibition, and thereby account for poorer performance on tasks such as that outlined in Experiment 2.

Williamson et al's (1991) data provide no basis on which this distinction can be made as the lexical decisions made by their subjects were not deliberately primed as part of the experimental procedure.

The three experiments in this study are designed to yield answers to four questions: 1) Can the findings of Williamson et al(1991) be generalized to a young offender population? 2) Do psychopaths show an interference effect corresponding to the facilitation effect demonstrated by controls when affective stimuli are processed? 3) Can these effects be extended into a more cognitively complex task in which the affective relationship between words is made manifest? and 4) Do the patterns of reaction time differences between psychopathic and nonpsychopathic youths, hypothesized to reflect deficits in automatic processing, persist when emotional words are presented in a manner which forces controlled processing?

CHAPTER II

Literature Review

History and Development of the Concept of Psychopathy

Psychopathy is that construct which describes an element of personality predisposing one to criminal and other antisocial behaviors. Similar notions are embodied in terms like Moral Corruptness, Antisocial Personality Disorder, and Moral Insanity. Historically, the diagnosis of this attribute has progressed from a purely theoretical and attributional definition (eg., Pinel, 1801; Pritchard, 1835) to one based primarily on observable behaviors (i.e., Antisocial Personality Disorder; APA, 1994). More recently, there has a been a recognition of the need to include both dimensions (Hare, 1985).

The observation that certain members of society seem virtually incapable of sustaining the expected levels of lawful, responsible behavior is obviously not new. Neither are attempts to explain this. Pinel, as early as 1801, coined the phrase mania sans delire to characterize the condition of individuals who demonstrated high levels of social irresponsibility despite apparently intact intellectual functioning. Benjamin Rush (1812), one of the founding fathers of

modern psychiatry, was amongst the first to hypothesize a physiological basis for antisocial behavior as characterized by his description of "a congenital defect of moral derangement" which was therefore the domain of medicine. The term "Moral Insanity" was coined by Pritchard and survived until quite recently. He wrote: "The intellectual faculties appear to have sustained little or no injury, while the disorder is manifested principally or alone in the state of the feelings, temper, or habits." Pritchard (1835) continued: "the individual is incapable... of conducting himself with decency and propriety, having undergone a morbid transformation." The last two words suggest that Pritchard was referring to adult onset cases which, as Tuke (1891) pointed out in considering the words of Rush (1812), is difficult to reconcile with the notion of a "congenital defect."

It should be noted that Pritchard was including, in his description, individuals who were likely suffering from impulse control disorders, and therefore was likely to have introduced heterogeneity to his patient pool. Similar diversity seems to have shaped Maudsley's (1879) description, which appears to correspond more closely to the current clinical picture

of Bipolar Affective Disorder as described in the Diagnostic and Statistical Manual of Mental Disorders - Forth Edition (DSM-IV): "This, in fact, a class of case in which a deep state of genuine melancholia alternates with a state of mental excitement, the symptoms of which are principally those of moral insanity." By 1904, a Royal Commission was organized which introduced a distinction between such cases, and those closer to the purer presentations described by Rush, Pinel, and Pritchard.

Parallelling the theoretical concerns of the Royal Commission were those pertaining to issues of personal responsibility; particularly in legal matters. For example, Gray (1858) wrote: "The doctrine of moral insanity is bad.... because it tempts men to indulge their strongest passions under the false impression that God has so constituted them.... that there is no punishable guilt in indulging them. This is fatalism." This view was also, in part, a reaction to a failure to find any physiological basis for the disorder. More importantly, it highlights the concern that characterizing misbehavior as biologically based contradicts the notion of personal responsibility.

Shortly after the turn of the century, there was

heightened interest in defining the condition more precisely, in part to aid the advancement of research. Kraepelin (1909) for example, created a list of seven subtypes. It included the excitable, the unstable/impulsive, the eccentric, the liar, the swindler, the antisocial, and the quarrelsome. It is interesting to note that all of these ideas survive in the current conceptualization of psychopathy, though not as discreet subtypes. Kahn (1931) expanded the list to fifteen types including the nervous, anxious, sensitive, compulsive, excitable, hyperthymic, depressive, moody, affectively cold, weak willed, sexually perverse, hysterical, fantastically cranky, and eccentric. Scheider (1934) took the opposite approach: Rather than creating a list of subtypes, he held that this condition could be taken to include "all those abnormal personalities who suffer from their abnormality or cause society to suffer." This later group would, of course, include neurotics and many others who would have been excluded by the other criteria.

The diversity of explanations, labels and definitions noted above underscores the lack of consistency that has plagued researchers in the area of

serious criminal behavior. To the extent that differing subject selection criteria distinguish participants across studies, it is virtually impossible to generalize findings from one group to the next.

While debate continued as to the scope of behaviors and characteristics appropriate for inclusion in the diagnostic criteria for psychopathy, Cleckley (1941, 1976), who has since become recognized as one of the central writers in the area of psychopathy, put forth the first description of the disorder, which also carried an implicit assumption about the psychological factors underlying it. His description acknowledged the superficial charm and flair psychopaths often present with and had, at its core, the concept of semantic dementia (Cleckley, 1976), underscoring the apparent rift between words and deeds that figures prominently into the many vignettes characterizing the behavior of psychopaths. This idea is well represented in the often quoted phrase, "They know the words but not the music" (Johns & Quay, 1962).

Cleckley's seminal work The Mask of Sanity (1976) provided many of the diagnostic criteria in use to the present day. The 16 characteristics he identified are listed in Table 1 below. As is readily evident by their

inspection, Cleckley's criteria left researchers and clinicians to rely heavily upon inference concerning the presence or absence of the essential characteristics.

Table 1

Cleckley's 16 Diagnostic Criteria

1. Superficial charm and good intelligence
2. Absence of delusions and other signs of irrational thinking
3. Absence of nervousness or psychoneurotic manifestations
4. Unreliability
5. Untruthfulness and insincerity
6. Lack of remorse or shame
7. Inadequately motivated antisocial behavior
8. Poor judgement and failure to learn by experience
9. Pathological egocentricity and incapacity for love
10. General poverty in major affective reactions
11. Specific loss of insight
12. Unresponsiveness in general interpersonal relations
13. Fantastic and uninviting behavior with drink, and sometimes without
14. Suicide rarely carried out
15. Sex life impersonal, trivial, and poorly integrated
16. Failure to follow any life plan

Predictably this resulted in limited diagnostic reliability, and ultimately in dissatisfaction with Cleckley's criteria. Owing in part to the strong behavioral influence of the times, a complete reversal took place such that new diagnostic strategies evolved

which placed exclusive emphasis on directly measurable criteria. The best current example is found in DSM-IV (APA, 1994) which does not refer directly to psychopathy per se, but includes Antisocial Personality Disorder (APD; see Table 2 below).

Table 2

DSM-IV Diagnostic Criteria for Antisocial Personality Disorder (APA, 1994)

A. There is a pervasive pattern of disregard for and violation of the rights of others occurring since age 15 years, as indicated by three (or more) of the following:

(1) failure to conform to social norms with respect to lawful behaviors as indicated by repeatedly performing acts that are grounds for arrest

(2) deceitfulness, as indicated by repeated lying, use of aliases, or conning others for personal profit or pleasure

(3) impulsivity or failure to plan ahead

(4) irritability and aggressiveness, as indicated by repeated physical fights or assaults

(5) reckless disregard for safety of self or others

(6) consistent irresponsibility, as indicated by repeated failure to sustain consistent work behavior or honor financial obligations

(7) lack of remorse, as indicated by being indifferent to or rationalizing having hurt, mistreated, or stolen from another

B. The individual is at least age 18 years.

C. There is evidence of Conduct Disorder (see p. 90) with onset before age 15 years.

D. The occurrence of antisocial behavior is not exclusively during the course of Schizophrenia or a Manic Episode.

While this strategy has improved diagnostic reliability, it has hampered the integration of explanatory hypotheses which address psychopathy at the level of underlying psychological factors. Also, since adolescents, by definition, do not meet the minimum age requirement of 18, they are diagnosed according to the closely related, though less stringent heading of Conduct Disorder. The criteria for this condition are virtually identical to those in Part A of the former DSM-III-R (APA, 1987) criteria, for Antisocial Personality Disorder. The distinction between Conduct Disorder and APD partially explains why most of the research concerning criminal antisocial behavior has been carried out with adult populations.

The PCL-R and Hare's Approach to the Assessment of Psychopathy

More recently, Robert Hare (1980, 1991) has advocated for, and standardized a diagnostic scheme based on behavioral criteria but which also operationalizes characteristics of the sort described by Cleckley. Proper completion of the Psychopathy Check List-Revised (PCL-R; Hare, 1991) yields highly reliable psychopathy ratings, in the form of a score ranging from 0 to 40, with higher scores corresponding to

greater levels of psychopathy. A score of thirty or higher is generally used as the cutoff between psychopath and non-psychopath groups, but Hare has emphasized that the instrument can also be used to classify individuals along a psychopathic dimension. Each ratee is assigned a score of 0, 1, or 2 on each of 20 items, according to a strict set of scoring guidelines, and the overall score is the sum total of the individual item scores.

Factor analytic studies (eg., Harpur, Hakstian & Hare, 1988) have consistently yielded a two-factor solution. Factor I reflects interpersonal/affective features, of the type described by Cleckley, and Factor II reflects the more behaviorally recognizable antisocial and criminal features inherent to the diagnosis of APD. Forth, Hart and Hare (1990) provided evidence that the PCL is useful as a research instrument in young offender populations, but did not work with a large enough sample (n=75) to conduct a factor analysis. This remains to be done.

Standardization and Psychometric Characteristics of the PCL-R

Standardization studies cited in the PCL-R manual (Hare, 1991) have been conducted in a variety of

settings. Most relevant here are those carried out in correctional or forensic institutions. Data gathered from six North American (three Canadian and three U.S., N=1192) jails resulted in an approximately normal distribution of PCL-R scores with a mean of 23.63, and standard deviation of 7.92. These studies were all based on adult populations, but included members from a variety of ethnic groups including Caucasians, Blacks, English and French Canadians, and Native Canadians.

The pooled distribution derived from four forensic samples (N=440) was likewise approximately normal. The mean in this sample was 20.56, and the standard deviation 7.79. In the PCL-R Manual, Hare (1991) commented on the remarkably high similarity between the distributions obtained at the various sites. Likewise, the PCL-R Manual (Hare, 1991) reports good interrater reliability for the individual items, ranging from 0.42 to 0.86, and more importantly, total score interrater reliabilities of 0.78 when single raters administer the PCL-R, and 0.87 when the averaged scores of two-rater teams are used. These latter figures refer to data obtained from prison inmates. In the forensic samples, interrater reliabilities obtained through the use of independent raters was 0.91, and this figure increased

to 0.94 when the averaged scores of rater teams (of two) were used. Regarding internal consistency, Hare (1991) reported Cronbach's alpha coefficients of 0.86 and 0.85 for the inmate and forensic samples respectively.

Forth et al (1990) reported that a mean total score of 23.6, and a standard deviation of 6.8 emerged from their adolescent sample of 75 male young offenders. The median and mode of the distribution were very similar at 23.5 and 23.0 respectively. This study utilized an 18 item modification of the PCL (Hare, 1985), the forerunner of the PCL-R, and a description of these changes is provided in the Method section of this document. In brief, these are merely logical reflections of age and experience differences between young offender and adult populations, and involve the deletion of two items, and slightly modified scoring of two more. Prorating the scores onto the full 20 item scale yielded a mean of 26.2, and a standard deviation of 7.5. Total PCL score was not significantly correlated with age or educational level.

Other information reported by Forth et al (1990) included evidence for the validity of the PCL in Young Offender populations. For example, total PCL scores

were significantly correlated with the number of Conduct Disorder symptoms which applied to subjects. Significant correlations also emerged between total PCL score and number of previous violent offenses, and number of institutional charges for violent or aggressive behavior.

The vast majority of research pertaining to psychopathy, and related conditions, was performed using adult male subjects, many of whom were prison inmates. Most of these studies assigned subjects according to DSM criteria, which means that the findings are not readily generalizable to groups defined by the PCL-R criteria. Nevertheless, diagnostic overlap is fairly high. Hart, Forth and Hare (1991), for example reported a correlation of 0.48 between PCL-R scores and APD diagnoses. Furthermore, the correlation between PCL-R scores and number of APD criteria met was 0.72. Not surprisingly, in view of DSM's emphasis on relatively objective diagnostic criteria, these investigators also found that the highest correlation existed between APD criteria and PCL-R Factor II scores. In all, 79.2% of their subjects who met the PCL-R criteria for classification as psychopaths (i.e., total score of thirty or higher),

also met the DSM-III-R criteria for APD. Highlighting the relatively stringent criteria of the PCL-R was the converse finding that only 30.2% of the APD group were definable as psychopaths. In other words, the APD criteria define a much larger group of people, who likewise appeared more heterogeneous both qualitatively and quantitatively. As Newman and Wallace (1993) pointed out, this additional heterogeneity may stem in part from the fact that high social skills, an ability to avoid detection, and/or a less stereotyped manifestation of psychopathy among high PCL-R scorers may prevent formal APD diagnosis.

Relevant Research Findings

Some of the first experimental data to support Cleckley's conceptualization of psychopathy emerged from Lykken's (1957) demonstration that psychopaths show deficient passive avoidance learning compared to controls. In that study, Lykken required subjects to learn a sequencing (or "mental maze") task, consisting of 20 decision points requiring the depression of one of four switches. Pressing the correct switch moved the subject to the next set of choices, as signalled by a green light. Two of the three remaining switches activated red lights, indicating the need to make

another choice, and pressing the remaining switch resulted in a shock. Subjects were not told that the shock was avoidable. As successful learning of the task would result in fewer shocks, the threat of which would engender anxiety, Lykken used the number of shocks delivered as an index of how effectively anxiety reduction would reinforce correct responding. Consistent with Cleckley's position that psychopaths do not develop emotional responses (i.e. fear) as readily as normals, Lykken found that the psychopaths received significantly more shocks.

More specific models of proposed systems and deficits bearing on psychopathy began to emerge in the mid 1960's. Eysenck (1964), for example, postulated that psychopaths suffer from low levels of central arousal, and thus engage in highly stimulating, sensation seeking behaviors in an attempt to activate the relevant neurological structures. This is much the same thinking that is currently applied to the issue of Attention Deficit Hyperactivity Disorder, and the effectiveness of central stimulants, such as methylphenidate, in reducing motoric excesses. Chesno and Kilmann (1975) reported data directly relevant to this hypothesis. These investigators selected 90

subjects on the basis of Cleckley ratings and created two groups (high psychopathy and low psychopathy) of equal size. Subjects from both groups were further divided into three groups according to their level of anxiety, on the basis of self-reports. The task involved viewing a series of numbers for a brief period and either pressing, or not pressing, a button. Certain numbers signalled that button pressing would prevent an electric shock, whereas pressing when those numbers were absent would result in the delivery of an otherwise unscheduled shock. Testing occurred under three experimental conditions defined by the level of background white noise in the testing environment. The noise levels were 35, 65, and 95 dB respectively. The researchers were interested in assessing the effect of background noise on avoidance learning. They found that low anxious psychopaths made significantly more active errors (those resulting from pressing the button when numbers signalling shock were not presented) than the other groups in the 35 dB condition, but they made no more errors when the background noise was higher. Given that loud noise and electric shock both constitute forms of stimulation, Chesno and Kilmann (1975) hypothesized that receiving shocks in the low noise

condition was "beneficial" to the low anxious psychopaths in terms of increasing their level of central stimulation. Under higher noise conditions, when this stimulation was presumably already in place, the additional shock would have been subjectively perceived as more aversive, and hence its avoidance would have greater value as a reinforcer of correct responding. Schachter and Latane (1964) had previously produced highly compatible results by injecting their subjects with adrenaline, which also has the effect of increasing arousal.

These findings suggested an alternative explanation for Lykken's (1957) data; psychopaths may have been unwilling, rather than unable to learn the passive avoidance task if indeed the resulting increased levels of central arousal were in some way beneficial or even pleasurable. This possibility was further investigated by Schmauk (1970) who employed three different types of punishment in a design which closely resembled Lykken's. These were electric shock, being verbally informed when an error was committed, and being fined 25 cents for each error. Subjects in the latter condition were told they could earn as much as eight dollars if their performance was perfect.

While psychopaths performed more poorly when punished by shock or verbal feedback, they made no more passive avoidance errors when financial punishments were used. This is consistent with the hypothesis that electric shock may improve central arousal in psychopaths.

Contrary data were provided by Siegal (1978) who allowed his subjects to turn over as many cards from each of 11 decks as they wished. For each numbered card they turned over they were payed one cent, whereas they were fined one cent for each face card they turned over. The card decks were prearranged to contain a fixed number of punishments. In the first deck, no face cards were included, and hence no fines were imposed. In the final deck, all cards were face cards. The percentage of face cards increased progressively in 10 percent increments from the first to the last deck. As subjects could abandon a deck, and move to the next whenever they wished, it was possible to derive a measure of response suppression on the basis of how many cards were not played in the time taken to complete the initial (100% payoff) deck. Siegel (1978) predicted that response suppression would be poorest among psychopaths when the probability of punishment was most uncertain. In fact, psychopaths' responses

were significantly less suppressed than those of controls, and most of the between-group difference originated in the fifth to ninth (40% to 80% punishment) decks. Therefore, while their responding, and hence suppression, was comparable to that of controls when the probability of punishment was very low or very high, they were slower to suppress their responses in the middle probability range. Of equal importance was the finding that psychopaths could estimate prior payoff rates about as accurately as controls. From this one can conclude that their failure to suppress was not explainable on the basis of deficient appreciation of the risks; they were, once again, seemingly less willing to suppress responses or, as Newman and Wallace (1993, pp. 316) put it: "psychopaths appear less able or less inclined to integrate such information with expectations about the future." This is consistent with Shapiro's (1965) suggestion that the process of integrating immediate whims and wishes with longstanding values and goals is disrupted in psychopaths, thus explaining their apparent impulsiveness.

There is an alternative explanation for these data: Specifically, that once a dominant response

behavior has been established, psychopaths are unable to disengage from it, and voluntarily consider new information in modifying their response strategies. Combining Schmauk's (1970) finding that psychopaths make no more passive avoidance errors than controls if monetary punishments are used, and Chesno and Kilmann's (1975) design, Newman and Kosson (1986) punished passive avoidance errors with a ten cent fine instead of an electric shock. Under these conditions, psychopaths made no more active or passive avoidance errors than controls. In a second phase of the study, a ten cent reward was also given for correct responses, thereby establishing competing reward and punishment contingencies. This resulted in significantly more passive avoidance responses being committed by psychopaths than by controls. The investigators interpreted this as evidence that psychopaths have difficulty abandoning a response set established on the basis of securing rewards, even in the face of competing punishment contingencies.

Given that their apparent lack of impulse control invites comparison of psychopaths to frontal lobe injured patients, a number of investigators have conducted studies examining performance on a range of

test consists of three parts: In the first, the subject reads the names of colors down vertically oriented columns printed on a page. The words green, blue, and red are the only ones used, and they are printed in an ordinary black typeface. The subject is asked to read aloud as many words as possible in 90 seconds. The second part of the task is very similar, but instead of actual words, strings of X's are presented which are printed in random-looking alternations of red, blue, and green ink. The subject's task is to name the ink color for as many groups of X's possible in 90 seconds. The third and final phase of the test merges the first two parts; i.e., the words red, green and blue appear as in part one, but they are not printed in their corresponding colors. The subject is to name the ink color, as in part two, and ignore the printed word.

As reading of the printed word is an automatic and therefore fast process, it must be deliberately inhibited to respond correctly to each item. The failure to do so, as measured by a reduced number of correctly named colors (according to ink), is reflected in an interference score derived from the data of all three parts. Previous research (eg. Golden, 1978) has upheld the utility of this score in discriminating

between intact and frontal lobe impaired populations, owing to the importance of the frontal lobes both to planning and behavior inhibition.

One could summarize the findings reported thus far in this section in a few statements: First, psychopaths are more likely to show punishment effects when monetary penalties (negative punishment) are used, than when aversive stimuli (positive punishment) are applied. Second, they will show these punishment effects in the form of response suppression as long as competing reinforcement contingencies are not in place. Third, they appear to integrate new information poorly unless forced to delay responding for even a brief period, and fourth, it seems they cannot be differentiated from controls on tests of intellectual ability or neuropsychological impairment. Since the first three of these points seem consistent with the view that psychopaths may focus narrowly on cues signalling positive reinforcement, a number of investigators have pursued the possibility that psychopaths block out less salient information, or over focus on "events of immediate motivational significance" (Newman & Wallace, 1993, pp. 323). This hypothesis has lead to a series of studies designed to

force the division of attention. Jutai, Hare and Connolly (1987) for example, recorded event-related cortical potentials while subjects listened to phonemes either with or without the simultaneous task of playing a video game. Two phonemes were used, and the task was to press a button when the less frequent of these was heard. If psychopaths do indeed devote attention to a primary task (eg. playing a video game) to the relative exclusion of other stimuli, their performance on the detection component should have suffered relative to their performance in the detection only condition. More importantly, any such performance decrease should have been of greater magnitude than that shown by controls. This was not the case.

The research most relevant to the present study is that of Williamson et al (1991). Their findings emerged within the context of a broader experiment in which both Event Related Brain Potentials (ERPs) and response time (RT) data were recorded while psychopaths and controls completed a lexical decision making task. In their design, letters were presented and subjects were required to respond by depressing a button if a letter sequence formed a word. Williamson et al used words which had previously been assigned a position on a

seven-point scale according to "Pleasantness" (Toglia and Battig, 1978; see Appendix A). The investigators wished to determine if positive and negative words, as opposed to those of neutral emotional value, were less accurately identified as proper English words. They also measured the time taken to react to each word. Their results were interesting; while psychopaths did not make more errors than controls on either neutral or emotional words, their response latencies were higher for the emotional words than those of controls. Their results are listed in Table 3 below.

Table 3

Mean Reaction Times from Williamson et al (1991)

	Controls	Psychopaths
Positive	812	884
Negative	817	905
Neutral	863	867

Note. All times are in milliseconds.

Following previous research conducted with noncriminal populations (Graves, Landis, & Goodglass, 1981; Strauss, 1983) Williamson et al (1991) correctly hypothesized that a facilitation effect would emerge for nonpsychopathic subjects when emotionally nonneutral words were presented. They did, however, not anticipate the emergence of an interference effect in

the data produced by psychopathic subjects as this did not follow from earlier findings (Strauss, 1983) which attribute response facilitation to the existence of additional information where affective connotations are concerned. That is, if psychopaths are truly insensitive to this additional information, they should respond to emotional words in the same way as they would to neutral words, but not slower.

Before proceeding further, two limitations in this design should be highlighted. The first is that psychopaths might merely show a different threshold in the strength of emotional connotation needed before they will make use of affective information, or alternately may require additional contextual cues. Williamson et al's (1991) findings may therefore not be generalizable to the emotional phenomena of interest to the real-world study of antisocial behavior. The second point is that in the absence of any conceptual matching requirement, the relationship between the semantic and affective meaning of words is ambiguous. For these reasons, Experiment 2 in the present study included two key modifications to the stimuli and task. The first was to require subjects to match words which are conceptually related in both the semantic and emotional

realm. Hence, if a subject responds in a way indicating congruence between two words such as Depression and Sadness, this should occur faster and/or more accurately if an affective conceptualization of the term is available, as opposed to a merely semantic one. As for the second modification, it was hypothesized that the use of words which more representatively draw from the domain of experiences of interest to the study of psychopathy would enhance between-group differences. After all, the concept of semantic dementia refers to deficits demonstrable in matters of nontrivial emotional import.

Newman and Wallace's (1993) hypothesis that psychopaths operate under conditions of deficient automatic processing allows for the emergence of an interference effect in the data generated by psychopathic subjects in the first two Experiments. Hence, a suitable post-hoc comparison was planned. To test for the effects of automatic processing, it is necessary to present material in such a way that its semantic value remains intact, but that the word's visual familiarity, which would facilitate automatic recognition if related meanings were primed in memory, is removed. In Experiment 3, this is achieved by

presenting the second of each pair of stimulus words (the target) backward; a technique commonly employed in studies of controlled versus automatic processing. The rationale behind this procedure is that repetitive exposure to written words is accompanied by a transition in the status of those words from a collection of letters, to a collective symbol (eg. LaBerge & Samuels, 1974). As a result, rapid recognition and reading are facilitated upon the attainment of adequate fluency over repeated presentations. Presenting a word backward forces a subject to engage in deliberate, controlled decoding, which results in a fading of primed activation owing to the cognitive load imposed by deciphering the reversed lettering.

In the interests of accurately representing the hypothesis of deficient automatic processing, it is necessary to acknowledge the following points. First, while priming is an example of automatic processing, it is not the only example. By definition, virtually any cognitive operations, including those responsible for the activation of controlled processing, can come under automatic control provided they place progressively fewer demands on attentional resources over the course

of repeated execution. Second, Newman and Wallace (1993) explicitly stated that while any such deficits might be contributing factors to psychopathic behavior, they are not necessarily the sole causal factors. Indeed they emphasized the importance of integrating any cognitive explanation with the existing experimental, theoretical, and psychophysiological findings.

Need for the Present Study

The three studies described below are designed to address four questions. The first of these concerns the replicability of Williamson et al's (1991) findings in a group of psychopathic (P) and non psychopathic (NP) young offenders (YO's). In addition, it planned for a test of interference effects. Experiment 2 was included to further extend the investigation of affective language differences to a more cognitively complex (and theoretically relevant) task. The third experiment was designed to test Newman and Wallace's (1993) hypothesis that psychopaths suffer from deficient automatic processing in aspects of language functioning relevant to emotional words. Another goal of this study was to contribute a series of findings designed primarily from a cognitive processing perspective, which at the same

time represented a natural continuation of research done so far in this area.

CHAPTER III

Method

Subjects

A total of 30 adolescent males, 15 psychopaths and 15 controls, served as subjects in this study. All were sentenced or remanded to custody under the provisions of the Young Offenders Act of Canada (1980). At the time of their participation, all subjects were residing either at the Edmonton Young Offender Centre (EYOC) or the Turningpoint Program at Alberta Hospital Edmonton (AHE). To be housed in either facility, non-remanded subjects must have received an open or closed custody sentence. Adolescents before the Court may request psychiatric assessment prior to sentencing which takes place over a one-week period at AHE. Other adolescents at AHE have been sentenced and remain for longer periods, typically four to six months, to engage in inpatient treatment. The modal diagnosis of Young Offenders at AHE is Conduct Disorder, and this applies equally to those undergoing remand assessment and inpatient treatment. Female YOs were excluded from this study only because they exist in much smaller numbers than males in the Alberta Young Offender system. This is highlighted by the fact that only one of the eight

living units at EYOC houses females, and only two of fifteen beds at AHE were consistently occupied by females over the five months the data for this study were collected.

Despite comprehensive prescreening, a total of thirty four individuals had to be tested in order to find 15 subjects meeting the criteria for inclusion for each group. Those subjects ultimately included were all between 16 and 19 years of age. The two groups did not differ on the basis of age, or their scores on the Shipley Institute of Living Vocabulary or Abstraction subscales. These data are summarized in Table 4 below.

Table 4

Summary of Subject Variables

Variable	Group		df	*t*
	Psychopaths (n=15)	Controls (n=15)		
Age	16.67 (0.90)	17.00 (0.84)	28	-1.05
Vocabulary	25.27 (4.43)	23.27 (6.00)	28	1.04
Abstraction	28.00 (4.90)	28.80 (5.65)	28	-0.41

Note. Values in parentheses represent standard deviations. All values of *t* are insignificant.

Subjects were classified into the Psychopathic (P) or Nonpsychopathic (NP) group on the basis of their

scores on a modified scoring of Hare's (1991) Psychopathy Check List - Revised (PCL-R). Following the method outlined by Forth, Hart, and Hare (1990), items 9 and 17 were deleted as they refer to domains of experience in which adolescents typically have little background: parasitic lifestyles and multiple short-term marital relationships. Item 18 refers to juvenile delinquency, and its scoring required modification as it would have otherwise provided no discrimination among a group of incarcerated Young Offenders. Subjects with a history of violent offenses were assigned a 2, and those without received 1 point on this item. Finally, Forth et al (1990) recommended a modification to the scoring of item 20, criminal versatility, given that young offenders typically have a shorter history in this area. With this alteration in place, conviction on four or more types of offenses resulted in a score of 2, conviction on three types of offenses a score of 1, and less than three, a score of 0. All PCL-R ratings were based on a review of institutional files, including formal charge records, as well as a semi-structured interview lasting approximately 90 minutes. The content of this interview was based on the outline sold with the PCL-R package.

NP and P subjects were matched on the basis of the Shipley Institute of Living Scale subtests (Verbal and Abstraction), as well as age to control for the effects of maturation and intellectual ability. The Shipley Institute of Living Scale (SILS; Shipley, 1940) correlates highly (eg. r=0.86, Weiss & Schell, 1991; r=0.85, Zachary, Crumpton & Spiegel, 1985) with more comprehensive measures such as the WAIS-R (Wechsler, 1981), and allows for direct assessment of word vocabulary as well as one's ability to detect abstract patterns and similarities. Both of these skills are directly relevant to the tasks of the present experiments.

The writer originally intended to match the P and NP groups on the basis of education in addition to age and IQ scores. It quickly became apparent, upon interviewing the participants that this was not practical since many were taking courses at multiple grade levels, and others had a history of enrollment in behavior adaptation or special education classes. Their grade standings were therefore simply not comparable.

Procedure

Prior to commencement of the research project, written proposals were submitted for ethical review by

the University of Alberta, Alberta Hospital Edmonton, and the Correctional Services Division of Alberta Justice. Written approval was obtained from all three institutions, and are included in Appendix C.

The writer made brief presentations to groups of potential subjects both at AHE and EYOC. Sign-up forms were left in the EYOC living units, and the voluntary nature of participation was emphasized. On subsequent visits to EYOC, the lists were checked for new volunteers, and an appointment was made in consultation with the YO. Those remanded to AHE were invited to participate individually as they were admitted.

A thorough explanation of the experimental procedure was given to each individual who indicated interest in participating. In addition, each subject was provided with an information sheet (see Appendix D) outlining the objectives and requirements of the study, the confidential nature of their participation, and the procedure for contacting the experimenter (E).

On the day of his appointment, each subject met with the experimenter in a quiet area at EYOC or AHE where an interview could be held, the experimental procedures could be carried out, and a SILS could be administered according to standard procedure. During

the actual experiments, subjects sat in front of a portable microcomputer programmed to present stimuli and record responses as outlined below. All three experiments were run in a single session, though the sequence of administration was counterbalanced through all six possible orders of presentation (i.e. 5 subjects each) to control for order effects. Common to all three experiments was software, written by the experimenter, which had provisions for flexible stimulus presentation and reaction time measurement. Connected to the computer via a cable was a pair of switches spaced 20 cm, on center, apart.

Experiment 1.

The first part of this study was an attempt to replicate Williamson et al's (1991) finding of response facilitation in a YO population. The same word list employed by those investigators was used in this part of the present study. It included 13 words in each of three categories: Neutral, emotionally Positive, and emotionally Negative. All words were nouns, and the original ratings of affective valence were obtained from Toglia and Battig (1978). Words were matched on the basis of number of syllables and length, in addition to affective rating and frequency. In

addition, 39 pronounceable nonwords were created by altering one or two letters for each of the selected words. In the original study, the investigators were also interested in controlling right and left visual field exposure for the purposes of observing electrocortical activity. Since that manipulation met with no significant findings, it was not repeated here.

The hypotheses under investigation in Experiment 1 were that i) NP subjects and P subjects would demonstrate no significant differences in the speed with which they performed the lexical decision making task when presented with neutral words, but ii) that among NP subjects a facilitation effect would emerge upon presentation of emotionally Positive or Negative words, corresponding to an interference effect for P subjects. Response accuracy was recorded for two reasons. First, it was necessary to exclude the RTs corresponding to incorrect responses in order to ensure that outlying data did not merely reflect random or careless responding. Secondly, this allowed for a comparison of the mean errors committed by each group.

Following the method of Williamson et al (1991), subjects were asked to view each group of letters, and to depress a button whenever the letters formed a

proper word. Prior to beginning, the task was explained to each subject, and his understanding was tested with two example presentations. By contrast to Williamson et al's (1991) 175 ms stimulus presentation, the words in this experiment remained visible until a response was entered, or the maximum allowable time of 10 seconds elapsed. Brief stimulus presentations where no target word follows are useful in evoked potential electroencephalogram studies, but offer no benefit in RT studies unless a target word follows.

Experiment 2.

Subjects were presented with 40 words; 20 of which referred to common affective states (eg. depression, anger), and 20 of which were affectively neutral. These words served as primes, and were presented near the left of the screen, and displayed in a large, highly legible font (Times Roman 40). Directly to the right of each prime, another word (the target) was presented following a 200 ms SOA, and subjects were required to determine whether or not the two words were related. Half of the twenty emotional and twenty neutral words were paired with related words, and the other half with unrelated words.

Examples of related words were "Sad - Cry", and "Fiction - Untrue." Unrelated pairings included such combinations as "Offended - Pleasure", and "Slow - Vision." Upon presentation of each pair, S's task was to depress either the button marked SAME or that marked DIFFERENT. The software measured RT in milliseconds (ms), and scored each response as correct or incorrect. A complete list of all words is included in Appendix B.

All word lists contained ten words and a total of 15±2 syllables. The mean frequency of words in each list was calculated using data published by Francis and Kucera (1982), and all are in the range of 25±3. These figures are proportional to the number of occurrences of each word encountered in a computer-based analysis of printed English from a variety of published sources.

Though Francis and Kucera (1982) do not provide data on Imagery (the potential for the meaning or object referred to by a word to be visualized), it is noted that unlike Williamson et al's (1991) study, no proper nouns are contained in the stimuli of Experiments 2 and 3. Also, since the present study is concerned with assessing subjects' ability to render decisions about the similarity of stimuli with a priori relationships, an independent index of Pleasantness

such as that provided by Toglia and Battig (1968) is not included. Having obviated the need for Pleasantness and Imagery ratings, it was possible to draw stimuli from a larger and more contemporary pool, although there is a finite number of words that refer to emotional experience.

Experiment 3.

In the final component of this study, a method similar to that of Experiment 2 was employed. The only difference was that the second (target) word in each pair was spelled with its letters appearing in reverse order, to force controlled processing. The prime was presented normally. Given the limited number of suitable affective words, the same list was used in Experiments 2 and 3, however some words were paired differently and the order of presentation was varied.

Data Analyses

To control for inflation, the probability of Type I error was maintained at 0.05/3 (0.017) across all three experiments. All data analyses were performed using SPSS PC+ computer software running on a microcomputer. The main analyses were conducted using the MANOVA procedure which allowed for the specification of a repeated measures design.

In keeping with the methods of Williamson et al (1991), any data further than 2.5 standard deviations from a given subject's mean RT for that category of Word Type were excluded from the analyses. Trimming subjects' means in this manner is widely recognized (eg., Hampel, Rousseeuw, Ronchetti & Stahel, 1986) as an appropriate method of reducing the effects of outlier observations.

CHAPTER IV

Results

The variance-covariance matrices emerging from the reaction time data of the three experiments were analysed using the Box M test. The assumption of homogeneity of variance was upheld in all three cases with nonsignificant χ^2 values of 2.26(df=6), 2.68(df=3), and 6.20 (df=3) emerging for Experiments 1, 2 and 3 respectively. As a final test of the appropriateness of the ANOVA model, normal probability plots were constructed and visually inspected to confirm an appropriately linear distribution.

The prorated mean PCL-R total scores, as well as the Factor I and Factor II scores are shown in Table 5. Though each of the two groups in Williamson et al's (1991) sample had means approximately 3 points higher than those in the present study, the between group difference in total PCL-R score was approximately 18 points in both cases.

The number of errors committed by subjects in each group are presented in Table 6. Since these data could not be assumed to follow a normal distribution, they were subjected to a non-parametric (Mann-Whitney U test) analysis. As was the case in the Williamson et al

Table 5

Mean Group Prorated PCL-R Scores

	Group	
	Psychopaths	Controls
Total	33.25 (2.47)	14.94 (3.94)
Factor I	12.87 (2.59)	4.40 (1.92)
Factor II	15.40 (1.74)	8.20 (2.40)

Note. Values in parentheses represent standard deviations.

(1991) study, no significant differences emerged, thus verifying that the two groups responded with comparable accuracy in all three experiments.

Table 6

Mean Errors by Group

	Group		
Experiment	Psychopaths	Controls	U
1	2.80 (3.30)	5.53 (4.72)	71.5
2	7.53 (2.20)	7.86 (3.16)	111.0
3	6.67 (2.16)	8.80 (3.19)	65.5

Note. Values in parentheses represent standard deviations. All values of U are insignificant. Means reflect total errors

including those committed during presentation of nonwords (Experiment 1) and mismatched words (Experiments 2 and 3).

Experiment 1.

The means of the six (2 Group x 3 Word Type) cells are plotted in Figure 1, along with those reported by Williamson et al(1991), and are shown in Table 7 with their corresponding standard deviations. The ANOVA results summarized in Table 8 confirm the impression

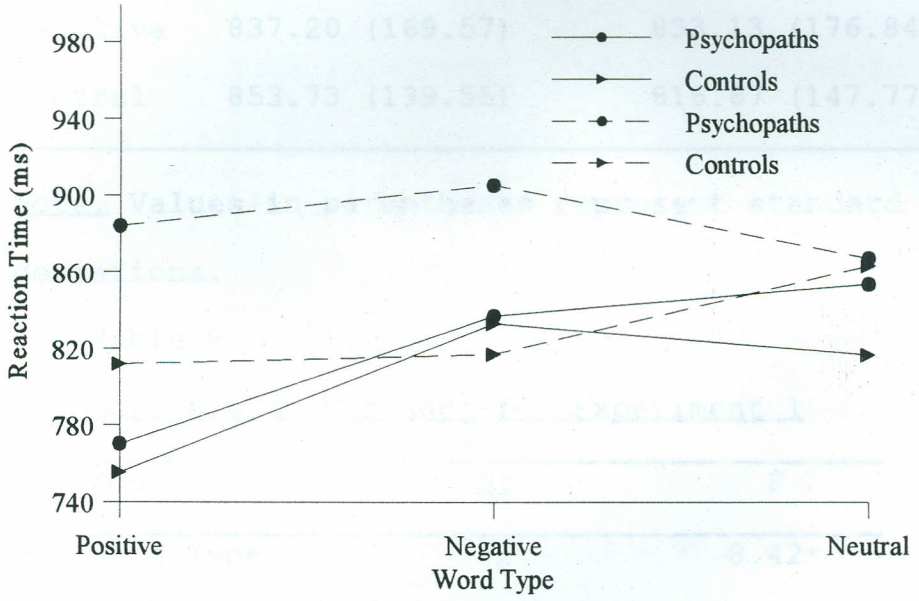

Figure 1. Mean Reaction Times from Experiment 1 (solid lines) and from Williamson et al (1991) (dashed lines).

conveyed visually by Figure 1, that only the main effect of Word Type was significant. The results

reported by Williamson et al(1991) were therefore not reproduced in the present sample of young offenders. Planned post-hoc contrasts based on Word Type revealed that affectively Positive words met with significantly shorter RTs then affectively Negative words,

Table 7

Mean Reaction Times from Experiment 1

	Group	
Word Type	Psychopaths	Controls
Positive	770.20 (119.52)	755.47 (119.30)
Negative	837.20 (169.57)	833.13 (176.84)
Neutral	853.73 (139.55)	816.67 (147.77)

Note. Values in parentheses represent standard deviations.

Table 8

Analysis of Variance for Experiment 1

Source	df	F
Word Type	2	8.42*
Group x Word Type	2	0.34
Subjects within-group Error	56	(6218.78)

Table 8(cont.)

Group	1	0.15
Error	28	(52490.25)

Note. Values enclosed in parentheses represent mean square errors.

*$p < 0.01$.

$F(1,28)=17.84$, $p<0.001$; and affectively Neutral words, $F(1,28)=16.19$, $p<0.001$. The difference between Negative and Neutral words, however, fell slightly short of statistical significance, $F(1,28)=3.44$, $p=0.074$.

Experiment 2.

The data from Experiment 2 were subjected to an analysis similar to that carried out for Experiment 1 but with only two types of words: Emotional and Neutral, thereby producing a 2 x 2 (Group x Word Type) repeated measures factorial design. Again, the main effect of Word Type was the only source of significance. Although the Group x Word Type interaction effect was not of sufficient magnitude to reject the null hypothesis, the cell means, plotted in Figure 2, strongly suggest a trend toward significance in which the Psychopaths processed Neutral words more

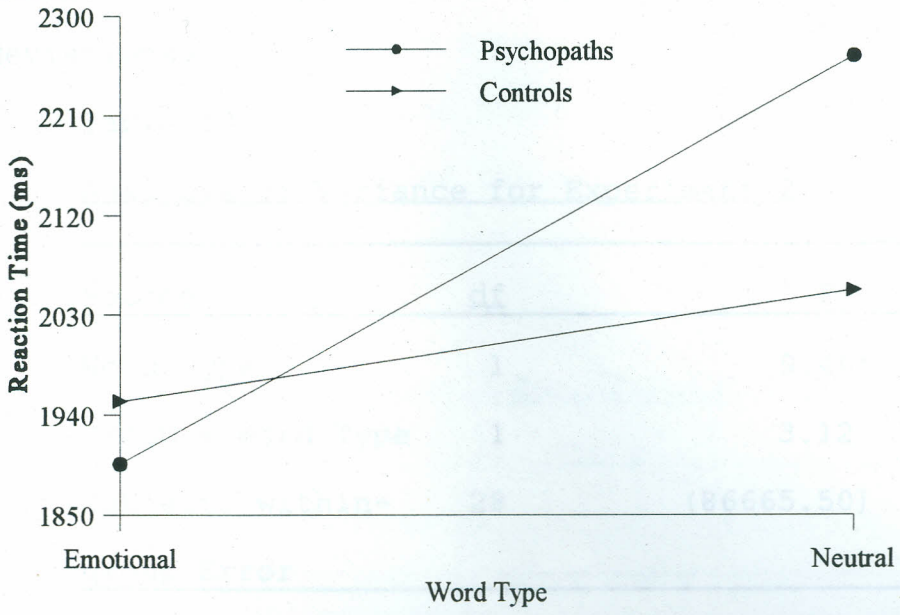

Figure 2. Mean Reaction Times from Experiment 2.

slowly than Controls, but Emotional words more rapidly. Indeed, had alpha been less rigorously chosen, for example, 0.10, this interaction effect would have been significant.

Table 9

Mean Reaction Times for Experiment 2

	Group	
Word Type	Psychopaths	Controls
Emotional	1895.53 (652.84)	1952.33 (924.64)
Neutral	2263.53 (726.69)	2051.80 (1064.98)

Note. Values in parentheses represent standard deviations.

Table 10

Analysis of Variance for Experiment 2

Source	df	F
Word Type	1	9.46*
Group x Word Type	1	3.12
Subjects within-group Error	28	(86665.50)
Group	1	0.06
Error	28	(1385048.10)

Note. Values enclosed in parentheses represent mean square errors. *$p < 0.01$.

The RT data are presented numerically in Table 9, with the corresponding ANOVA summary appearing in Table 10.

Experiment 3.

Data from the third experiment were treated somewhat differently than those of Experiment 2 despite the similarity of the word lists and experimental design.

Table 11

Mean Transformed Reaction Times from Experiment 3

	Group	
Word Type	Psychopaths	Controls
Emotional	739.93 (791.64)	1075.53 (1323.44)
Neutral	1088.73 (983.25)	1670.20 (2020.65)

Note. Values in parentheses represent standard deviations.

Specifically, the mean Emotional and Neutral RT values for each subject were subtracted from the corresponding values generated in Experiment 2. The rational for this is that statistical tests based on the ANOVA model assume a null hypothesis of no differences between any of the means being compared. The raw data would not have satisfied this assumption because the hypothesis being tested was that the Experiment 3 data would be different than those of Experiment 2, not different than zero. A significant result based on an analysis of

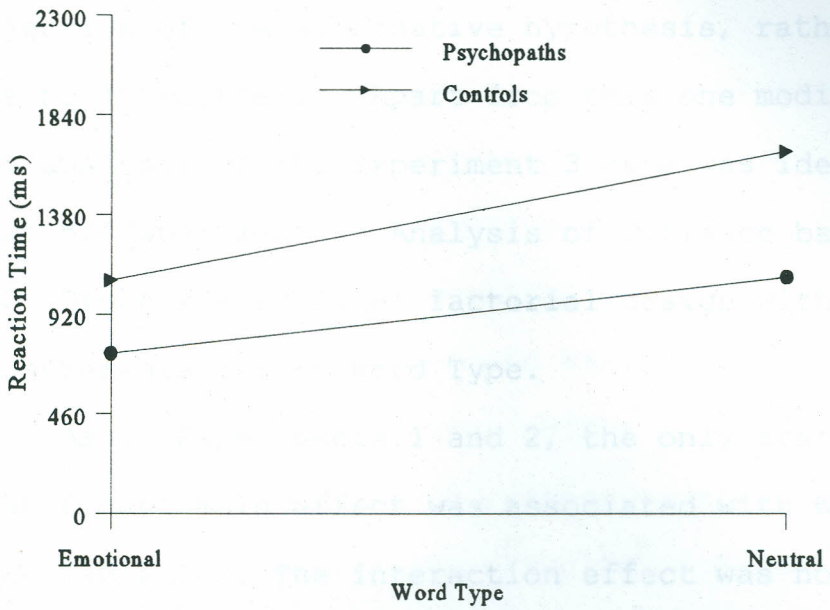

Figure 3. Mean Transformed Reaction Times from Experiment 3.

Table 12

Analysis of Variance for Experiment 3

Source	df	F
Word Type	1	9.91*
Group x Word Type	1	0.67
Subjects within-group Error	28	(336819.78)
Group	1	0.93
Error	28	(3377179.00)

Note. Values enclosed in parentheses represent mean square errors. *$p < 0.01$.

the untransformed data would therefore have prompted rejection of the alternative hypothesis, rather than the null hypothesis. Apart from this one modification the analysis of the Experiment 3 data was identical to that of Experiment 2: Analysis of Variance based on a 2 x 2 (Group x Word Type) factorial design with repeated measurements across Word Type.

As in Experiments 1 and 2, the only statistically significant main effect was associated with Word Type (See Table 12). The interaction effect was not significant.

Figure 3 graphically depicts the data presented in Table 11, which are the cell means of Experiment 3.

CHAPTER V

Discussion

Collectively, the results of the present investigations are consistent with Strauss' (1983) finding that individuals process emotionally relevant words more quickly than neutral words, but provide little support for Newman and Wallace's (1993) hypothesis that psychopaths suffer from deficient automatic processing with respect to affective information. Moreover, the results of Experiment 1 are dissimilar to those reported by Williamson et al (1991).

Although the post-hoc analyses based on the significant Word Type effect found in Experiment 1 showed a facilitation effect associated with affectively positive words, no evidence of the hypothesized interference effect emerged upon comparing RTs to Neutral and affectively Negative words. In addition, as inspection of Figure 2 reveals, the RTs of Controls in Experiment 2 changed relatively little as a function of Word Type compared to those of Psychopaths. This is the opposite of what was hypothesized on the basis of the prior research, and suggests that the Psychopaths experienced more RT facilitation than their

Controls although the effect was not, strictly speaking, significant.

In attempting to reconcile Williamson et al's (1991) findings with the present results one might consider four possibilities. First, the present data may simply reflect type II error. That is, a real effect of the sort previously described exists, but due to certain features of the present subject sample, or the methods used, failed to emerge. Given that an identical word list was used, and few if any differences in procedure were introduced, this would seem to implicate the subject sample. Only by replicating Experiment 1 with additional young offender samples can this question be answered.

The second possibility is the opposite of that just discussed. In other words, that Williamson et al's (1991) findings were attributable to type I error. Again, the key to answering this question lies in replication, but with an adult population. The third plausible explanation relates to experimental and control group inequality. Specifically, Williamson et al(1991) noted that no IQ data were available for their subjects but added, quite correctly, that controlled studies comparing the intelligence scores of

psychopaths and nonpsychopaths have consistently failed to surface significant findings. It is, nevertheless, possible that their particular sample contrasted on this dimension, a difference which would have complicated the interpretation of their data. This observation notwithstanding, one would expect that a significant difference in intelligence would more likely have resulted in an unequal number of errors, or a significant main Group effect, neither of which were reported.

The fourth and probably most interesting explanation makes appeal to developmental differences between the present YO sample, and the adult participants in Williamson et al's (1991) study. Namely, one might speculate that any automatic processing deficits present in adult psychopaths distinguish them from their nonpsychopathic counterparts to a greater degree than is the case for younger individuals. If so, one must necessarily conclude that such a deficit is not central to the existence of those features that characterize psychopathy, for the simple reason that there are undeniably psychopaths in the young offender population, even if this deficiency is not

experimentally evident before adulthood, by the methods of this study. Indeed, the concept of automaticity holds that processes become increasingly automatic upon repetition. This would be consistent with the position that affect, or at least affective labelling, is not of interest to psychopaths, who may therefore simply fail to reflect on emotional states and events to the degree that nonpsychopaths do. If so, there should be a negative relationship between age and the degree of affective facility psychopaths demonstrate relative to controls. This would fit with the results of Experiment 1 as well as Williamson et al's (1991) data, and would emphasize the need to identify more sensitive tests of automatic processing for use with younger individuals. Indeed, it was hypothesized that the semantic matching requirements of Experiment 2 (as opposed to the simple recognition required in Experiment 1) would provide such a test. Although the interaction effect fell slightly short of significance, it was larger than that which emerged from Experiment 1.

The results of Experiment 3 would have been more interpretable had Experiment 2 yielded significant findings. Nonetheless, the relatively parallel lines shown in Figure 3 appear markedly different from those

in Figure 2, suggesting that the data transformation used in Experiment 3 was a valid way to restore the assumption of zero differences inherent to the ANOVA model. That the Word Type effect continued to be significant suggests that some response facilitation still occurred, but that it was no more pronounced for one group than the other since the interaction was not significant.

To the extent that any differences which depended on automatic effects may have emerged from Experiment 2, the transformed data of Experiment 3 would likely have also proven significant since the forced use of controlled processing would have interfered with automatic processing. More relevant to the purpose of Experiment 3, a significant interaction effect would have provided strong support to the position that any interaction effects emerging from Experiment 2 were attributable to deficient automatic processing on the part of the Psychopaths unless, of course, the greatest RT differences were noted for Psychopaths rather than Controls.

In Experiment 3 the choice of whether to present the target or the prime spelled in reverse could actually have been made either way, but for different

reasons. Presenting the prime spelled normally, as per Experiment 3, may well activate semantically related material in memory, but the controlled processing involved in deciphering the backward-spelled target is, by definition, incompatible with priming, and hence should nullify its effect. By contrast, presenting the prime backward does not result in the immediate activation of related concepts in memory, provided that the word is sufficiently long and complicated to preclude complete decryption and priming during the interstimulus interval. The problem is that this might well take place with shorter, more recognizable words, such as DAS (SAD). Hence priming could have been a factor in some trials, and not others. During trials where no priming took place, presentation of the prime word would simply add a constant delay to the trial's RT equal to the 200 ms interstimulus interval. On the other hand, it would not be possible to identify, on the basis of RT alone, those trials during which the subject had successfully deciphered the prime word, and a confounding effect would therefore have been introduced.

A Revised Theory of Psychopathic Behavior

Although the hypothesized interaction effects did not appear in any of the three studies, the pervasively significant Word Type effect, in particular the significant difference in RTs to positive and negative words in Experiment 1, requires further discussion as it is difficult to explain outside of a cognitive model. This, along with the past and present evidence that psychopaths apparently have intact declarative knowledge of matters pertaining to emotional states strongly suggests that their social behavior is governed mainly by motivation factors. The question remains, however, as to how this fits with the existing research and, for the purposes of the present investigation, with cognitive processing more generally. Figure 4 is a motivational model influenced by an earlier psychophysiological model suggested by Gray (1975). Gray's model interfaced behavior with environmental cues at the level of learning processes and does not address or make predictions concerning the role of language.

The model outlined in Figure 4 incorporates a semantic and affective network, which are interconnected and hence capable of cross activation,

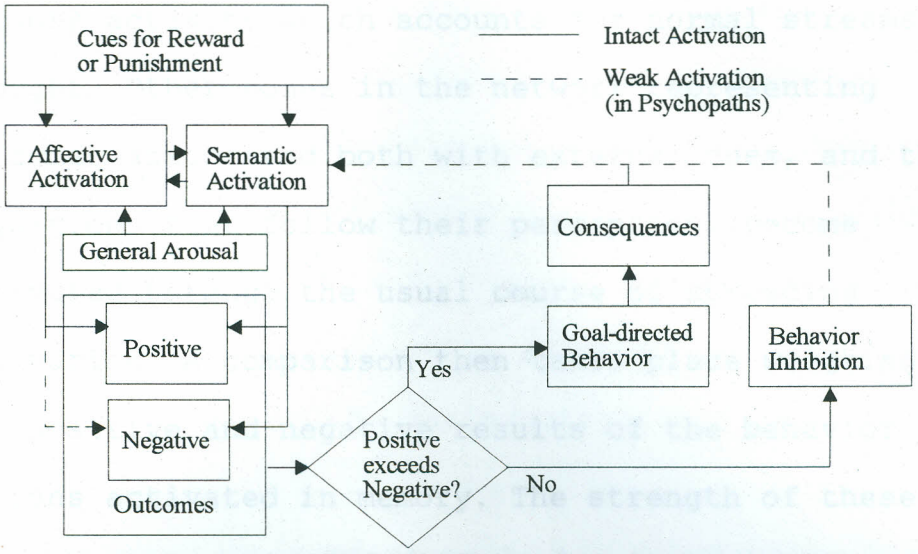

Figure 4. Modified Explanatory Model. Weak activation of affective nodes related to negative outcomes, and weak semantic reintegration are hypothesized to influence psychopathic behavior.

but are at the same time independent in that each has excitatory links with a general arousal system, and the neurological structures involved in perception. The role of the general arousal mechanism is to alter the sensitivity of the organism to stimuli related to reward or punishment. Internal drive factors engendered by hunger, boredom, or other stimuli result in increased activation, which in turn, heightens the effect of spreading activation among both semantic and affective nodes. Even without clear external cues,

there is a certain level of background "noise" or network activity which accounts for normal streams of thought. Other nodes in the network representing outcomes associated both with external cues, and the cognitions that follow their perception, become activated through the usual course of spreading activation. A comparison then takes place weighing the net positive and negative results of the behavior options activated in memory. The strength of these representations is a function of prior experience, as well as the number of nodes contributing activation, since nodes may have multiple connections, and each one gains excitatory potential as a function of use.

With the comparison complete, one of two things might happen to the behavior being contemplated. If the net positive outcomes are represented more strongly than the negative, that behavior will be expressed. Outside of the organism, there will be consequences associated with that behavior which are incorporated into the semantic network thus adding to a database of past experience. Conversely, if the negative representations are stronger, behavior should be inhibited, and the representation of that behavior should be inhibited in memory. As other related nodes

continue to be active, alternative representations will come to the forefront as they are semantically related in terms of their goals. The cycle then repeats. In sum, this model may explain how a perceived need results in a series of semantic and affective nodes being activated both to form a series of cognitions, and to automatically identify a series of behavioral options directed at the satisfaction of a particular need.

The question remains as to how psychopaths might differ from nonpsychopaths according to this model. The answer would appear to be in two places. First, as shown in Figure 4, weak activation of those nodes associated with negative outcome would seem consistent with prior findings highlighting the ineffectiveness of punishment with psychopaths. It also explains why psychopaths might benefit, in terms of active avoidance learning, by putatively punishing stimuli such as shocks or background noise since these would increase general arousal, and therefore affective activation. As a result, the level of activation being spread to nodes representing negative outcomes would be greater. Since there are a finite number of positive and negative outcomes represented in memory, there would be a

ceiling on this effect that would allow the negative outcomes to "catch up." This is important because an overall increase in arousal should otherwise also strengthen the representation of positive outcomes and therefore maintain a net difference.

A second area where psychopaths and nonpsychopaths might differ is diagrammed, in Figure 4, as inputs to the semantic network from the right-hand side of the diagram. The first of two possibilities involves a comparison leading to non-performance of the behavior being evaluated. Whereas non psychopaths may show a subsequent inhibition of that behavioral representation in memory, weak inhibition could result in a failure to suppress that representation, and a corresponding failure to consider alternatives. At a social level, the affected person would resemble someone with a lack of appropriate problem solving skills, who dwells on an obviously maladaptive set of behaviors to have their needs met. The second instance arises when the evaluation of outcomes results in the performance of goal directed behaviors, but the consequences of that behavior, at least when negative, are not incorporated into the semantic network, again due to weak activation. The individual would appear unable to

profit from experience. In addition, they would not experience feelings of guilt because of the poor association between their actions and its impact on others. While contact with an upset individual would certainly constitute a new set of external cues, the cognitions associated with these perceptions would not be accompanied by aversive emotional experiences because of the weak activation of affect by spreading activation from semantic activity.

The model outlined above seems to accommodate the research cited in the literature review very well. As pointed out above, the general arousal provision explains why shock or noise might improve passive avoidance learning. The finding that psychopaths' behavior is more readily shaped by reward than punishment contingencies fits with the notion of weakly activated representations of negative outcome. Forcing a time delay prior to responding would allow sufficient activation of negative outcomes in memory, from the semantic side, to explain the finding that psychopaths' made no more passive avoidance errors when immediate responding was not available (Newman, Patterson & Kosson, 1987).

In terms of language functioning, the results of

the present investigation are quite consistent with this model. Specifically, the affective cues inherent to the Positive words in Experiment 1 may explain the seemingly faster RTs of Psychopaths. Likewise, the hypothetically weaker activation of negative outcomes fits with the lack of a facilitation effect for those words. Alternatively, the fact that Psychopaths and Controls evidenced similar RTs to all three word types may suggest that even in nonpsychopaths, the links to negative outcomes are less direct, or less strong. If so, this would still imply that psychopaths differ from normals as a matter of degree, rather than in the nature of the underlying processes. With regard to Experiment 2, the significant effect of Word Type is consistent with the fact that some of the Emotional words were positive.

Psychoeducational Implications

Though little support was found for the hypothesized deficiencies in automatic processing, another model has been proposed, and myriad other cognitive conceptualizations are possible. For this reason one must recognize the role that early education in morality, empathy, and emotional integration might play in remediating these shortcomings. Inasmuch as

persistent exercise of semantic connections is said to strengthen them, it may be possible to offset potential psychopathic tendencies. Theoretically it should also be possible to remediate these deficits later in life, even though they would be expected to become progressively more ingrained over the course of one's development. The failure to replicate Williamson et al's (1991) findings suggest that there may be difficulty identifying young psychopaths other than on the basis of their antisocial behavior. One could not rely on access to this information from external sources, however, since the identity of young offenders is legally protected.

Cognitive restructuring (eg. Samenow, 1984) exercises may prove useful in treating psychopaths early in life, and could be delivered as remedial curriculum to students whose in-school behavior was consistently of concern. From a humanitarian perspective this would encourage a view of young potential psychopaths as legitimate candidates for the needed funding for such treatment, and would likewise promote a less pejorative view of them.

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