COHESION AND COHERENCE
IN THE SPEECH OF PSYCHOPATHIC CRIMINALS
by
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Abstract

This study was designed to examine the hypothesis that the speech of criminal psychopaths is poorly integrated. Measures of cohesion (lexical, referential, conjunctive) and coherence (plot-units) were used to assess the degree to which independent clauses were linked together in the personal narratives of criminal psychopaths and criminal nonpsychopaths. General deviance in communication, as measured by the Scale for Thought, Language, and Communication Disorders (Andreasen, 1980), was also assessed. A significant number of psychopaths produced disordered communications. These communications failed on a number of levels: Psychopaths used relatively few cohesive links between sentences, failed to provide appropriate referents in discourse, failed to link action and resolution in stories, and showed significant clinical impairment in their ability to communicate. The results suggest that effective connections among speech units in psychopaths' discourse are not as numerous as those found in nonpsychopaths. In addition, psychopaths may suffer from a more general impairment in communication that is related to, among other things, discourse which has a tendency to slip off track and a failure to directly answer a listener's questions.
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Introduction

The concept of psychopathy has a long and relatively controversial history. The definition and conceptualization of the construct have undergone a number of changes over the last two hundred years (see Pichot, 1978 for a review). Initially, both personality and behavioural variables were included in the description of psychopathy; however recent definitions have often focused on its behavioural manifestations. Common to most clinical descriptions are the following characteristics: a lack of empathy, a failure to form enduring relationships with others (lovelessness), shallow affect, a lack of remorse or guilt, a failure to learn from experience, a lack of anxiety, and persistent antisocial behaviour that usually begins in childhood (Cleckley, 1976; Craft, 1965; Grant, 1977; Hare, 1970; McCord & McCord, 1956).

Recent investigations involving psychopathic subjects have moved away from the realm of clinical description to empirical studies of the cognitive and behavioural processes that are thought to underlie the psychopathic personality. Most relevant to the present research are investigations of language processing. This work suggests that there are differences between psychopaths and nonpsychopaths in the way they perceive and process language (Hare & McPherson, 1984; Hare & Jutai, 1988; Hare, Williamson, & Harpur, 1988; Williamson, Harpur, & Hare, 1990; 1991) and in the organization of their speech (Hare
& Gillstrom, 1991; Gillstrom & Hare, 1988). It has been proposed that these processing and production differences may be particularly apparent for language stimuli requiring deep semantic analysis or conveying affective information (Hare & Gillstrom, 1991; Hare & Jutai, 1988; Hare et al., 1988; Williamson et. al, 1991, 1990).

Speculation concerning these language abnormalities has led to the suggestion that the thoughts and concepts underlying psychopaths' speech may be poorly integrated or not well connected to each other (Gillstrom & Hare, 1988; Hare & Gillstrom, 1991). One way of investigating this hypothesized deficit is through the analysis of cohesion and coherence. The present investigation examined narrative speech in psychopaths through measures of text cohesion and coherence. These measures have been used to examine other clinical groups that exhibit communication deficits or disorders of thought (e.g. Harvey, 1983; Rochester and Martin, 1979; Rochester, Martin, & Thurston, 1977).

Measures of cohesion (Halliday & Hasan, 1976) assess the degree to which words and phrases in a sentence form relationships with other words and phrases in the sentence or in other sentences to create a text. In the present study four measures of text cohesion were obtained. The first, lexical cohesion, refers to the reiteration of a word or phrase (e.g. I saw a dog - Then the dog saw me; a word or phrase is repeated
in some form). The second, referential cohesion, reflects the relationship between a word and a previous speech unit because it is a pronoun, a demonstrative, or a comparative term (e.g. I saw a dog - Then the dog saw me; the is a demonstrative referring back to a dog). The third, conjunctive cohesion, links two clauses together by conjunctions (e.g. I saw a dog - Then the dog saw me; then forms a temporal conjunction). The fourth cohesion variable measured in the present study was incompetent references. This variable actually reflects a failure in the use of referential cohesive ties and also measures a failure in the use of the referential "phoricity" system.

Phoricity systems refer to the structuring of utterances on the basis of what speakers assume their listeners know. They involve speech units that require previously presented information for their interpretation. For instance, consider the two independent clauses and the referential cohesion that exists between them; 1. Jack went up the hill, 2. He fell down. It is clear that he refers to Jack and that the speaker is safe in assuming that the listener will know that this is the case. However, sometimes speakers fail to provide adequate prior information for the listener to be able to infer exactly which prior speech unit a pronoun, demonstrative, or comparative term is referring to. For example, 1. Jack and John went up the hill, 2. He fell down. In this case it is unclear who it is
that he refers to. Individuals with language and communication deficits often produce a relatively high number of these incompetent references (e.g. Docherty, Schnur, & Harvey, 1988; Harvey, 1983). Past studies have also shown that these communication-disordered individuals may exhibit less cohesion in their speech, or may use more reiterative (lexical cohesion) than semantic cohesive strategies (e.g. Rochester & Martin, 1979). If psychopaths do in fact have difficulty in linking speech units, then they might have difficulty in forming cohesive texts and in using the referential phoricity system effectively.

Coherence, unlike cohesion, is concerned with defining the meaning relationships that exist among events or propositions described within a text (e.g. Reiser & Black, 1982). The measure of coherence used in the present study is plot-unit analysis (e.g. Botvin & Sutton-Smith, 1977; Gillam, 1989). Plot-unit analysis assesses the course of actions or events that makes up a narrative. For example, an initial state of threat should be followed by an action to remove or deal with the threat, and then some type of resolution (successful or not successful). If the initial state of threat is an important part of the story being told, and if it is not referred back to, then the story will seem less coherent.

Consider the following short narratives that were generated specifically to the prompt, "I want you to tell me
about a time you felt really angry. Try to remember how you felt then and then tell me what happened" (pauses and hesitations not included):

1. I was at home feeling lousy [negative feeling state] - because my friend J. ratted on me [villainy] - I figured I'd get even by paying a visit to his old lady [plan] - So I went to her house and scared her a bit [plan carried out] - She told J. - and I was glad [negative feeling state nullified] - cause he deserved it - He didn't think I had it in me - He's afraid of me now [villainy nullified]

The plot units are:

a. negative feeling state/negative feeling state nullified

b. villainy/villainy nullified

c. plan/plan carried out

2. Angry - I was - I was angry - [negative feeling state] These tough guys were bugging me [threat] at the bar. My girl-friend was there. She wanted me to go with her to get a hose or something [plan]. These guys kept bugging me. My friend P. was there. He's complaining away cause I was supposed to be putting up this job. They wouldn't stop so I beat on this guy [attack] Then I went shopping with K. (girl-friend) [plan carried out]

In this narrative the plot units are:

a. negative feeling state/ ? (possible
nullification)

b. threat/ ? (possible nullification)
c. plan/plan carried out
d. attack/? (possible counterattack, wound, kill, flee)

If the two texts above are compared it can be seen that the first exhibits a more coherent description (1. is from a nonpsychopath; 2. is from a psychopath). This is partly due to a difference between the texts in the amount of closure of plot units. If a great deal of inference is applied to the second narrative, a reader might guess that the protagonist in the story might have had his negative feelings nullified or he would not have gone shopping, or that the entire threat (these guys) was somehow nullified because he was even able to go shopping. A great deal more inference is required for the second narrative because concepts have not been specifically linked together. Consequently, the second narrative is more vague or lacks the same degree of coherence as the first. If psychopaths do have difficulty in linking together concepts in their speech, then psychopathy should be associated with failures in making these ties.

In addition to the question of how well speech units may be linked together in psychopaths' language there is the larger issue of how well psychopaths actually communicate. Observers in our lab have suggested that psychopaths have difficulty in
adhering to one train of thought, use excessive jargon, and sometimes use words they have made up. For this reason dyadic speech was assessed in psychopaths by rating their conversational language on the Scale for the Assessment of Thought, Language, and Communication (TLC; Andreasen, 1979a; 1979b). Although this instrument was developed as a measure of formal thought disorder, its author has described it mostly as a scale to assess language and communication deficits from which a disorder of thought may or may not be inferred. In the present study the TLC ratings were taken to represent a deficit in language or communication and not thought disorder per se. For instance, the TLC includes a category of derailment. A high rating on this category suggests that an individual produces speech where ideas are only obliquely related to previously presented ones. This may be representative of some underlying disturbance of thought, but more importantly, it impairs communication since a listener will find derailed discourse difficult to understand. To be consistent with previous studies that have used the TLC in assessing communication impairments in various psychopathological groups, the term thought disorder will be used with reference to the TLC. However, thought disorder will be taken to mean a deficit in language or communication measured by clinical rating scales.

Because high TLC scores are evident in certain pathological groups, a structured diagnostic interview, the
Schedule for Affective Disorders and Schizophrenia - Lifetime Version (SADS-L; Spitzer, Endicott, & Robins, 1979) was administered to diagnose functional psychiatric disorders which may be related to thought disorder. Diagnoses were made using the third edition of the Research Diagnostic Criteria (RDC; Spitzer, Endicott, & Robins, 1989). This ensured that all subjects were normal with respect to the functional psychiatric disorders characterized by thought disorder.

By analyzing the narrative speech of psychopaths through cohesion and coherence measures this study was intended to test the hypotheses that psychopathy is associated with the production of speech units that are poorly connected or integrated. In addition, by obtaining an overall measure of communication impairment in the dyadic speech of psychopaths, the hypothesis was tested that psychopaths suffer from a more general deficit in communication.

Psychopathy

The Assessment of Psychopathy

For a number of reasons psychopaths have usually been studied in a forensic environment. First, psychopaths are easiest to find in prisons and jails. Second, assessment devices have often focused on the commission of antisocial acts as opposed to the identification of personality variables. This trend is reflected in the definition of antisocial personality disorder described in the current edition of The Diagnostic and
Statistical Manual of Mental Disorders (DSM-III-R; American Psychiatric Association, 1987).

For the research proposed here the Revised Psychopathy Checklist (PCL-R: Hare, 1991; Hare et al., 1990) was used to assess psychopathy. Extensive evidence attests to the reliability and validity of the Psychopathy Checklist for the assessment of psychopathy in criminal populations (Hare, 1980, 1983, 1985b, 1990; Hare et al., 1990; Harpur, Hakstian, & Hare, 1988; Harpur, Hare, & Hakstian, 1989; Newman & Kosson, 1986; Wong, 1984).

Unlike the DSM-III-R, the PCL-R measures two correlated constructs that are both considered important elements of the psychopathic personality (Harpur et al., 1989). Factor 1 includes items measuring an egocentric, callous and remorseless use of others and defines a personality construct that closely resembles the classical clinical description of the psychopath (e.g. Cleckley, 1976). Factor 2 encompasses items related to a chronically unstable and antisocial lifestyle and resembles the diagnosis of antisocial personality disorder defined in DSM-III-R.

Unless otherwise noted, studies cited in the following review will have used the PCL-R (or its original version) to assess psychopathy.

Psychopathy's Relationship to other Constructs

Psychopathy has been found to be positively correlated
with scores on measures of impulsivity, machiavellianism, narcissism, and sensation seeking, but negatively related to measures of socialization (Hare, 1991; Harpur et al., 1989). Foreman (1988) found that psychopathy was positively correlated with an interpersonal style of dominance, but negatively correlated with nurturance, as measured by the Interpersonal Adjective Scales (Wiggins, Phillips, & Trapnell, 1990). Rorschach responses made by psychopaths have been found to correlate with psychodynamic measures related to narcissism, egocentricity, low anxiety and emotional detachment (Gacono, 1990; Gacono & Meloy, 1988).

Psychopathy is also associated with diagnoses or ratings of substance abuse disorder, histrionic personality disorder, narcissistic personality disorder, and antisocial personality disorder (Hart and Hare, 1989; Smith and Newman, 1990; Hemphill, Hart, & Hare, 1990).

Generally, psychopathy does not overlap with mental disorders typically associated with psychosis or thought disorder. Hart and Hare (1989) found that in a forensic psychiatric population, patients diagnosed as psychopathic were less likely than other patients to receive a DSM-III Axis I diagnosis. Furthermore, psychopathy was negatively correlated with prototypicality ratings of schizophrenia and had an odds-ratio of less than one for the diagnosis of schizophrenia. Psychopathy and Language
Clinically, it has often been noted that psychopaths appear to be highly verbal (Cleckley, 1976). Many can be disarmingly charming and tell impressive self-serving stories that lead to artful swindles (Millon, 1981). Their glibness, insincerity, and ability to deceive all appear to involve an effective use of language (Hare et al., 1988). However, observations made by Hare and his colleagues suggest a different picture of psychopaths' language (Hare & Gillstrom, 1991; Hare, Forth & Hart, 1989). After viewing hundreds of hours of videotaped interviews with psychopathic and nonpsychopathic criminals, and conducting such interviews themselves, observers in Hare's lab have often suggested that psychopaths appear to use excessive jargon, poorly integrated phrases, and that they seem to have difficulty adhering to one train of thought. This has led to the suggestion that there is a poor integration of the thoughts and concepts underlying the speech of psychopaths (Hare and Gillstrom, 1991). Currently, there are no studies which directly address these issues, but there are some which offer results suggestive of differences between psychopaths and others in the perception and production of speech.

Eichler (1965) analyzed the speech of young adult males who met the criteria for the American Psychiatric Associations' (1952) category of sociopathic disorder. He found that sociopaths scored higher than did normals on the categories of
negation, retraction, qualifiers, and evaluation. Qualifiers (suppose, more or less, etc.) tend to add ambiguity to statements. Retractors - a word or phrase that partially or totally detracts from the statement preceding it - also reduce language clarity.

Eichler's results suggest that there may be a basic conceptual inconsistency and illogicality in sociopathic thought. For example, to the question, "Did you ever steal from them {foster family}?", a psychopath studied in our lab replied, "It wasn't really too bad. Not too often. Once in a while I'd take some pillows or something. But I wouldn't be stealing. I'd just take them and use them and lose them or something."

In a previous study, Weintraub and Aronson (1962) found that in the speech of normal young adult males, evaluators (a value judgement) and qualifiers, retractors, and qualifiers, and negators (no, not, nothing, etc.) and retraitors were highly correlated. Therefore their co-occurrence in the speech of psychopaths would not be considered unusual. However, excessive use of qualifiers, retractors and negators would result in speech filled with the following type of statement, "I guess that was good, but it really wasn't." This would provide less than optimal information for the listener as it is conceptually inconsistent and ambiguous in meaning.

A second indirect method of assessing the ability of
psychopaths to link conceptual units in their speech is to study the hand gestures they make while speaking. The rationale for this research is that gestures may have their basis in the same internal processes as speech, and may be viewed as an external representation of these processes (e.g. Butterworth & Beattie, 1976; Cicone, Wapner, Foldi, Zurif, & Gardner, 1979; Gillstrom & Hare, 1988; McNeill, 1985).

Gillstrom and Hare (1988) assessed the degree to which psychopaths made use of different types of hand gestures while involved in conversation. They found that psychopaths, relative to nonpsychopaths, made inordinate use of a particular type of hand gesture, referred to as a beat. Beats are small rapid hand movements that occur during speech or pauses in speech. Beats may reflect the degree to which discourse is broken down into functionally discreet units (McNeill & Levy, 1982), and may mark meta-linguistic points in the breakdown of speech processes, possibly reflecting an attempt to reinstate speech flow (McNeill, 1985). Gillstrom and Hare (1988) suggested that the overuse of beats may mean that the central language processes of psychopaths are organized into relatively small conceptual units. This would be reflected in speech which is made up of short, poorly integrated phrases.

Although there have been no empirical studies that have investigated the speech output of psychopaths, a number of studies have looked at the way in which psychopaths differ from
nonpsychopaths in the processing of simple verbal input. These investigations have been summarized in a recent review article (Hare et al., 1988), but will be briefly described here since they suggest that psychopaths may perceive or process language differently than do nonpsychopaths.

In general, these investigations involved the study of perceptual asymmetries with divided visual field or dichotic listening techniques. Typically, when single words are presented to both ears simultaneously, or alternately to the left or right visual field, most right-handed individuals exhibit a right ear or a right visual field advantage for the report of the stimuli they have heard or seen. This is due to the neurophysiology of the visual and auditory systems coupled with control of language functions by the left hemisphere in most individuals. In the auditory system contralateral projections are dominant, with the result that information presented to the right ear projects most strongly to the left hemisphere. Information presented to the right visual field projects to the left hemisphere from the right nasal hemiretina and the left temporal hemiretina. Information transmitted initially to the left hemisphere is better perceived and reported, presumably reflecting more efficient or preferential processing of linguistic materials by that hemisphere.

Using a standard dichotic listening paradigm, Hare and McPherson (1984) found that psychopaths showed a smaller right-
ear advantage (less lateralization) than did nonpsychopaths. Despite this reduced laterality the overall performance of psychopaths was as good as that of nonpsychopaths.

In a divided visual field task where subjects saw common words flashed briefly to either the left or right visual field, psychopaths and nonpsychopaths both exhibited a right visual field-left hemisphere advantage (Hare, 1979). However, in a divided visual-field task that involved differing levels of semantic categorization, lateralization differences between psychopaths and nonpsychopaths were obtained (Hare & Jutai, 1988). Specifically, when words were required to be matched on the basis of morphological features, or whether or not they were a member of a concrete category, psychopaths and nonpsychopaths both exhibited the fewest errors for stimuli presented to the right visual-field (left hemisphere). When the subjects had to match words to a superordinate abstract category, which presumably required a greater degree of semantic processing, psychopaths made the fewest errors for stimuli presented to the left visual-field (right hemisphere) whereas nonpsychopaths continued to perform in the expected manner.

The most general conclusions that can be drawn from these studies is that the left hemisphere of psychopaths is not strongly specialized for language or that the resources for language processing in the left hemisphere are relatively
limited in psychopaths (Hare et al., 1988). More specifically, psychopaths may have difficulty in the interpretation of lexical items within the left hemisphere.

None of the tasks in the reviewed studies could be considered to be difficult relative to the requirement that an individual produce a cohesive and coherent narrative of some life event. In the research presented here psychopaths were required to produce such a text. Psychopaths, when compared to nonpsychopaths, were expected to rely more on simple lexical relationships than semantic and logical ones in producing cohesive texts.

**Psychopathy and Affective Processing**

Clinicians have long noted that psychopaths seem to suffer from a general poverty of affect. This defect has generally been described as a shallowness of feeling (e.g. Cleckley, 1976; Grant, 1977), reflected behaviourally in labile and short-lived expressions of emotion. "But mature whole hearted anger...deep joy, and genuine despair are reactions not likely to be found within this scale" (Cleckley, 1976, p. 212).

Using experimental paradigms Hare and his colleagues (e.g. Hare, 1978; Hare & Craigen, 1974) have demonstrated that psychopaths show unusual autonomic responses following a signal of an impending aversive event. Psychopaths consistently show smaller than usual skin conductance responses but larger than usual heart rate acceleration. Hare (1978, 1982) has suggested
that this may reflect an adaptive coping mechanism whereby the heart rate acceleration helps psychopaths to reduce the impact of the forthcoming aversive events. The small electrodermal responses are seen as evidence for the success of this coping strategy.

Patrick and Lang (1989) found that psychopathic sex offenders gave smaller autonomic responses during imagery of fearful material than did other sex offenders. Psychopaths also failed to exhibit a reduction in the blink-startle reflex while viewing slides with positive affective content and also failed to exhibit appropriate facial muscle responses to slides with negative content. Generally, these studies would seem to support the notion that psychopaths, at least autonomically, show anomalous or reduced responses to affective information.

Language and Affect in Psychopaths

Cleckley (1976) suggested that psychopaths suffer from a deep-seated semantic disorder which he termed semantic dementia. At its core lay a complete lack of meaning-related elaborative affective processes. This deficit was then "masked" by well functioning expressive and receptive processes. "Here is the spectacle of a person who uses all the words that would be used by someone who understands, and who could define all the words but who is still blind to the meaning." (Cleckley, 1976, p.214). Others have described the psychopath in a similar way: "... ideas of mutuality of sharing and of identification
are beyond his understanding in an emotional sense; he knows only the book meaning of words" (Grant, 1977. p. 50). Cleckley's description of semantic dementia suggests that psychopaths suffer from an inability to relate real feelings to words.

Although there have been a variety of studies examining language processing in psychopaths, relatively few investigations have explicitly examined the processing of affective linguistic information. One recent study (Williamson, et al., 1990) examined the responses of psychopaths to emotional and neutral words during a divided visual field lexical decision task. The explicit task involved distinguishing between words and pronounceable nonwords, but the experimental manipulation of interest was whether or not the decision time and event-related brain potentials (ERPs) would be different for emotional and neutral words. Consistent with the literature, nonpsychopaths responded more quickly to the emotional than to the nonemotional words, and amplitudes of specific ERP components were larger in response to emotional words than to neutral words. Psychopaths failed to show these effects, suggesting that they carried out less semantic elaboration of the affective words than did the nonpsychopaths. Whether this reflected a failure to integrate affective and linguistic processes, or a general failure of elaborative processes could not be determined from this study.
Another recent investigation into the processing of linguistically based affective information provides some evidence that it is the integration functions that are impaired in psychopaths (Williamson et al., 1991). Experiment 1 investigated the basis for the way in which psychopaths group words. Using a method described by Brownell, Potter, and Michelow (1984), subjects were required to indicate which two out of three words were most similar in meaning. Psychopaths were less likely to match words on the basis of emotional polarity (both words have a positive or negative affective tone) than were nonpsychopaths.

Osgood (Osgood, May, & Miron, 1975) has shown that the evaluative or good-bad dimension accounts for most of the variance individuals use when rating words. Psychopaths appeared to make less use of this basic component of word meaning than did nonpsychopaths.

Taking this observations into account, in the second experiment of Williamson et al. (1990), it was hypothesized that if psychopaths have a deficit in making use of information concerning emotional polarity then they would tend to make errors suggestive of a confusion of emotional valence. Other psychopathological groups, most notably depressives (Williamson, Crockett, Hurwitz, & Remick, in press) and schizophrenics (Cramer, Weegman, & O’Neil, 1989), have previously been shown to confuse emotional valence.
Tests were constructed which required subjects to match clauses or pictures on the basis of inferred emotional information. Errors could be made in a number of ways including the matching of emotions of opposite valence. A similarly constructed pictorial task was included to assess the specificity of this effect to linguistic information. An analysis of the types of errors made supported the hypothesis that psychopaths show a tendency to confuse emotions of opposite polarity, particularly for the linguistic task. The authors suggested that the results across the picture and sentence tasks may have indicated that psychopaths have difficulty in integrating information across linguistic units only when affective processing in the formation of conceptual relationships is required.

For this reason, in the present study, subjects were asked to produce two stories, both of which were drawn from the subjects' own experience. One concerned a putative emotional topic and the other a neutral topic. It was predicted that psychopathy would be most strongly associated with dependent measures in the analysis of the affective rather than the neutral narrative.

Thought Disorder

Formal thought disorder has been described as a disruption in the logical relationship among ideas (Bleuler, 1950). Concept boundaries may become fluid so that incongruous ideas
and objects are seen as related (e.g. Meehl, 1962). In addition, disorders relating to the content of thought, rather than its form, have also been included under the definition of thought disorder. For instance, responses to stimuli may be bizarre or idiosyncratic (e.g. Harrow, Grossman, Marshall, Silverstein, & Meltzer, 1982). Initially, clinical observation led to the belief that thought disorder was pathognomonic of schizophrenia (Bleuler, 1950); however, recent studies suggest that thought disorder may be present in nonschizophrenics (e.g. Andreasen & Powers, 1974; Harvey & Brault, 1986). Some investigators have suggested that disordered thinking fits along a continuum with normal thinking (Harrow & Quinlan, 1977). Harrow and Quinlan (1977) found that schizophrenics differed from other patient groups on measures of severe deviant thinking, but not on measures of milder thought disorder. Andreasen and Grove (1986) suggested that in fact normal individuals may exhibit mild thought disorder. One category of thought disorder - derailment - is found in normal individuals at significant levels. Twenty to thirty percent of normals have been reported to exhibit derailment at greater than mild levels (Andreasen & Grove, 1986; Oltmanns, Murphy, Berenbaum, & Dunlop, 1985).

Andreasen (1979a, 1979b) developed a set of definitions that many researchers have used in studying disordered speech. These definitions cover eighteen categories of thought disorder
such as derailment, tangentiality (replying to a question in an oblique or irrelevant manner), and poverty of content of speech (an adequate amount of speech containing little information). The scale that the categories form is known as the Scale for the Assessment of Thought, Language, and Communication Disorders (TLC; Andreasen, 1980). This scale emphasizes the direct observation of language behaviour in evaluating thought disorder. The author makes the point that thought disorder is most often assessed from speech, and not from an individual’s thoughts; therefore "disorganized speech" rather than "thought disorder" is a more accurate term. As previously stated, the present study conceptualized ratings on the TLC as being indicative of disordered communication or language. The TLC has been shown to be both a reliable and valid instrument (e.g. Andreasen, 1979a, 1979b; Andreasen & Grove, 1986; Docherty, Schnur, & Harvey, 1988; Harvey, 1983; Harvey, Earle-Boyer, & Levinson, 1988; Harvey, Earle-Boyer, & Weilgus, 1984).

Past research has found that TLC-rated thought disorder is made up of several components that have different prognostic significance and are sensitive to patient diagnosis. For instance, poverty of speech appears to be an enduring feature of chronic schizophrenic illness (Andreasen, Hoffman, & Grove, 1985; Docherty, Schnur, & Harvey, 1988; Pogue-Geile & Harrow, 1984) and to predict poor outcome (Harvey et al., 1988). Andreasen and Grove (1986) found that the negative signs of
thought disorder, poverty of speech and poverty of content of speech (adequate amount of speech conveying little information), were most useful in predicting continued impairment amongst psychiatric patients. In manic patients, positive rather than negative signs of thought disorder have been found to be most stable in the acute stage of illness (Harvey et al., 1984).

In the present study, the scores for two subscales based on TLC categories, as well as an overall measure of thought disorder, were calculated (Andreasen, 1979a). Positive formal thought disorder encompasses pressure of speech, tangentiality, derailment, incoherence, and illogicality. Negative formal thought disorder includes only poverty of speech and poverty of content of speech. The overall score was the total of all thought disorder categories. It was predicted that increasing psychopathy would be associated with higher scores on positive thought disorder, since the scale contains categories related to a previous clinical observation, namely that in psychopathic speech concepts are not well connected.

Cohesion: Meaning and Measurement

Cohesion is defined by Halliday and Hasan (1976) as a semantic relationship. Cohesion is based on the meaning existing between an element in a text and some other element that is crucial to its interpretation. The relation between elements can be systematized by classifying them into a small
number of distinct categories: reference, conjunction, lexical, substitution, and ellipses. The latter two will not be discussed further as they are not included in the present research. Their occurrence in the speech of subjects in similar studies has been shown to be of very low frequency (e.g. Rochester & Martin, 1979; Wykes & Leff, 1982). It should be noted that since cohesion is text based, ties may occur between clauses that are not immediately adjacent to one another.

The various types of cohesion measured in the present study can be seen in Table I. Referential cohesion refers to how an individual is able to interpret the meaning of one text element because of its relationship to another text element. It is interpretable either because it is identified with the referent (pronomial, demonstrative) or because it is compared with the referent (comparative). Conjunction is different from other cohesive relationships in that it expresses the logical relationships existing between clauses. These can be additive, adversative, temporal, causal, or continuative in nature. The conjunction will stand in some type of relationship to the sentence preceding it, linking it to the one that follows. Lexical cohesion is the reiteration of a previous text element. This can occur through straight repetition (same root), a synonym, a superordinate, or a general item. It may involve the repetition of words, phrases, or whole clauses.
<table>
<thead>
<tr>
<th>Category</th>
<th>Subcategory</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reference</strong></td>
<td>1. Pronomial</td>
<td>When we were walking out of the bar one night a guy grabs her // So I just about got in a fight with him</td>
</tr>
<tr>
<td></td>
<td>2. Demonstrative</td>
<td>&quot;And when the door opens I'm going to get you&quot; // I just told them that</td>
</tr>
<tr>
<td></td>
<td>3. Comparative</td>
<td>It could take two months to save the money // That's a long time</td>
</tr>
<tr>
<td><strong>Conjunction</strong></td>
<td>1. Additive</td>
<td>I knew the bartender there // And he always makes nice strong drinks</td>
</tr>
<tr>
<td></td>
<td>2. Adversative</td>
<td>I just took off // But it was the only time (table continues)</td>
</tr>
<tr>
<td>Category</td>
<td>Example</td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>3. Causal</td>
<td>We went out drinking // So I had a lot to drink</td>
<td></td>
</tr>
<tr>
<td>4. Temporal</td>
<td>She went out that night // But then I went out with my buddies</td>
<td></td>
</tr>
<tr>
<td>5. Continuative</td>
<td>He never taught before // Actually the second year I had my first year teacher</td>
<td></td>
</tr>
</tbody>
</table>

**Lexical**

<table>
<thead>
<tr>
<th>Type</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Same root</td>
<td>They put me in to see the doctor // I seen the doctor</td>
</tr>
<tr>
<td>2. Synonym</td>
<td>And I despised it // Cause I hate that city with a passion</td>
</tr>
<tr>
<td>(or Co-hyponyms)</td>
<td></td>
</tr>
<tr>
<td>3. Superordinate</td>
<td>We were sitting in Alphaville // This city is dead</td>
</tr>
<tr>
<td>4. General item</td>
<td>It was a puzzle that was given to me // I can get that thing together</td>
</tr>
</tbody>
</table>

**Note.** Categories are adapted from Rochester and Martin (1979). Quotations are from subjects in the present study. Presuming
Halliday and Hasan have argued that the cohesive relations that are established by conjunction and reference are semantic in nature while those established by lexis are lexicogrammatical in nature. However the expression of the relations requires both the semantic and lexicogrammatical systems. This implies that simple word repetition establishes some type of semantic relationship. However, when a speaker repeatedly uses some form of a word in a text lexical cohesion is coded irrespective of the meaning of that word. Simple lexical repetition may not require the semantic encoding of actual word meanings to act as a form of text cohesion. This is particularly evident when the same lexical items are used repeatedly across clauses or sentences, a speech peculiarity that has been related to empty speech (Nicholas, Obler, Albert, & Helm-Easterbrooks, 1985) and "schizophrenic" speech (Chaika, 1974). Chaika (1974) suggested that schizophrenics may not be able to match semantic features to words in the lexicon.

Fine (1978) has suggested that conjunction and reference should be viewed as tending to establish meaning relationships, whereas lexical ties should be viewed as establishing more formal links. Generally, simple repetition has been viewed as carrying the least amount of meaningful information (Fine,
Past studies have investigated whether or not thought disordered individuals rely more on reiteration than on the semantic relationships expressed by referential cohesion (e.g., Rochester and Martin, 1979). However, the results of these studies have been mixed.

Rochester and Martin (1979), in their study of schizophrenic speakers, examined cohesive relationships as a means of describing how thought disordered speakers might differ from non-thought disordered speakers. They hypothesized that the vague and tangential speech often seen in thought disordered speakers may be due to a failure to link clauses to prior discourse. They predicted that this might be realized in fewer cohesive ties of all types, or in a preponderance of lexical ties. The authors hypothesized that reiteration seems to require less extensive integration of textual information than do other forms of cohesion. The authors' hypotheses proved to be partially correct. Overall, both thought disordered and non-thought disordered schizophrenics used less cohesion than the normal group. However, as predicted, the thought disordered group used more lexical cohesion than did the non-thought disordered group. Thought disordered speakers tended to rely very heavily on lexical cohesion, especially simple repetition as opposed to synonymy or general categories. The investigators concluded that thought disordered speakers were actively
processing at a lexicogrammatical level, thereby forming lexical chains, but they often did not form the more meaningful semantic ties.

Similar results were obtained for the offspring of schizophrenics in a study of the speech of children vulnerable to psychopathology (Harvey, Weintraub, & Neale, 1982). These children used more lexical ties than did normal children. Children of schizophrenics also used fewer cohesive ties overall. The authors suggested that their results were indicative of poorly linked speech units in the children of schizophrenic parents.

Rochester and Martin (1979) found that thought disordered speakers used more lexical cohesion than did normal speakers. Other researchers have found no differences between normal adults and pathological groups in their use of lexical ties (Harvey, 1983; Ragin & Oltmanns, 1986). However, Rochester and Martin (1979) used as their dependent measure the proportion of lexical cohesion to other types of cohesion, whereas Harvey (1983) and Ragin and Oltmanns (1986) used number of ties per clause. Harvey reported that if Rochester and Martins' method had been used in his study, then the relative proportions of lexical cohesion would have distinguished normals from patients. Ragin and Oltmann's study of lexical cohesion and thought disorder suffered from a number of methodological problems which makes it difficult to evaluate. In comparing
normals, schizophrenics, schizoaffectives, and manics the authors used an average of less than ten subjects per group and based their analysis on only fifteen clauses per subject. Not surprisingly, they found few group differences. Those that did prove significant were related to within-clause lexical cohesion (the rationale for this measurement was not made clear) and changes in cohesion over time. The lack of within-clause lexical cohesion was related to thought disorder and not clinical diagnosis. As the pathological subjects became less thought disordered they used less lexical cohesion.

A number of studies have looked at cohesive ties in relation to thought disorder and different types of psychopathology (e.g. Harvey, 1983; Ragin & Oltmanns, 1986; Wykes & Leff, 1982). This research has grown out of the debate about whether or not manics, like schizophrenics, can be considered thought disordered. Harvey (1983), found that thought disordered schizophrenics and manics used less reference and conjunctive ties than did normal speakers. The non-thought disordered speech segments of thought disordered patients did not differ from those of normals.

What is most important about this study is that it established a relationship not between disordered communication and diagnosis, but between disordered communication and certain patterns of cohesive ties. Wykes and Leff (1982) suggest that cohesion analysis may uncover whether or not ideas and phrases
are appropriately linked. If they are not, the authors felt that such a deficit was most closely related to the thought disorder category of derailment.

In the present study cohesion analysis allowed the assessment of the extent to which psychopathy was associated with a tendency to produce poorly developed texts through an inadequate use of cohesive ties, or perhaps through the inordinate use of lexical cohesion. It was hypothesized that if psychopaths have a general deficit in integrating semantic information to form cohesive texts, then psychopathy would be associated with narratives filled with lexical ties at the expense of other cohesive ties. An alternative prediction was that if psychopathy is related to a generalized deficit in the formation of a text through cohesive relationships, then psychopathy would be associated with fewer ties of all types. If psychopathy is related specifically to a verbal affective deficit that involves a difficulty in carrying out the semantic integration necessary for combining affective and linguistic information, then it was predicted that these deficits would be apparent only for affective texts.

The Register of the Narratives

Halliday and Hasan (1976) stress the fact that register, along with cohesion (e.g. Ellis & Ure, 1969; Hymes, 1964) define a text. The concept of register has been described in various ways but usually includes information concerning the
topic or field of a text, its mode, its purpose or message-form, and the relationship existing between listener and speaker. Register relates to the context of a situation and the fact that a text is a communication.

The narratives produced in the present research were texts of planned discourse. Subjects were asked to produce a story about a past event in their lives based on a particular topic. They were given a few minutes to think about what to say and how to say it. They were given some directives on what form it should take. The topics of the discourses were relatively unrestricted in that subjects could tell a story about any time they felt angry or had difficulty in doing something. The relationship existing between the listener and speaker was fairly formal; however the listener was not perceived as being a member of the prison bureaucracy. The mode of the situation was oral with an orientation to relate past events that were personal to the speaker. From the listener’s viewpoint, the purpose of the communication was for the speaker to produce a planned discourse in story form. Ochs (1979) has pointed out that there are often differences between planned and unplanned discourse. Essentially, discourse that is planned makes relatively more use of adult syntactical constructions than is seen in unplanned discourse. For instance, the syntax will make a semantic link explicit and specific so that conjunctions such as "because" or "so" are expressed (e.g. "I’m so tired - I went
running today - I think I'll rest" versus "I'm so tired because I went running today so I think I'll rest"). This may be because it takes more planning to form specific semantic relationships.

There is no reason to believe that psychopathy might be associated with a failure to be sensitive to the register of a discourse. If in fact psychopaths can be charming and are good manipulators, and yet produce speech that is not well connected, then one might expect them to be especially sensitive to the demands of the listener at a pragmatic level.

It should be noted that other authors have had a less rigorous view of what constitutes textness. Petofi (1985) defines a text as a verbal object which is identified as a text by any one interpreter at any particular time. Brown and Yule (1983) simply state that a text "is the verbal record of a communicative event (p. 190)." From this viewpoint, nothing defines textness except for an individual's decision that a given object is a whole in the communication context. Coherence is not necessary to form a text. For example, a disorganized monologue produced by a thought disordered speaker may form a text since it can be viewed as a sample of incoherent speech.

Reference Patterns

Unlike lexical and conjunctive cohesion, referential cohesion is part of one of the phoricity systems in English. Phoricity systems refer to the structuring of utterances on the
basis of what speakers assume their listeners know. They involve speech units that require previously presented information for their interpretation. The noun phrase or nominal group is one such speech unit. Generally, there are two types of nominal groups. The first simply presents new information and the second presumes previous information so that it may be understood by the listener. Information can be presumed from previous verbal information as in referential cohesion, either explicitly (e.g., So I was in the city and I didn’t like it) or implicitly (e.g., I went to the city and robbed the bank). Information can also be presumed from the immediate environment (e.g., Look at that guard), or general knowledge (e.g. The police are bad). Sometimes, the references contained in a text are ambiguous. One example of this type of reference would be:

I was driving in my car with my girlfriend and my ex-girlfriend

Then she said that she didn’t believe me

Since it is unclear who it is that she refers to, the listener is unable to interpret the second clause. References can also be unclear. For instance a speaker may make a pronomial reference when there is no previous referent. If an individual’s utterances are full of unclear or ambiguous references then the listener is unable to effectively understand what the speaker means.
Rochester and Martin (1979) found that thought disordered speech samples contained more unclear and ambiguous references than did non-thought disordered samples. This finding has been consistent across a number of studies. Harvey (1983) found that unclear and ambiguous references differentiated between the speech of thought disordered and nonthought disordered manics and schizophrenics. Harvey et al. (1982) also reported that the speech of children of schizophrenics contained more of these types of references than did the children of normals and other at risk groups. Based on a study that assessed thought disorder and reference difficulties at a six month interval, Docherty et al. (1988) suggested that the frequency of incompetent references (ambiguous and unclear combined) may be a stable trait of schizophrenics.

In the present study the unclear and ambiguous references categories were coded and combined into the category of incompetent references (Docherty et al., 1988). This category was then correlated with PCL-R scores. It was predicted that if increasingly high scores on the PCL-R are associated with a failure to develop texts on a semantic level, then they should also be associated with a relatively high degree of incompetent references. Alternatively, if psychopathy is associated with particular difficulties in the integration of affect and language, then incompetent references would be mostly associated with the affective narrative.
Coherence: Meaning and Measurement

Although cohesion can be used to identify the unity of a text it does not the guarantee that a discourse will be understandable or meaningful. Cohesion can be scored irrespective of meaning relationships and is therefore not an adequate assessment of the overall understandability of discourse. In assessing the coherence of speech the relationships existing between events within a discourse are taken into account. If connections between propositions are weak, then the overall text will be relatively less coherent or understandable. In analyzing a text it is important to understand how a series of concepts link up to form more complex meanings. This can be done by examining coherence. In contrast to cohesion, coherence is more concerned with delineating the relationships that exist between events described within a text. There are a number of systems for examining these relationships (e.g. Gulich & Quasthoff, 1982; Omanson, 1982; Reiser & Black, 1982); however they have not often been used to investigate psychopathological groups. One study has shown that text-based presuppositional relationships between propositions tend to break down in schizophrenics (Hoffman, Kirsten, Stopek, & Cicchetti, 1982).

Plot-unit Analysis

In the present study, the narratives subjects produce should contain some structuring of semantic relationships so
that they form a meaningful text. The story should begin at the beginning, move ahead reasonably smoothly in time, and evaluate states and events so that it is possible to infer what the story is about (Polanyi, 1985). Subject narratives should meet these conditions if their discourse is to be seen as coherent and meaningful.

One way of describing these relationships is through the use of story grammars. Story grammars were constructed for the description of the structure of a genre of stories known as folk-tales. Very specific and invariant rules were developed to describe the ordering of events within these stories. However, these rules may not be appropriate for the analysis of narratives that may be structured differently (Mandler, 1984, p. 17). For this reason, the use of story grammars would not seem to be appropriate for the present purposes.

Another way to approach the problem is to look at the way in which expectancies are set up in the listener by information given in the narrative (Black & Reiser, 1982). Generally, if a problem is mentioned that is central to the point of the story, then information concerning some type of resolution or outcome is expected to be provided by the narrator. If the narrator is able to structure the story appropriately then both problem and resolution or result will be provided. For instance, if the event involves anger, then the narrator should attempt to explain what led to the anger and its outcome.
One way to assess this is through the use of plot-unit analysis (Botvin & Sutton-Smith, 1977; Sutton-Smith, Botvin, & Mahony, 1976). Compared to story grammars there is more emphasis on meaning in plot-unit analysis. Instead of consisting of a schematic structure within which elements are placed, plot-unit analysis is directed at discovering how the text explains the actions of the main characters. Plot-units are verbal noun dyads indicating action (or the potential for action) and resolution (e.g. injury - recovery or death). As well as being sensitive to the structural complexity of a story (Botvin & Sutton-Smith, 1977), these dyads are also useful in assessing the extent to which one concept is linked to another within a text. For instance, if the occurrence of an injury is central to a story then some type of resolution or result should occur with regard to the injury. If it does not, then the discourse may seem unconnected or vague. Secondary dyads should not interrupt the flow of the story. If present, they should be embedded within primary dyads (Botvin & Sutton-Smith, 1977).

As previously indicated, psychopaths may have difficulty in linking conceptual units to form a coherent text. Plot-unit analysis allowed the assessment of this hypothesized deficit through the identification of logical conjugates which should be present in pairs. It was predicted that psychopathy would be associated with a tendency to introduce the first part of a
plot-unit, but not to complete it. The dependent measure in this case was the proportion of closed to open plot units.
Experimental Hypotheses

It has been suggested that psychopaths' concepts, as expressed in their speech, are not well connected to one another. This deficit may take one of a number of forms. Based on clinical observation and the research reviewed above, it was hypothesized that:

1. Psychopathy is associated with an increase in lexical cohesion or a decrease in the use of all types of cohesion.
2. Psychopathy is associated with an increase in the use of incompetent references.
3. Psychopathy is associated with a failure to open and close the same plot-unit.
4. Psychopathy is associated with positive, but not negative measures of thought disorder.

These hypotheses were modified by the caveat that, if abnormalities in speech production are affectively based in psychopaths, then these predictions would be realized for the affective, but not the neutral stories.

Method

Subjects

Subjects were 40 male inmates from a Canadian Federal prison near Vancouver, B.C. who had volunteered to participate in an ongoing research project. Psychopathy was assessed using the PCL-R, a 20 item scale of proven reliability and validity (e.g., Hare, 1980, 1985, 1991; Hare et al., 1990). It measures
both behavioural and personality variables on the basis of an extensive interview with the inmate and a review of his institutional files. The summed score (maximum of 40) provides a global measure of psychopathy. The intraclass correlation coefficient for the PCL-R in the population from which this sample was drawn was .84. The interview and ratings were carried out by individuals trained in its use (not the experimenter). When available the means of double ratings were used to increase reliability. Past research has demonstrated that those individuals with low and high PCL-R scores do not differ on levels of education, parents' social class, I.Q. or other neuropsychological variables (e.g. Hare, Frazelle, Bus, & Jutai, 1980; Harpur et. al., 1989; Hart, Forth, & Hare, 1990).

In most studies, subjects have been divided into high (PCL-R 30 or greater) or low (less than or equal to 20 on the PCL-R) psychopathy groups for comparative research. For the primary analysis in the present study, however, psychopathy was treated as a continuous variable. Some additional analyses were carried out using subjects classified as psychopaths (PCL-R score 30 or greater; n = 21) or as nonpsychopaths (PCL-R score less than 30; n = 15). For all analyses, 4 subjects who received diagnoses of either schizophrenia or schizoaffective disorder were omitted as described below.

The individual who performed the initial PCL-R assessments recruited subjects to participate in the present research if
they had learned English as their first language and if they were between the ages of 18 and 60. The mean age of the 36 subjects was 29.6 years (S.D. = 9.1; range = 19 to 56 years). The mean years of education was 8.9 (S.D. = 1.9; range = 4 to 12). Neither education nor age was found to correlate with PCL-R ratings nor any of the dependent variables. The mean PCL-R score was 29.4 (S.D. = 8.2; range = 7.5 to 40.0).

Procedure

Two stories, one involving an angry incident, and one involving a topic of personal difficulty, were collected from the subjects at the beginning of the session. This was followed by the administration of the SADS-L interview. Collection of the speech samples and the administration of the SADS-L interview were carried out by the author, a Ph.D. level clinical psychology graduate student, who was blind to PCL-R ratings. Subjects were paid $7.00 for the session which lasted from 1 to 2.5 hours. Subjects were tested individually.

Speech Samples

The subject was asked to produce two types of stories that were to be based on personal experience. This task required a subject to recall a time when he was angry and a time when he had difficulty in doing or learning something. The directive for the angry (difficulty) story was: "I want you to tell me a story about a time you felt really angry (had difficulty in doing or learning something). Like most stories, it should have
a beginning, a middle, and an end. Tell the story as if you are there. Describe what happened and what you did. I'll give you a couple of minutes to think about it. Then I want you to tell me what happened like it was a story. You should speak for a few minutes. Are there any questions?" The interviewer then answered any questions that the subject had concerning the instructions and told him not to talk to the interviewer while he was telling the story. If a subject asked for specific advice about what to speak about he was encouraged to continue to try to recall an angry (difficult) time. Two subjects (both nonpsychopaths) could not think of an angry time so they were asked to speak about a sad incident. Some subjects were not sure what was meant by the topic "difficulty in doing or learning". The experimenter gave the example of "trying to figure out a math problem". None of the subjects used this example in creating a story. After questions were answered the interviewer repeated the instructions and the subject began. A couple of the subjects asked the interviewer questions about story content after they had begun their narration. For example, one subject asked if someone that he was describing was known to the interviewer. In these cases the interviewer responded with "mmm" and the subject continued.

The emotional topic occurred first or second on a random basis. There was 20 minutes between each story. After the telling of each story the experimenter asked questions about
its content for about 10 minutes. The narratives were recorded on audio tape with high quality head-held microphones.

**SADS-L**

After collecting the speech samples the SADS-L structured interview was administered. The first 15 to 30 minutes were spent gathering demographic information from the subject. General questions about the subject's past psychiatric history were also asked. The subject was then told that he would be asked a set of standard questions about how he felt and thought. The interview took from 30 minutes to 1.5 hours and was videotaped.

Before making RDC diagnoses both the experimenter and the reliability coder reviewed the training materials provided by the authors. The reliability coder was a M.A. level graduate student in clinical psychology who had a great deal of previous experience in the administration of structured interviews and their scoring. The experimenter had been previously trained in the use of the SADS in a psychiatric hospital. Both the SADS-L videotapes and prison files were used to make diagnoses. The second rater made diagnoses for a randomly selected set of 20 subjects based on the same information.

Subjects met the criteria for a variety of diagnoses. However, for the present study only the subjects who met the criteria for disorders found to have been related to thought disorder were of interest. Two subjects met the criteria for
schizoaffective disorder (both depressed type), and two subjects met the criteria for schizophrenia (one paranoid and one disorganized). These subjects were excluded from the study.

The two subjects who were rated as schizoaffective by the experimenter were given the same diagnoses by the student. The two raters also agreed on a past instance of schizoaffective disorder (depressed type) for one of the subjects. Neither rater gave any other current diagnosis of schizophrenia, schizoaffective disorder, mania, or depression. Agreement was almost perfect on other diagnoses not relevant to the current study.

One of the two subjects diagnosed as schizophrenic had been rated in the psychopathic range on the PCL-R with a score of 30. The other subjects excluded from the study had PCL-R scores of 24, 23, and 5.

It was surprising to find that 10% of the initial sample suffered from serious psychopathology. However, the prison from which the inmates were drawn was at the time being used to house the most dangerous and disturbed offenders in its geographic area. The mean PCL-R score obtained in the present study is in fact slightly higher than has been found in past research, as is the proportion of inmates defined as psychopathic by the PCL-R. Both the elevated PCL-R scores and the serious pathology that was found may have been a reflection of prison policy. At the time, offenders were being screened
upon arrival at the institution, and the less violent and less dangerous inmates were being sent to other institutions.

Cohesion and Reference Ratings

The experimenter transcribed all of the 80 stories from the audio tapes, including pauses and word repetitions. The stories were then broken down into independent clauses based on the definition of Rochester and Martin (1979): an independent clause is a unit which stands by itself as a declarative, interrogative, imperative, or exclamatory structure. Relative clauses, adverbial clauses, and fact or report complements were treated as part of this basic unit as were sentence modifiers. Number of words and number of clauses were counted. Cohesion and incompetent references were scored according to a manual that was created for this study based on the book *Cohesion in English* (Halliday & Hasan, 1976) and an unpublished manual provided by Harvey (1983).

Hanging clauses were included at the beginning of a new clause. Unless these clauses were necessary for the interpretation of subsequent information they were not scored for linguistic variables nor were they included in the word count. Repetitions of words within a clause were also not scored (e.g., "They - they went to the store"; only the second "they" was coded for linguistic variables and included in the word count). A masters level graduate student from speech and hearing sciences who was familiar with the coding of cohesion,
but knew nothing about psychopaths, then performed the same analysis on 30 (15 affective and 15 neutral) of the 80 stories using the manual provided by the experimenter.

Previous investigators have found the reliability for coding cohesion to be high. Harvey (1983) obtained Kappas of .79 for lexical cohesion, .87 for referential cohesion, and .94 for conjunction. Ragin and Oltmanns (1986) obtained an interrater reliability of .95 for the amount of lexical cohesion per transcript. Rochester and Martin (1979) computed Kappas of .73 to 1.00 for selecting cohesive items and .96 for selecting referents. In the present study interrater reliability (Pearson product moment correlation) for the neutral (affective) story for number of cohesive ties per transcript was .81 (.84) for lexical cohesion, .82 (.88) for referential cohesion, and .92 (.90) for conjunction. For the identification of incompetent references it was .91 (.90). Interrater reliability for the number of words and clauses ranged from .95 to .98 for the affective and neutral stories.

**Plot-Unit Ratings**

There is no set of standard plot-units for the analysis of narratives of real life events. For this reason, plot-units were selected that had proven useful in a previous story structure analysis (Gillam, 1989). In addition, new plot-units were created based on a subset of the present narratives. The author and the same coder who had scored cohesion for
reliability jointly reviewed the 30 narratives (15 affective and 15 neutral) that had previously been coded by the second rater. They identified and discussed new plot units, in addition to those given in Gillam (1989), necessary for coding the narratives. The basic unit of analysis was the independent clause. The plot units that were used, both from Gillam (1989) and newly created, are shown in Table II.

All of the plot-units were then used by both raters to independently analyze 5 stories selected from a book of short stories. Reliability for these ratings was high, and any discrepancies were discussed by the raters. Finally, thirty new narratives from this study were selected (fifteen affective and fifteen neutral stories), and were coded by both raters. The interrater reliability in the present study for the neutral (affective) stories was .88 (.89) for the identification of plot-units (the same plot unit opened and closed). This value compares favourably with those reported by Botvin-and Sutton-Smith (1977), who reported interrater agreement of .81 for the identification of plot-units using graduate students with three hours of training, and by Gillam (1989), who reported an interrater reliability of .91. Using the same plot-units, the author then rated the remaining 42 narratives.

Thought Disorder Ratings

The TLC was scored according to the manual provided by its author (Andreasen, 1980) and the revisions proposed by Oltmanns
## Table II

Plot-units and Their Definitions

<table>
<thead>
<tr>
<th>Problem</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative Feeling State</td>
<td>Nullified/not Nullified</td>
</tr>
<tr>
<td>Description of self as having</td>
<td></td>
</tr>
<tr>
<td>negative feelings.</td>
<td></td>
</tr>
<tr>
<td>Villainy</td>
<td>Nullified/not Nullified</td>
</tr>
<tr>
<td>Injurious or malevolent act</td>
<td></td>
</tr>
<tr>
<td>committed on the speaker.</td>
<td></td>
</tr>
<tr>
<td>Deception</td>
<td>Revealed/not revealed</td>
</tr>
<tr>
<td>A misleading act or statement</td>
<td></td>
</tr>
<tr>
<td>that is intended to cause a</td>
<td></td>
</tr>
<tr>
<td>participant in the narrative</td>
<td></td>
</tr>
<tr>
<td>to act or think wrongly.</td>
<td></td>
</tr>
<tr>
<td>Threat</td>
<td>Nullified/not nullified</td>
</tr>
<tr>
<td>A potential source of danger,</td>
<td></td>
</tr>
<tr>
<td>harm, or distress.</td>
<td></td>
</tr>
</tbody>
</table>

*(table continues)*
Table II continued

<table>
<thead>
<tr>
<th>Problem</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan</td>
<td>Carried Out/not Carried Out</td>
</tr>
<tr>
<td>A scheme (thought, intention) for doing something.</td>
<td></td>
</tr>
<tr>
<td>Attack</td>
<td>Counterattack/Wound/Flee</td>
</tr>
<tr>
<td>To attack a participant with intent to harm (can be verbal).</td>
<td></td>
</tr>
<tr>
<td>Injury</td>
<td>Recovery/Death</td>
</tr>
<tr>
<td>Physical harm or damage to a participant.</td>
<td></td>
</tr>
<tr>
<td>Pursue</td>
<td>Capture/Escape/Release</td>
</tr>
<tr>
<td>To chase in order to capture or harm.</td>
<td></td>
</tr>
<tr>
<td>Search</td>
<td>Find/not find</td>
</tr>
<tr>
<td>To look for something.</td>
<td></td>
</tr>
</tbody>
</table>
Table II continued

<table>
<thead>
<tr>
<th>Problem</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compete</td>
<td>Win/Lose</td>
</tr>
<tr>
<td>To compete with another participant for something.</td>
<td></td>
</tr>
<tr>
<td>Command</td>
<td>Obeyed/Not obeyed</td>
</tr>
<tr>
<td>To be ordered to do something.</td>
<td></td>
</tr>
<tr>
<td>Aid</td>
<td>Accepted/Not accepted</td>
</tr>
<tr>
<td>To offer aid to a participant.</td>
<td></td>
</tr>
<tr>
<td>Promise</td>
<td>Kept/Not kept</td>
</tr>
<tr>
<td>To promise a participant something.</td>
<td></td>
</tr>
<tr>
<td>Problem</td>
<td>Resolved/not Resolved</td>
</tr>
<tr>
<td>A problem that is hard for a participant to contend with.</td>
<td></td>
</tr>
</tbody>
</table>

Note. Adapted from Gillam (1989).
et al. (1985) based on the first 30 minutes of the SADS-L interview, with the appropriate correction for time as instructed in the manual. Each TLC category is scored on a 0 to 3 or 4 point scale. In the present study, the experimenter and a PhD graduate student in forensic psychology, not involved in any of the previous ratings, first read the manual, and scored 5 training tapes to discuss discrepancies in scoring. Then the experimenter rated all the subjects on the TLC and the student rated 50% of the subjects to assess reliability. Typically, for any category a score of 0 is considered to be indicative of no thought disorder, a score of 1 to be representative of mild thought disorder, and 2 taken to indicate the definite presence of thought disorder. Kappa coefficients of agreement for the presence (2 or greater) and absence (less than 2) of thought disorder for the frequently occurring categories of this scale are given in Table III. They range from .58 to .82 and are quite similar to those obtained by other researchers (e.g. Andreasen, 1979a; Harvey, 1983; Oltmans et al., 1985). For categories having a base-rate of less than 20 percent, Kappas were not calculated; however the absolute agreement between raters for these categories was high (at least 95 percent).

Results

Thought Disorder

The thought disorder ratings were highly negatively skewed
resulting in a non-linear relationship with the PCL-R. The thought disorder ratings were therefore transformed by their square root (Cohen & Cohen, 1983). This produced an approximately normal distribution for thought disorder and an approximately linear relationship between thought disorder and the PCL-R. The PCL-R was found to correlate .35 ($p < .03$) with the transformed scores. This suggests that increasing psychopathy is accompanied by an increased tendency to produce disordered communications.

Reliabilities, means, and standard deviations for thought disorder categories, broken down by psychopathy group, are presented in Table III. Only categories for which at least one individual scored a 1 are included.

A score of 1 or below on the TLC is considered to be indicative of mild thought disorder or no thought disorder. Thought disorder appears to have occurred with relatively greater frequency among subjects relative to a sample of normal individuals assessed by Andreasen and Grove (1986). The percentage of individuals exhibiting scores of 2 or greater for that sample and the present sample can be compared in Table III.

A Chi-Square analysis was performed, with subjects classified by the presence or absence of thought disorder and by the presence or absence of psychopathy. The analysis was highly significant ($\text{Chi-square}(1) = 13.02$, $p < .001$). Twenty
Table III

Summary of Information for Thought Disorder (TD) Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Psychopaths (n = 21)</th>
<th>Nonpsychopaths (n = 15)</th>
<th>Kappa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>p^a</td>
<td>M (SD)</td>
</tr>
<tr>
<td>Poverty of Speech</td>
<td>.81 (1.0)</td>
<td>29</td>
<td>.07 (.3)</td>
</tr>
<tr>
<td>Poverty of Content</td>
<td>.10 (.3)</td>
<td>0</td>
<td>.07 (.3)</td>
</tr>
<tr>
<td>Pressure of Speech</td>
<td>.33 (.9)</td>
<td>14</td>
<td>.00 (.0)</td>
</tr>
<tr>
<td>Tangentiality</td>
<td>.76 (.9)</td>
<td>29</td>
<td>.46 (.9)</td>
</tr>
<tr>
<td>Derailment</td>
<td>1.24 (1.2)</td>
<td>48</td>
<td>.40 (.6)</td>
</tr>
<tr>
<td>Illogicality</td>
<td>.09 (.4)</td>
<td>5</td>
<td>.00 (.0)</td>
</tr>
<tr>
<td>Incoherence</td>
<td>.23 (.4)</td>
<td>9</td>
<td>.00 (.0)</td>
</tr>
<tr>
<td>Distractible Speech</td>
<td>.10 (.3)</td>
<td>0</td>
<td>.00 (.0)</td>
</tr>
<tr>
<td>Circumstantiality</td>
<td>1.20 (1.0)</td>
<td>48</td>
<td>.80 (1.0)</td>
</tr>
<tr>
<td>Loss of Goal</td>
<td>1.29 (1.0)</td>
<td>53</td>
<td>.73 (1.1)</td>
</tr>
</tbody>
</table>

Reliability

| Positive TD            | 2.67 (3.1) | 57  | 1.00 (1.9) | 13  | .91   |
| Negative TD            | .81 (1.0)  | 29  | .13 (.4)   | 0   | .87   |
| Total TD               | 6.14 (3.7) | 95  | 2.67 (3.9) | 33  | .86   |

(table continues)
Table III continued

<table>
<thead>
<tr>
<th>Note. Only categories for which at least one subject scored a one or more are included.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only categories for which at least one subject scored a one or more are included.</td>
</tr>
<tr>
<td>aThe percentage of individuals scoring greater than 2 or greater on the variable. bThe percentage of 94 normal individuals scoring 2 or greater on the variable as reported by Andreasen and Grove (1986).</td>
</tr>
</tbody>
</table>
out of 21 subjects in the psychopathic range of the PCL-R were classified as thought disordered, whereas only 5 of the 15 subjects in the nonpsychopathic range were so classified. Similar analyses were carried out separately for positive and negative thought disorder. Neither positive ($r = .16, p > .34$) nor negative ($r = .29, p > .09$) thought disorder correlated significantly with psychopathy. This apparent lack of relationship may have been due to the highly skewed nature of the thought disorder distributions that were not amenable to correction. However, there was a relationship between PCL-R group and positive thought disorder for the Chi-Square analysis, ($\text{Chi-square}(1) = 7.07, p < .01$). The most frequently occurring categories of positive thought disorder were derailment and tangentiality. Group differences in negative thought disorder were not significant after the Yates Correction, ($\text{Chi-square}(1) = 3.29, p > .07$), with 6 psychopaths and none of the nonpsychopaths scoring 2 or greater. All of the 6 psychopath's scores of 2 or greater were due to poverty of speech and not poverty of content of speech. The mean values for each group for positive, negative, and total thought disorder can be found in Table III.

**Affect Manipulation Check**

Whether or not the two story types differed on emotionality was assessed by two raters, not involved in any other ratings, who rated each story on two 7-point Lykert
scales. One of the raters was a graduate student in clinical psychology and the other had just completed an undergraduate degree in psychology. For the first scale, ratings were made to the question "How emotional is this story?" with scale anchors of "Extremely" (7) and "Not at all" (1). For the second scale, ratings were made to the question "How much interpersonal conflict is there in this story?" with scale anchors of "A lot" (7) and "None at all" (1). The intraclass correlation for the average of two raters was .69 for emotionality and .79 for conflict. Paired sample t-tests were carried out on the resultant mean scores. On the emotionality dimension the two story types differed (t = 2.59, p < .01; mean for the difficulty story = 3.9, SD = 1.7; mean for the angry story = 4.8, SD = 1.3). The stories also differed on the interpersonal conflict dimension (t = 3.99, p < .001; mean for the difficulty story = 3.2, SD = 1.6; mean for the angry story = 4.8, SD = 1.3). These results suggest that the two stories differed on the rated dimension of emotionality; however they may also have differed on other dimensions. In subsequent discussions the angry story will be referred to as affective and the difficulty story will be referred to as neutral. However, even though the "neutral" story was rated as less emotional then the angry one, there is no evidence that it was not emotional.

Discourse Variables

The Means and S.D.s for total number of words, total
number of clauses, mean length of utterance (MLU; mean number of words per independent clause) and open and closed plot-units for each story type can be found in Table IV. No significant differences were found between high and low psychopathy groups for any of these variables. As can be seen in Table IV, the number of clauses and words used was sensitive to whether or not subjects related a neutral or an affective story. Subjects told longer stories for the affective topic; however MLU did not differ for the two story types. Subjects also produced more open and closed plot-units for the affective story suggesting it was more complex than the neutral story.

In order to assess the relationship between the dependent variables and the discourse variables, correlations were calculated between the two sets of variables for all subjects. These correlations are shown in Table V.

The number of open and closed plot-units was included on the dependent variable list so as to assess the relationship between story length and story complexity. The correlations show that the total number of clauses was highly related to the number of open and closed plot-units. This suggests that story complexity, as assessed by the number of plot-units, was related to story length. However, story length was not significantly associated with the degree to which subjects opened and closed the same plot-units, as indicated by the nonsignificant correlation, suggesting that coherence was not
Table IV
Means and Standard Deviations of the Discourse Variables for the Affective and Neutral Stories

<table>
<thead>
<tr>
<th>Variable</th>
<th>Neutral Story</th>
<th>Affective Story</th>
<th>t(34)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Plot Units</td>
<td>3.94 (1.97)</td>
<td>5.67 (3.57)</td>
<td>3.18**</td>
</tr>
<tr>
<td>Closed Plot Units</td>
<td>2.75 (1.75)</td>
<td>4.36 (2.98)</td>
<td>3.50***</td>
</tr>
<tr>
<td>Number of Words</td>
<td>395 (205)</td>
<td>537 (384)</td>
<td>2.75**</td>
</tr>
<tr>
<td>Number of Clauses</td>
<td>45 ( 26)</td>
<td>61 ( 46)</td>
<td>2.50*</td>
</tr>
<tr>
<td>MLU&lt;sup&gt;a&lt;/sup&gt;</td>
<td>9.07 (1.73)</td>
<td>9.00 (2.20)</td>
<td>.24</td>
</tr>
</tbody>
</table>

<sup>a</sup> MLU length of utterance which is the number of words per independent clause.

* p < .05.
** p < .01.
*** p < .001.
Table V
Correlations of the Dependent Variables with Total Words, Clauses and MLU for the Affective and Neutral Stories

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total Words</th>
<th>Total Clauses</th>
<th>MLU&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Neutral Story</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lexical Cohesion</td>
<td>.07</td>
<td>.23</td>
<td>.35*</td>
</tr>
<tr>
<td>Referential Cohesion</td>
<td>.07</td>
<td>-.01</td>
<td>.32*</td>
</tr>
<tr>
<td>Conjunctive Cohesion</td>
<td>-.08</td>
<td>.02</td>
<td>-.01</td>
</tr>
<tr>
<td>Total Cohesion</td>
<td>.07</td>
<td>-.06</td>
<td>.35*</td>
</tr>
<tr>
<td>Incompetent References</td>
<td>.27</td>
<td>.33*</td>
<td>-.12</td>
</tr>
<tr>
<td>Closed/Open Plot-units</td>
<td>.05</td>
<td>.05</td>
<td>.02</td>
</tr>
<tr>
<td>Open Plot Units</td>
<td>.63***</td>
<td>.72***</td>
<td>-.19</td>
</tr>
<tr>
<td>Closed Plot Units</td>
<td>.54***</td>
<td>.63***</td>
<td>-.15</td>
</tr>
</tbody>
</table>

(table continues)
Table V continued

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total Words</th>
<th>Total Clauses</th>
<th>MLU&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affective Story</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lexical Cohesion</td>
<td>.07</td>
<td>.23</td>
<td>.28</td>
</tr>
<tr>
<td>Referential Cohesion</td>
<td>.07</td>
<td>-.01</td>
<td>.39&lt;sup&gt;*&lt;/sup&gt;</td>
</tr>
<tr>
<td>Conjunctive Cohesion</td>
<td>-.08</td>
<td>.02</td>
<td>-.02</td>
</tr>
<tr>
<td>Total Cohesion</td>
<td>.07</td>
<td>-.06</td>
<td>.46&lt;sup&gt;**&lt;/sup&gt;</td>
</tr>
<tr>
<td>Incompetent References</td>
<td>.14</td>
<td>.12</td>
<td>.08</td>
</tr>
<tr>
<td>Closed/Open plot-units</td>
<td>.02</td>
<td>.05</td>
<td>.02</td>
</tr>
<tr>
<td>Open Plot Units</td>
<td>.68&lt;sup&gt;***&lt;/sup&gt;</td>
<td>.82&lt;sup&gt;***&lt;/sup&gt;</td>
<td>-.20</td>
</tr>
<tr>
<td>Closed Plot Units</td>
<td>.58&lt;sup&gt;***&lt;/sup&gt;</td>
<td>.70&lt;sup&gt;***&lt;/sup&gt;</td>
<td>-.14</td>
</tr>
</tbody>
</table>

Note. Cohesion variables and incompetent references are occurrences per clause.

<sup>a</sup> Mean length of utterance.

* p < .05.

** p < .01.

*** p < .001.
related to story length. MLU was related to total cohesion for both story types. Rochester and Martin (1979) demonstrated that for non-thought disordered individuals the longer the MLU the greater the number of cohesive ties. However, the authors also found that this relationship did not hold for thought disordered individuals.

Cohesion

Table VI displays the correlations between the PCL-R and the dependent variables. These correlations reveal a negative association between the PCL-R and the cohesion variables for the neutral, but not the affective, stories. This appears to be due to a general trend for psychopaths to use less cohesion than the nonpsychopaths in the neutral story. In the affective story the groups used similar amounts of cohesion.

The relationship between psychopathy and the effect of an emotional topic on story telling was assessed by partialing the variance of the neutral story variables out of the correlations between psychopathy and the affective dependent variables. The partial correlations between psychopathy and the cohesion variables for the affective story, with neutral story variance removed, are shown in Table VI. None of these correlations were significant, suggesting that the relationship between psychopathy and cohesion was not particular to an emotional story topic.
Table VI
Correlations of the PCL-R with the Dependent Variables for the Neutral and Affective Stories

<table>
<thead>
<tr>
<th>Variable</th>
<th>Neutral Story</th>
<th>Affective Story</th>
<th>Affective Story (neutral variance partialed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lexical Cohesion</td>
<td>-.41**</td>
<td>.07</td>
<td>.20</td>
</tr>
<tr>
<td>Referential Cohesion</td>
<td>-.30</td>
<td>-.20</td>
<td>-.07</td>
</tr>
<tr>
<td>Conjunctive Cohesion</td>
<td>-.37*</td>
<td>-.01</td>
<td>-.07</td>
</tr>
<tr>
<td>Total Cohesion</td>
<td>-.47**</td>
<td>-.08</td>
<td>.20</td>
</tr>
<tr>
<td>Incompetent References</td>
<td>.23</td>
<td>.43**</td>
<td>.55***</td>
</tr>
<tr>
<td>Closed/Open plot-units</td>
<td>-.44**</td>
<td>-.40*</td>
<td>.29</td>
</tr>
</tbody>
</table>

Note. Cohesion variables and incompetent references are occurrences per clause.

* $p < .05$.

** $p < .01$.

*** $p < .001$. 
The Means and S.D.s for the cohesion variables for each affect type are presented in Table VII for psychopaths and nonpsychopaths. Due to the number of t tests that were performed the Bonferonni correction was used across each story type. The familywise Type I error rate was held at .05 by testing each comparison at $p = .008 (0.05/6$ variables).

Total cohesion was about 2.48 ties per clause across the different types of stories. This figure compares favorably with those previously found for interviews and the retelling of a story just heard, which have ranged from 2.04 to 3.86 in normal individuals (Harvey, 1983; Rochester and Martin, 1979). Referential and conjunctive cohesion are also in the same range as that previously found. Harvey (1983) reports values of .97 for reference and .45 for conjunction in normals based on an open topic interview.

Close in value to those figures are those found in the present study: .88 (neutral story) and .92 (affective story) for reference and .41 (neutral story) and .43 (affective story) for conjunction. What is different from previously reported values are the figures for lexical cohesion. For both the affective and neutral story relatively high amounts of lexical cohesion were found: 1.18 ties per clause for the neutral story and 1.14 ties per clause for the affective story. Harvey (1983) reported .66 ties per clause and Ragin and Oltmanns reported
Table VII
Means and Standard Deviations of the Dependent Variables for the Affective and Neutral Stories for Psychopaths and Non-psychopaths

<table>
<thead>
<tr>
<th>Variable</th>
<th>Psychopaths (n = 21)</th>
<th>Nonpsychopaths (n = 15)</th>
<th>t(34)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td></td>
</tr>
<tr>
<td><strong>Neutral Story</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lexical Cohesion</td>
<td>1.11 (.19)</td>
<td>1.29 (.29)</td>
<td>2.31</td>
</tr>
<tr>
<td>Referential Cohesion</td>
<td>.78 (.27)</td>
<td>1.01 (.23)</td>
<td>2.43</td>
</tr>
<tr>
<td>Conjunctive Cohesion</td>
<td>.38 (.09)</td>
<td>.43 (.08)</td>
<td>1.74</td>
</tr>
<tr>
<td>Total Cohesion</td>
<td>2.28 (.43)</td>
<td>2.73 (.39)</td>
<td>3.19*</td>
</tr>
<tr>
<td>Incompetent References</td>
<td>.08 (.07)</td>
<td>.04 (.06)</td>
<td>1.69</td>
</tr>
<tr>
<td>Closed/Open Plot-units</td>
<td>.60 (.34)</td>
<td>.89 (.20)</td>
<td>2.99*</td>
</tr>
</tbody>
</table>

*(table continues)*
<table>
<thead>
<tr>
<th>Variable</th>
<th>Psychopaths</th>
<th>Nonpsychopaths</th>
<th>t(34)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 21)</td>
<td>(n = 15)</td>
<td></td>
</tr>
<tr>
<td>Affective Story</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lexical Cohesion</td>
<td>1.13 ( .28)</td>
<td>1.15 ( .29)</td>
<td>.17</td>
</tr>
<tr>
<td>Referential Cohesion</td>
<td>.84 ( .31)</td>
<td>1.03 ( .22)</td>
<td>2.00</td>
</tr>
<tr>
<td>Conjunctive Cohesion</td>
<td>.43 ( .15)</td>
<td>.43 ( .10)</td>
<td>.04</td>
</tr>
<tr>
<td>Total Cohesion</td>
<td>2.40 ( .49)</td>
<td>2.61 ( .34)</td>
<td>1.40</td>
</tr>
<tr>
<td>Incompetent References</td>
<td>.11 ( .06)</td>
<td>.04 ( .06)</td>
<td>2.98*</td>
</tr>
<tr>
<td>Closed/Open Plot-units</td>
<td>.67 ( .16)</td>
<td>.91 ( .16)</td>
<td>3.29*</td>
</tr>
</tbody>
</table>

Note. Cohesion variables and reference failures are occurrences per clause. The familywise Type I error rate was held at .05 by testing each comparison at p = .06/6 = .008.

* p < .008.
.71. However, Rochester and Martin (1979) found that the proportion of cohesion to total cohesion is sensitive to context in that for interviews, where topics were based on past experience, subjects used lexical cohesion to a greater degree than they did other types of cohesion. For the retelling of a story just heard subjects tended to use reference to a greater degree than other types of cohesion. It may be that the particular context of the present study led to the particular amounts of cohesion that were found, or it may be that inmates tend to use more lexical cohesion in their speech than noninmates.

Group differences were apparent for total cohesion in the neutral story. Psychopaths used less cohesion overall than the nonpsychopathic group. There were also trends for group differences on lexical ($p = .03$) and referential ($p = .02$) cohesion. Nonpsychopaths tended to use both types of cohesion more often than dispsychopaths. For the affective story, no group differences were found, although once again there was a trend for nonpsychopaths to use more referential cohesion than the psychopaths ($p = .05$).

**Incompetent References**

As can be seen in Table VI, increasing psychopathy was related to a tendency to make incompetent references. For the affective story psychopathy added a significant amount of variance to this relationship, over and above that contributed
by the neutral story.

The mean number of incompetent references for the affective and neutral stories can be seen in Table VII. Amounts of .06 (neutral story) and .08 (affective story) per clause are higher than the zero values previously reported for normals (Harvey, 1983; Rochester & Martin, 1979). In the present study, psychopaths, when compared to nonpsychopaths, were found to use more incompetent references for the affective, but not the neutral, story. A value of .11 is far above that previously reported for normal individuals, but below .19, a value reported for TD schizophrenics (Harvey & Brault, 1986).

Coherence

Correlations shown in Table VI suggest that increasing psychopathy was associated with a failure in plot-unit closure for both the affective and neutral stories. As is shown in Table VII, for both story types psychopaths produced fewer completed plot-units than nonpsychopaths, about 65 versus 90 percent. These results suggest that the stories produced by psychopaths were less coherent than those produced by nonpsychopaths.

Discussion

The most general conclusion that can be drawn from the results of this study is that psychopathy is associated with a tendency to produce disordered communications. These communications appear to fail on a number of levels. First,
psychopathy is associated with the use of few cohesive links between sentences. Secondly, psychopaths sometimes fail to provide the appropriate referent for what they are talking about. Thirdly, they frequently introduce information that sets up expectations in listeners about what they might hear next, and then fail to provide that piece of information. Finally, psychopathy appears to be related to clinically-rated deficits in communication, as measured by the TLC.

The level of impaired communication found in the psychopathic subjects was somewhat unexpected. It was thought that psychopaths would score higher than nonpsychopaths on positive thought disorder. This would be consistent with the clinical observation that their speech tends to slip off track. The finding that almost 30 percent of the psychopaths exhibited negative formal thought disorder, and that this was due to poverty of speech and not poverty of content of speech, was surprising. Poverty of content of speech might have been expected, based on the clinical impression that psychopaths speak a lot but impart little information. That they exhibited poverty of speech could be an artifact of prison life, in that an inmate often does not discuss or divulge personal information. Alternatively, it could be representative of more serious pathology. Andreasen and Grove (1986) found that negative thought disorder was associated with more long term impairment in functioning than was positive thought disorder.
Negative thought disorder also appears to be a stable trait of schizophrenia, whereas positive thought disorder does not (Docherty et al., 1988).

All but one of the psychopaths in the present study exhibited a significant amount of disorganized communication as measured by the TLC. This needs to be reconciled with some of the previous clinical descriptions of psychopathy, and with the clinical presentation of other thought disordered groups.

Psychopaths have been described both as glib con artists who can talk almost anyone into anything, and as individuals who produce poorly connected speech units. The findings of the present study would seem to support the latter. Reduced communicability, as measured by the TLC, was higher in psychopaths than in nonpsychopaths. It is possible that the pattern of the subcategories of thought disorder found for psychopaths may differ from that found for other psychiatric groups. For this reason, psychopathic speech may communicate more information than that of, say, schizophrenics.

Alternatively, it could be that Hare's recent observations concerning psychopathic speech are correct. Rather than being the glib con artists that they are commonly portrayed as, it may simply be that their lack of social anxiety coupled with a desire to be dominant in most social situations makes them initially attractive to others. This would allow them to take advantage of some of the people some of the time, even if
reality, their ability to communicate verbally is somewhat impaired.

In the present study specific patterns of thought disorder, other than positive and negative, were not investigated. It was predicted that psychopathy would be associated with positive signs, which it was. The frequency of derailment and tangentiality that was found in the speech of psychopaths would suggest that they frequently slip off topic when they are speaking, and that they often fail to answer direct questions. Psychopaths exhibiting positive thought disorder might be expected to produce speech that is poorly connected, but fluent. For the neutral story they did produce speech that was lower in cohesion than that of nonpsychopaths. They also produced fewer completed plot-units for both story types. Both of these findings are indicative of a relatively high level of unconnected discourse in psychopaths.

However, fluent speech that changes topic quickly may not always sound strange to listeners; without changes in topic, speech would become very boring. Schizophrenics or manics presenting with significant thought disorder are usually immediately identifiable, without the aid of a clinical rating scale. Psychopaths are not generally recognized as thought disordered. One possible reason for this discrepancy is that there may be differences in the content of speech when comparing psychopaths and other thought disordered groups. The
TLC focuses on the form of speech and not its content. Often, both the form and content of schizophrenic speech are odd and bizarre. Idiosyncratic speech is common in thought disordered schizophrenics (Harrow et al., 1982). In psychopaths this has not been observed. If a psychopath replies tangentially but without strange content to a speaker’s question, the speaker may simply assume that individual is evasive or glib. Consider the following two responses to the question, "Do your moods go up and down?"

1. "I'm just such a - uh - believer that - uh - that life is so short and that we're here for such a short time and so - so we're all going to die anyways at one stage so then - uh - you - we pass on into a totally new strata and all the problems of this world for us are solved and then we have a new set of problems and a new set of joys - whichever one - uh - its not something I claim to understand".

2. "Uh - up and down? - well you know - some people worry and I don't worry about much".

Both responses are tangential replies to the question. However, the second response, which was made by a psychopath, would probably pass without comment in a regular conversation, despite the fact that it fails to answer the question. The first response was produced by an individual that was excluded from the present study due to an RDC diagnosis of
schizophrenia. His checklist score was in the nonpsychopathic range. His response was not only tangential but contained somewhat overly abstract, if not strange content. Most listeners would immediately be aware that there is something odd about this individual's speech and also would find it difficult to understand. It is possible that although the form of psychopaths' speech would be considered to be indicative of some type of communication disorder, its content is ordinary enough that listeners can easily infer a meaning. Future research might focus more on listeners and how it is that they infer meanings from the speech of psychopaths. For instance, psychopaths may not produce unusual content in their speech, but instead exhibit deficits in the form of their discourse. It is possible that it is easier for a listener to infer what an individual means if form, rather than content, is impaired.

Rosenberg and Tucker (1979) found that the content of schizophrenic speech was distinct from that of nonpsychiatric patients. The authors suggested that schizophrenics violate the semantic baselines established by members of a language community. These violations do not have to be in the form of bizarre content, but merely involve deviations from expected sex and social roles (e.g. age or familiarity). These types of deviations are related to the previously discussed concept of register. In the present study there was no indication that any of the subjects failed to take into account the topic of the
story or, more generally, that they were to tell a story. Neither did the raters of the story transcripts encounter bizarre or strange content. However they did sometimes encounter information that seemed confused or did not make sense. Consider the following story about being angry:

"My most emotional experience was - uh - one of them - the most clearest one was in here when I was the - in the middle of life skill class when somebody pushed the panic button by accident - I never had on a white tee-shirt - I had a blue tee-shirt on - And - uh - they pulled me out there and centred me out in front of cl - clo - the crowd - Cause they had no real reason to take anybody away - Because it was by accident - So they decided to centre me out - Because the copper in M9 didn’t say that he didn’t like me - And he gave me a hassle - And said to centre me out - And made me go back to the unit and change - I didn’t say anything - He was doing all the talking - He asked me why I didn’t have a blue tee-shirt on - I answered his question by saying that all my white tee-shirts were in the wash - He said "well go to SIS" - "And grab a green shirt then" - I said why" - "I’m already here" - "This - the class is almost over" - And - uh - he said "too bad" - "Go back and do it" in front of about 25 guys" (the panic button is pushed when a guard is in trouble; SIS is stores).
This story, the shortest produced, was told by a psychopath who scored in the moderate range on poverty of speech and also exhibited derailment and loss of goal. This individual's confusion over tee-shirt colours is obvious. He also seemed to have difficulty in producing a story with a clear beginning and end. His interjection of information concerning tee-shirts before it was relevant suggests that he may have had difficulty in either organizing the information into a coherent account or that he failed to take into account the listener's needs.

Bernstein (1966) has made a distinction between elaborated and restricted speech codes. Restricted speech codes are those found among cultural groups and the intent of the speaker is conveyed not through verbal selections, but through changes in gesture, physical set, and other such devices. When using a restricted code, speech sequences are disjunctive and concrete; propositions may not be fully developed and gaps in logic can be present; meanings are discontinuous, but listeners are able to infer what the speaker means by attending to extraverbal channels. This type of speech is often used between people who know each other well.

Elaborate speech codes rely on the self-editing of information so that it takes into account the speaker's role in a communication. The preparation and imparting of explicit
information is the major purpose of the elaborated code. It is possible that some subjects in the present study produced stories in restricted code form, perhaps that belonging to prison inmates. This would mean that the listener would have to make inferences about meanings based on information that is culturally foreign, since the speaker has failed to be sensitive to the register of the situation. If this were so, the story quoted above would make more sense to another inmate than it did to the raters. This argument could be used to suggest that psychopaths are somehow insensitive to a listener's needs and therefore produce relatively unconnected restricted-code speech regardless of the social context. This would allow a psychopath to communicate with those in a similar cultural group without having to produce explicit meanings. However, communication with those outside this cultural group would be impaired.

In the present experiment, psychopathy was associated with a failure to present story information that was coherent. Psychopaths presented information to open a plot-unit, and then did not include enough additional information in subsequent discourse to let the listener know what happened. This suggests that expectancies were set up in the listener to which the speaker was insensitive. It also suggests that psychopathy was associated with a failure to link actions and resolutions within their narratives. This would make it
difficult for the listener to understand what the speaker is trying to say.

Black and Reiser (1982), in their discussion of the structural models of comprehension, have suggested that a model of text comprehension should explicate how knowledge structures are used to guide the retrieval of information from a representation. They suggested that plot-units are useful in understanding a story because they allow the listener to predict future story events. For example, if a competition plot-unit is identified, then the listener can infer and expect that someone will win and someone will lose, based on previous knowledge structures.

Black and Reiser (1982) also suggested that plot-unit constituents have another function in text comprehension. They facilitate the recall of information. For example, an individual may recall that there was a competition in a story. In retrieving information about the competition, a strong expectation will be set up as to the competition outcome. Additionally, the information in other plot-units may become activated. If an individual remembers that someone won the competition, then the expectancy for a rematch may be set up and memory may be searched for such information. In this way, memory retrieval from a representation begins with knowledge structures that organize information. In psychopaths it is possible that there is some breakdown in this process, whereby
assessing one part of a plot-unit does not lead to the activation of its corresponding constituent, or related plot-units. It is also possible that the knowledge structures themselves could be faulty, whereby the plot-unit based expectations that psychopaths have are somehow different than those of other individuals.

In the present study, total cohesion, lexical cohesion, and conjunctive cohesion in the neutral story decreased as psychopathy increased. This was in accordance with the prediction that psychopaths would use little cohesion overall. It suggests that the independent clauses in the texts of psychopaths are not as well-linked as those of nonpsychopaths. For the affective story this relationship did not hold. Although it appeared that cohesion measures were topic sensitive in their relationship to psychopathy, the actual relationship seems to be one where both groups changed levels of cohesion across the two stories, with the psychopaths slightly increasing and the nonpsychopaths slightly decreasing cohesion levels. This resulted in no relationship with the PCL-R for lexical cohesion in the affective story. The finding that cohesion measures may be sensitive to topic should be useful knowledge for future studies of text cohesion.

Perhaps the most interesting finding in the present study was that psychopaths have a tendency to produce incompetent references. This tendency did not distinguish psychopaths from
nonpsychopaths in the neutral story, but it did in the affective story. Subjects tended to produce longer stories, with more plot-units, in the affective stories than in the neutral ones. It is possible that the increased linguistic processing demands required to produce the longer and more complex stories, and to integrate more plot-units, resulted in less resources being available for the editing of inappropriate references. Cohen (1978) has demonstrated that reference failures increase in normals, and to a larger extent in schizophrenics, as the task of communicating a referent becomes more difficult. Within the context of an emotional story, the task of communicating may have been more difficult for psychopaths than for nonpsychopaths.

After reviewing the literature covering information processing and attentional functioning in the developmental course of schizophrenic disorders, Nuechterlein and Dawson (1984) suggested that referential communication deficits (among others) are likely to be the result of a reduction in the processing capacity that is available for task-relevant cognitive operation in persons vulnerable to schizophrenia. In fact, the authors suggested that referential communication deficits may represent a vulnerability factor for schizophrenic disorders. Perhaps in thought disordered schizophrenics a genetic predisposition operates (Harvey et al, 1988) to limit language-based resources. A similar
mechanism might underlie psychopaths' reference failures. Hare et al. (1988), have suggested that the resources for processing language may be limited in psychopaths.

Hare and Gillstrom (1990) have suggested that psychopaths may produce short and poorly integrated sentences. In the present study, psychopathy was not associated with the MLU, or the number of clauses and words produced. This would suggest that psychopaths do not produce shorter utterances, or sentences, at least when telling a story, but only that the utterances they do produce are poorly connected.

There are a number of limitations to generalization of the findings of the present study. The first has to do with register. In this study subjects were asked to produce a monologue in story form. This form of communication is much different than, say, a two-way dialogue, or giving a prepared speech. It is not known if the results obtained here would be reproduced across different contexts and tasks. The relative proportions of the different cohesion variables to total cohesion are sensitive to task (Rochester & Martin, 1979), and task complexity may affect the degree to which individuals produce unclear references (Cohen, 1978).

A second limitation has to do with the basic unit of the analysis. There were only about fifty clauses per story on which to base the present conclusions. This represents only a few minutes of speech. Although the effects found in these
samples were fairly strong, the degree to which they would generalize to other stories and subjects is not clear.

Another limitation of the current study has to do with how blind the raters were concerning group membership. All of the reliability raters, except for the individual who scored cohesion and coherence and the two individuals who scored story affectivity, had previously interviewed psychopaths. This may or may not have had an effect on their ratings.

Another difficulty with interpreting the present results is that thought disorder ratings were made on conversational speech patterns, whereas the dependent measures were derived from a story monologue. Some authors have identified specific passages of disordered speech for which cohesion and reference ratings were performed (Harvey, 1983). These passages contained significantly more incompetent references than did samples of non-disordered passages. In the present study the relationship between psychopathy and the reference measures, and between psychopathy and thought disorder, might have been better clarified by looking specifically at disordered speech samples.

The coding of cohesion and reference failures is a fairly straightforward enterprise. However, to capture all of the information contained in a story, measures additional to plot-units should be used. Information about setting, characters, and time could be included. Single-meaning constituents can be
used to assess information concerning actions (e.g., reactions, activities, announcements, narrator elaborations), and contextual constituents (e.g., location, contextual events, time) can be used to assess story background (Gillam, 1989). Future research might examine the degree to which these other aspects of psychopaths' stories deviate from those of nonpsychopaths. For instance, meaning may be easily derivable from psychopaths' stories because the stories include large amounts of this extra information. Additionally, the structural complexity of psychopaths' stories could be evaluated by examining the relationships among plot-units within a story (Botvin & Sutton-Smith, 1977).

Finally, the nature of the sample in the present study was somewhat different from that found in other studies of criminals. It was not expected that four subjects would be lost due to severe psychopathology. The sample was also slightly unusual in the number of psychopaths it contained. Usually they form about a third of most volunteer samples in a prison population. As suggested above, the policy in the prison at the time the sample was collected may have affected its composition.

Despite these caveats, the present results still suggest that a significant number of psychopaths produce disordered communications. Psychopathy was associated with the use of relatively few cohesive links between sentences, failure to
provide appropriate referents in discourse, failure to link actions and resolutions in stories, and a significant clinical impairment in the ability to communicate. Generally, these results suggest that effective connections among speech units in psychopaths' discourse are not as numerous as those found in nonpsychopaths. In addition, psychopaths likely suffer from a more general impairment in communication, related to, among other things, discourse that has a tendency to slip off track and that often fails to directly answer a listener's questions.

The relationship between the communication deficits exhibited by psychopaths and other psychopathological groups may be of interest to future investigators. Whether or not these deficits share a common developmental history, or underlying mechanism, may be of some importance to those researchers engaged in the task of looking for markers of mental disorders. Future research on psychopaths might also investigate the relationship between deficits in language processing and production; a deficit in one does not necessarily explain a deficit in the other.
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