



National Library  
of Canada

Acquisitions and  
Bibliographic Services Branch

395 Wellington Street  
Ottawa, Ontario  
K1A 0N4

Bibliothèque nationale  
du Canada

Direction des acquisitions et  
des services bibliographiques

395, rue Wellington  
Ottawa (Ontario)  
K1A 0N4

*Your file* *Votre référence*

*Our file* *Notre référence*

## NOTICE

The quality of this microform is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us an inferior photocopy.

Reproduction in full or in part of this microform is governed by the Canadian Copyright Act, R.S.C. 1970, c. C-30, and subsequent amendments.

## AVIS

La qualité de cette microforme dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de qualité inférieure.

La reproduction, même partielle, de cette microforme est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30, et ses amendements subséquents.

Canada

Emotional Processes in Young Adults Considered at Risk  
for Schizophrenia

Jocelyne Beaudet

A Thesis  
in  
The Department  
of  
Psychology

Presented in Partial Fulfillment of the Requirements  
for the Degree of Doctor of Philosophy at  
Concordia University  
Montréal, Québec, Canada

April 1994

c Jocelyne Beaudet, 1994



National Library  
of Canada

Acquisitions and  
Bibliographic Services Branch

395 Wellington Street  
Ottawa, Ontario  
K1A 0N4

Bibliothèque nationale  
du Canada

Direction des acquisitions et  
des services bibliographiques

395, rue Wellington  
Ottawa (Ontario)  
K1A 0N4

*Your file* *Votre référence*

*Our file* *Notre référence*

The author has granted an irrevocable non-exclusive licence allowing the National Library of Canada to reproduce, loan, distribute or sell copies of his/her thesis by any means and in any form or format, making this thesis available to interested persons.

L'auteur a accordé une licence irrévocable et non exclusive permettant à la Bibliothèque nationale du Canada de reproduire, prêter, distribuer ou vendre des copies de sa thèse de quelque manière et sous quelque forme que ce soit pour mettre des exemplaires de cette thèse à la disposition des personnes intéressées.

The author retains ownership of the copyright in his/her thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without his/her permission.

L'auteur conserve la propriété du droit d'auteur qui protège sa thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

ISBN 0-315-90822-X

Canada

## ABSTRACT

Emotional Processes in Young Adults Considered  
at Risk for Schizophrenia

Jocelyne Beaudet  
Concordia University, 1994

Disorder of affect is a core feature of schizophrenia. Disturbances in the expression of affect in particular have been targeted to account for much of the emotional and social morbidity of schizophrenia. The literature suggests that schizophrenics experience some form of dissociation between emotional response systems. Moreover, the affective disturbance component of the disorder may be present early in the individual's development. The assumption of the present study was that a high-risk population selected on the basis of deviant behavior patterns in childhood would present problems in areas of functioning that anticipate or lead to clinical difficulties in adulthood. Expressive, physiological and subjective dimensions of emotion were assessed in 181 young adults who had been identified fifteen years earlier by their peers as aggressive, withdrawn, aggressive and withdrawn, or socially normative. It was predicted that those with a childhood history of aggression and withdrawal, a behavioral pattern that was considered a risk factor for schizophrenia, would show a distinctive pattern of aberrant expressive, physiological and subjective emotional responses. The results provided partial support for the view that the adaptive properties of emotions are

impaired in individuals who are at risk for schizophrenia. The men with a childhood history of frequent aggression and withdrawal tended to weak cardiac acceleration in the emotional contexts of sadness or happiness but strong cardiac acceleration in the context of anger. This pattern of response suggested a low level of emotional processing efficiency signalling vulnerability for schizophrenia. Men with a childhood history of frequent aggression showed cardiac deceleration in the negative emotional contexts and this finding was interpreted as reflecting an impulsive response pattern to threat. The expected group differences in expressive and subjective responses were not demonstrated.

## ACKNOWLEDGEMENTS

Since, as witnessed by this thesis, I am more a scientist than a poet, words are not for me the best vehicle to express my gratitude to those who were part of this long and laborious process of incarnation of ideas in reality. So I just want to say that this achievement is also the achievement of:

My family, friends, and mentors. A special thanks to one of these mentors, Dr. Alex Schwartzman, to the members of my thesis committee, to:

Jacky Boivin, Madeleine Bourgeois, Pierre Duguay, Robert Ferland, Cécile Hébert, Helene Lamoureux, Michel Lauzon, Constant Papageorges, Julie Pelletier, Jean Roy, Claude Senneville, Gloria Smith, Danielle Viens and Jean Lajeunesse who introduced me to Jean-Didier Vincent a great neurophysiologist who said:

"L'utilité de la recherche, qui songe à la mettre en doute? Nous demandons simplement le droit à l'ironie".

I also want to offer my deepest gratitude to my mother, my son Imisha and my loving partner Jean-François who provided me with the impetus to realize my foolish dreams and their constant support throughout the process.

## TABLE OF CONTENTS

	Page
List of figures.....	vii
List of tables.....	ix
Introduction.....	1
Method.....	30
Results.....	43
Discussion.....	73
References.....	82
Appendices.....	100

## LIST OF FIGURES

	Page
Figure 1	
Males: Subjective evaluation as a function of Emotion and Condition .....	48
Figure 2	
Females: Subjective evaluation as a function of Emotion and Condition .....	50
Figure 3	
Males: Heart Rate change as a function of Peer Classification for the Self-generated condition .....	54
Figure 4	
Males: Heart Rate change as a function of Peer Classification and Emotion .....	56
Figure 5	
Males: Heart Rate change as a function of Emotion and Condition .....	58
Figure 6	
Males: Skin Conductance change as a function of Peer Classification and Emotion for the Film condition .....	62
Figure 7	
Females: Heart Rate change as a function of Emotion and Condition .....	64



Figure 8

Males: Range of Voice Amplitude as a function of Emotion .....	68
---	----

Figure 9

Females: Range of Voice Amplitude as a function of Peer Classification and Emotion.	72
--	----

## LIST OF TABLES

	Page
Table 1	
Sample frequency distribution (and percentage of original sample) by Peer Classification Group, Grade and Sex .....	33
Table 2	
Representativeness of the Classification Groups with respect to Original Aggressiveness and Social Withdrawal Scores.	34
Table 3	
Males: Means (and standard deviations) for Subjective evaluation as a function of Emotion and Condition .....	47
Table 4	
Females: Means (and standard deviations) for Subjective evaluation as a function of Emotion and Condition .....	49
Table 5	
Males: Means (and standard deviations) for Heart Rate change as a function of Peer Classification and Emotion .....	55
Table 6	
Males: Means (and standard deviations) for Heart Rate change as a function of Emotion and Condition .....	57

## Table 7

Males: Means (and standard deviations) for Skin Conductance change as a function of Peer Classification and Emotion in the Film condition .....	61
--	----

## Table 8

Females: Means (and standard deviations) for Heart Rate change as a function of Emotion and Condition .....	63
---	----

## Table 9

Females: Means (and standard deviations) for Range of Voice Amplitude as a function of Peer Classification and Emotion .....	71
--	----

Writing at the beginning of this century, Kraepelin (1919) and Bleuler (1911/1961) were the first to consider disorders of both thought and affect as the primary symptoms of schizophrenia. Since then, numerous researchers and clinicians have attested to the importance of both components as central features of the schizophrenia syndrome.

Using Jackson's (1887) distinction between positive and negative symptoms, Strauss, Carpenter and Bartko (1974) attempted to regroup the symptoms of schizophrenia accordingly, and to clarify the relative importance of various symptom clusters. In the positive-negative classificatory system, manifestations of thought disorder are considered for the most part as positive symptoms because they appear as active processes, as specific kinds of thinking that take the place of normal thinking. Negative symptoms, on the other hand, involve primarily the absence of normal responsivity and are manifested mainly by flat and inappropriate affect.

The positive-negative symptom distinction may serve to explain why thought disorder symptoms have commanded as much attention as they have over the past years, while affective deficits have been strikingly neglected by comparison. One possible reason is that psychiatric hospitalization is positively correlated with the presence of symptoms that represent a threat to the community (Levine, 1970). It is

easy to conceive why positive symptoms such as hallucinations or delusions would be more threatening to the community than negative symptoms. Positive symptoms are also more likely to be salient to a patient and his/her relatives than the absence of appropriate responses. Hence, they are more likely to be noticed and reported. In addition negative symptoms such as flat affect are less likely to be studied because affectivity as a construct is relatively difficult to assess (Strauss & Carpenter, 1974). Unlike delusions and hallucinations which are either present or absent, diminished affective responsivity is on a continuous trait dimension that shades into normality. In this general context, it is not surprising that affective deficits as such have remained relatively unexplored.

The dearth of studies in this area led Knight, Roff, Barnett, and Moss (1979) to underline the need for more investigations of disordered affectivity and social competence in schizophrenia. In a 22-year follow-up study of acute schizophrenics they found that thought disorder was a relatively poor predictor of outcome whereas affective deficit and poor social adjustment were clearly associated with poor outcome. On the basis of cross-lagged analysis of their data, the authors also reported that disordered affectivity may cause thought disorder. In short, both features of their findings were seen as strongly supportive of the primacy of affective deficit in schizophrenia.

There is now a body of research literature that deals with examining the reliability, internal consistency, and predictive validity of negative (deficit) symptoms. Negative symptoms have consistently been found to be reliable providing that they are adequately defined (Andreasen, 1982; Kay, Fiszbein, & Opler, 1987; Krawiecka, Goldberg, & Vaughan, 1977; Lewine, Fogg, & Meltzer, 1983; Overall & Gorham, 1962). Negative symptoms as a cluster have also been found to be internally consistent suggesting that they represent a valid construct (Andreasen & Olsen, 1982; Bilder, Mukherjee, Rieder & Pandurangi, 1985; Liddle, 1987). In addition negative symptoms have been shown to be associated with a number of independent validators in a variety of studies, including cognitive impairment (Andreasen et al., 1990; Bilder et al., 1985; Cornblatt, Lenzenweger, Dworkin & Erlenmeyer-Kimling, 1985; Johnstone et al., 1978; Liddle, 1987), differential responses to treatment (Angrist, Rotrosen & Gershon, 1980; Breier et al., 1987; Singh, Kay & Opler, 1987; Van Kammen & Boronow, 1988), and poor outcome (Carpenter, Bartko, Strauss & Hawk, 1978; Johnstone, Frith, Gold & Stevens, 1979; Pogue-Geile & Harrow, 1984, 1985). Finally, it has been demonstrated that negative symptoms tend to be quite stable over time (Biehl, Maurer, Juang & Krumm, 1989; Johnstone, Owens, Frith & Crow, 1986; Pfohl & Winokur, 1983; Pogue-Geile & Harrow, 1985).

Negative symptoms (affective deficit) have long been

recognized to be very important and possibly the most fundamental symptoms of schizophrenia. Although they have been minimized for a while, even as diagnostic criteria in DSM-III and DSM-III-R (American Psychiatric Association 1980, 1987), the reemergence of interest in negative symptoms has been an important development during the past decade in the area of schizophrenia. Their historical importance and the resurgence of research studies suggesting their internal consistency and validity have pleaded for more prominence in DSM-IV. The affective deficit has been targeted to account for much of the emotional and social morbidity of schizophrenia because this kind of impairment leads to social isolation and withdrawal, difficulty in holding a job or remaining in school, and an inability to relate to others (e.g. Pogue-Geile & Harrow, 1984).

The prominence of impaired affect in schizophrenia is not surprising. Affect plays a central role in the organization of individual behavior, and particularly in social interactions (Sroufe, 1979, 1982). As Zajonc put it: "affect dominates social interactions as well as being the major currency in which social interaction is transacted" (1980, p. 153). Affect is not merely a by-product of cognition or the end point of an appraisal process; affect, rather, is what cognition serves (Piaget & Inhelder, 1969).

The affective deficit in schizophrenia is manifested mainly by disturbances in the expression of affect.

Clinical descriptions of disturbances in the expression of affect in schizophrenia emphasize both flat and inappropriate affect. The term "flat affect" refers to a reduced range or a dampened intensity of affect. The term "inappropriate affect" refers to a discrepancy between expressed affect on the one hand and the intentions of the sender or the expectations of the receiver on the other.

Findings in the research area considering the role of affect expression in social competence are noteworthy. Izard (1971) for example, reports data on both humans and animals which point to the relevance of affect in social competence. In an animal study, the facial nerves of a group of rhesus monkeys were sectioned to eliminate the facial expression of affect. Thus handicapped, the animals were more often involved in aggressive encounters than before surgery. These data suggest that there is a vital role for affective expression in regulating the social behavior of the rhesus monkey and, by extension, that of the human. Other studies (Feldman, White & Lobato, 1982; Philippot & Feldman, 1990; Rosenthal, Hall, DiMatteo, Rogers & Archer, 1979; Spence, 1987) have shown that from the preschool years through early adulthood an individual's social competence is related to his or her ability to decode and encode nonverbal expressions of emotion.

Emotion encoding is typically defined as accuracy in conveying a discrete emotional state nonverbally (as judged



by others) and emotion decoding as accuracy in identifying or reading nonverbal behaviors such as facial expressions. It is the disturbances in the expression of affect, that is, the "encoding deficit" which is the hallmark of negative symptomatology in schizophrenia. Affective encoding deficits should be distinguished from "affective decoding deficits" ( i.e. deficits in affect perception-recognition) that have also been considered critical component of the interpersonal difficulties of schizophrenic patients (Morrison, Bellack, & Mueser, 1988). In terms of decoding deficit, considerable attention has been focused on facial-affect recognition skills. The evaluation of facial-affect displays requires information-processing abilities, including attention to and decoding of visual (facial) stimuli. Although it is clear that further research should examine relationships between affect recognition skills and symptomatology, it is likely that affective decoding and encoding abilities are independently relevant to schizophrenia.

#### Affective Encoding Deficits

##### Inappropriate Affect

Two studies on the expression of affect in schizophrenia were carried out by Gottheil and colleagues (Gottheil, Exline, & Winkelmayr, 1979; Gottheil, Thornton, & Exline, 1976). In the first, 16 schizophrenics and 16 normal subjects were asked to pose as happy, sad, fearful,

surprised, or angry. They were photographed, and the photos were rated. In general, schizophrenics showed significantly less sadness and surprise, but were as proficient as normals in making their pose correspond with the request. In the second study, 10 schizophrenics and 10 normal subjects were filmed describing three personal experiences, which had made them happy, sad or angry. Raters were significantly better at identifying the affective expressions in normals than in schizophrenics. These findings indicated that schizophrenics expressed their feelings in a way which made it difficult for others to discern them.

Knight and Valner (1988) compared good premorbid schizophrenics, poor premorbid schizophrenics and control subjects. Control subjects demonstrated congruence between their intended and communicated affect. Good premorbid schizophrenics achieved a similar congruence when they were expressing sadness and anger, but not when they intended to express happiness. Poor premorbid schizophrenics achieved congruence between their intended and communicated affect only when they were relating a sad experience.

In a clinical setting, Brown and colleagues (Brown, Schwartz, & Sweeney, 1978; Brown, Sweeney, & Schwartz, 1979) reported that schizophrenic patients differed from depressed patients and normal controls in how accurately they remembered expressing positive affect nonverbally with their faces and bodies. Compared to observers' ratings of actual

overt behavior in a group situation, depressed patients reported experiencing more pleasure than they expressed, whereas schizophrenic patients reported experiencing less pleasure than they expressed.

Overall, it appears from the preceding studies that schizophrenics experience some form of dissociation between their subjective and expressive responses, being more or less efficient in terms of affective encoding as a function of the emotional context.

#### Flat Affect

One of the indicators used to determine if a patient displays affective flattening is an unchanging facial expression. The face appears wooden, mechanical, frozen, and does not vary in expression, or varies less than normally expected with changes in the emotional content of discourse. Usually the patient fails to smile or laugh when prompted. Clinicians also look for lack of vocal inflection. While speaking, the patient fails to show normal patterns of vocal emphasis. Speech has a monotonic quality; that is, important words are not emphasized at points where there is a change of subject; the voice is not lowered in discussing private topics, or raised in speaking of exciting events for which louder speech would be deemed appropriate.

In spite of its clinical relevance, investigators interested in differential psychiatric diagnosis have tended

to minimize the importance of affective flattening because it is a symptom that is difficult to rate reliably. Nevertheless, because of its potential importance as a core symptom and prognostic indicator in schizophrenia, several investigators have proposed an alternate method for evaluating affective flattening, one that eliminates subjective ratings and introduces an objective measure, acoustic analysis, to examine vocal dynamics.

The measurement of emotional states from speech has a relatively long history. Such measurements have attempted to analyse not only the content of speech but also aspects of the voice that give expression to utterances. In 1938 Eisenberg and Zalowitz wrote "Here we are not interested in the content of speech but in the manner and qualities of speech, for example, loud or soft, fast or slow, smooth or hesitant, even or uneven tempo, etc." (p. 260). Similarly Soskin (1953) distinguished between two channels of speech. He described a verbal channel which carried potential semantic information and vocal channel which carried potential affective information. Since the 1950's, a number of researchers have explored the relation between emotional state and such vocal characteristics as fundamental frequency (pitch) and amplitude (loudness) (e.g., Alpert, Kurtzberg, & Friedhoff, 1963; Hargreaves, Starkweather, & Blacker, 1965). These studies have used a method by which speech is converted to a visual analogue that may then be

examined independently of content.

Acoustically, flattening of affect in schizophrenia has been associated with a speech pattern of reduced range in amplitude, that is, a reduction or absence of normal emphasis patterns (Alpert, 1983; Andreasen, Alpert, & Martz, 1981). In speech, emphasis is associated with differential loudness, differential pitch, or increased duration of the preceding pause for important words. Usually the speaker emphasizes the more significant words, helping the listener to direct his attention appropriately. Patients who appeared emotionally flat showed a lack of emphasis in their speech prosody (Alpert & Anderson, 1977). Moreover, this pattern appears to be specific to schizophrenia in that the flatness of affect frequently observed in depression has been associated with pause duration whereas the flatness observed in schizophrenia has been linked with constriction of the range dynamics.

#### Correlates of the Affective Encoding Deficits

Clinical descriptions of flat affect in schizophrenia typically refer to a reduced range or dampened intensity of the expressive aspect of affective responses. One question in need of clarification is whether diminished behavioral expressivity is part of a general attenuation of responsiveness including psychophysiological reactivity and subjective emotional feeling or whether it reflects a dissociation between response systems. Clinical

descriptions of inappropriate affect in schizophrenia refer to a discrepancy between expressed affect on the one hand, and the sender's intentions on the other. This discrepancy implies some form of dissociation rather than a general decrease in responsivity.

A major challenge for researchers in the general area of emotion concerns the question of differences in the degree of association between response systems. Within a system-theoretic point of view (Schwartz, 1982), one treats emotions as processes unfolding on different hierarchically organized levels of behavior. Each level is regulated by a separate control system. Thus, one would expect discrepancies between the different indicators of emotion. From this perspective, discrepancies between different components of emotional behavior can serve as an important source of information about the control processes underlying the surface behavior patterns.

For example, dissociation between self-report and behavior or between self-report and physiological responding may tell us something about the way people cope with emotional situations. A classic example of dissociation involves repression. "Repressors" are individuals who have developed the skill of minimizing or avoiding the experience of certain negative emotions: they generate as much physiological and overt behavioral responsivity as everyone else but by self-report experience less than others do

(Asendorf & Scherer, 1983).

As already stated schizophrenics have been found to report experiencing less than they express and have also been recognized to lack expressiveness. Tarrrier, Barrowclough, Porceddu and Watts (1988) found a lack of synchrony between schizophrenics' subjective reports of their affective states and physiological indicators of emotional arousal. They concluded that it may be unrealistic to expect psychotic patients to accurately assess their physiological states when desynchrony is commonly found in other less severe disorders (e.g. Hodgson & Rachman, 1974).

The functioning of the autonomic nervous system (ANS) has a long history in schizophrenia research. Despite conflicting findings, noteworthy contributions to this field (Depue & Fowles, 1973; Venable, 1966; Zahn, 1975) have indicated that the evidence preponderantly points in the direction of (1) higher tonic levels of those ANS indexes that are thought to reflect "arousal" under basal or resting conditions; (2) diminished ANS response to stress; and (3) slow habituation of electrodermal orienting responses to stimulation in the schizophrenic individual as compared to normal persons. These findings are consistent with the view that schizophrenics are hyperaroused.

Many of the assumptions about the benefits of expressing emotions are based on the well-documented inverse

relation between emotional expression and autonomic reactivity (Buck, 1984; Hokanson & Burgess, 1962; Hokanson & Shetler, 1961; Jones, 1935). According to Pennebaker (1985), lack of emotional expression coupled with the desire to express emotion is the fatal combination leading to chronic autonomic arousal and eventual breakdown. In this context chronic hyperarousal in schizophrenics would be interpreted as resulting from their incapacity to express what they feel.

Although various measures of arousal (e.g., heart-rate, skin-conductance) in the individual ought to correlate highly with one another, they do not (Lacey, 1967). In addition, people show unique idiosyncratic patterns of autonomic response. One individual may respond to stress with heart rate acceleration, whereas another might show no change in heart rate but a pronounced increase in skin conductance instead. It appears that the concept of arousal may perhaps be too simplistic. Considerable caution needs to be exercised in generalizing findings from one type of response to another within a system, from one system to another within the individual and from one individual to the next.

J. I. Lacey and B. L. Lacey (1970) postulated that heart-rate deceleration reflects cortical activation and openness to environmental input, while heart-rate acceleration is defensive in nature and represents a



"shutting out" of environmental stimuli. Accordingly, the arousal state observed at rest and the diminished ANS response to stress in schizophrenia may be viewed as a chronic defence against environmental stimulation. It is of interest to consider here Venables' (1975) interpretation of skin conductance (SC) fast recovery in high-risk children as reflecting susceptibility to "sensory flooding". Elevated heart rate (HR) in high-risk children may also represent the beginning of an attention defence against information overload (Spohn & Patterson, 1979).

Based on data collected in his laboratory, Claridge (1972, 1987) suggests that a unique feature of the "psychotic nervous system" is its tendency to physiological "dissociation". He postulates that this tendency is demonstrable empirically as an instability of physiological reactivity, leading to extreme response. It is important to bear in mind the heterogeneity of psychophysiological reactivity observed in schizophrenics, a fact articulated in the putative distinction made by Venable and his colleagues between "responder" and "non-responder" forms of the schizophrenic syndrome (e.g. Gruzelier & Venable, 1975). The heterogeneity in physiological reactivity is also mirrored in the differing findings reported by those workers studying high-risk children from a similar point of view: in this population, both abnormal hyperresponsivity (Mednick & Schulsinger, 1968) and its opposite (Kugelmass, Marcus &

Schmueli, 1985) have been said to characterize such children.

Based on the above literature review it is not clear whether diminished expressiveness is part of a general attenuation of responsivity or whether it reflects a dissociated process. The concept of emotion refers not only to a set of physiological reactions, feeling states and expressive behaviors, but also to the organization of these processes to meet specific biopsychosocial goals. A focus on organization leads us to direct our attention to the search for replicable patterns of processes within and across levels. These patterns may vary in their complexity from an undifferentiated globality (e.g., being "upset") to a differentiated specificity (e.g., being "disappointed"). They may also vary in their stability as a function of individual differences. Viewing individual difference variations from the perspective of levels and complexity of organization has the potential to integrate research findings on the psychophysiology of emotion with studies of personality, psychopathology and psychosocial development.

Evidence of impaired emotional development in schizophrenia is compelling and suggests that the affective disturbance component of the disorder may be present at a subclinical level early on. We now review the literature that deals with the development of affective encoding deficits in schizophrenia.

### Premorbid Encoding Deficits

At the beginning of this century, Bleuler (1911/1961) in his presentation of the theory of schizophrenic symptoms, explained that there are early character anomalies which are manifested in more than half the individuals who later became schizophrenics: the tendency to seclusion, withdrawal, together with moderate or severe degrees of irritability. Using physical systemic disease as a model, Claridge (1985) suggested that mental illness arises from a pre-existing tendency to disorder, the tendency manifesting itself as a variation in normal function in the psychological realm of those characteristics which we refer to as temperament or personality.

The fact that schizophrenia spectrum individuals, prior to developing the illness, display characteristics which become intensified in subsequent psychotic breakdowns, is well documented. Some fairly consistent, if perhaps surprising, facts have emerged from extensive investigations into the personality characteristics of pre-schizophrenics. The popular idea of pre-schizophrenics as people who are simply shy, introverted, withdrawn is not on the whole, supported by the evidence. Instead, retrospective studies (e.g. Nameche, Waring & Ricks, 1964) indicate that pre-schizophrenics only infrequently are classically withdrawn, silent personalities. Rather, they exhibit a mixture of antisocial acting-out behavior and neurotic symptoms, and at

the same time have difficulties in establishing good interpersonal relationships. Moreover, two studies have shown that having a mixture of aggressive and withdrawn behavior patterns increases the probability of later schizophrenia more than having either type of behavior pattern alone (Michael, Morris, & Soroker, 1957; Robins, 1966).

Prospective longitudinal studies of high-risk children have also shown that poor affective control and defective emotional rapport are among the characteristic precursors of schizophrenia spectrum disorders (e.g. Parnas, et al., 1982). In an attempt to identify factors that are important to the development of schizophrenia and to separate them from the associated secondary deficits, researchers have studied people before the onset of the disease. In the prototypic study, young people judged to be at "high risk" for schizophrenia are compared with "controls" deemed to be at low risk. Asarnow (1988) has reviewed the results from 24 such studies and organized the factors which were found to be important, taking a "developmental psychopathology" perspective. He noted that by middle childhood the high risk child already shows signs of social incompetence, immaturity, poor affective control and impaired fine motor coordination. During adolescence, it is interpersonal and school adjustment problems, which take on greater significance and descriptions of high risk teenagers

underline their poor affective control.

Both follow-up and follow-back studies have shown that abnormalities in interpersonal relationships, represented by oddities and isolation rather than shyness or timidity, are characteristic. These social difficulties may often be accompanied by antisocial behavior, particularly in boys, that differs from the general run of delinquency in tending to be both solitary and confined to one's home setting. It appears clearly that these features of behavior are somewhat different from those associated with other forms of adult mental disorder. Perhaps the most striking feature of the pre-schizophrenic's personality, whatever the age span, is the apparent disharmony of personality traits. These subjects appear to be at the same time impulsive, introverted and emotional. They display psychopathological traits of antisocial behavior, lack of impulse control, social withdrawal and hypersensitivity (Bleuler, 1978; Claridge, 1985). A good illustration of this phenomenon is provided by a recent study (Muntaner, Garcia-Sevilla, Fernandez, & Torrubia, 1988) aimed at assessing the relationship between personality dimensions and traits of psychosis proneness. This study indicates that subjects scoring high on the Eysenck's scales of Neuroticism and Psychoticism but low on the Extroversion scale would be predisposed to psychosis and to schizophrenia in particular.

### Rationale of the Study

The assumption of the present study is that a high-risk population selected on the basis of deviant behavior patterns in childhood will present problems in areas of functioning that anticipate or lead to clinical difficulties in adulthood.

Prominent affective encoding deficits in schizophrenia have been associated with poor premorbid adjustment and insidious onset, a finding which suggests that the affective disturbance component of the disorder may be present early on in the predisposed individual's development (Knight, et al., 1979). It is suggested here that those who become schizophrenic lag behind as children in their emotional development. Moreover they fail to progress to a more differentiated level of emotional responses. The inability to cope appropriately in responding to emotional stimuli becomes overwhelming. Inhibition of emotional expression may then develop as a protective mechanism. In this sequence, further emotional development is blocked, and the maladaptive emotional response becomes entrenched as a personality trait. Moreover, the inability to express a normal range of affective responses becomes encoded acoustically as a reduction or absence of normal emphasis pattern (flatness). Flatness of affect is considered a core symptom of schizophrenia and is the most common clinically observed disturbance of affect. Flatness of affect is also

thought to be a powerful predictor of outcome in schizophrenic illness. This symptom does not respond well to medication and remains as a crippling and debilitating deficit that prevents the patient from resuming a normal life.

Schwartz's general system theory of dysregulation (1983) suggests that flatness of affect in schizophrenia may reflect a neuropsychological disconnectedness producing dysregulation in the system. The dysregulation is expressed as a disorder in self-regulatory processes (e.g., increased responsiveness to stimuli, decreased recovery from stimuli, and decreased regularity of rhythms common to homeostatic processes) which, in turn, leads to the onset of the disease. There is evidence that inhibition of emotional expression is associated with an increase in autonomic activity, which, it is postulated, leads to chronic autonomic arousal (Pennebaker, 1985). Claridge (1985) has also suggested that a dysregulated mode of CNS functioning as evidenced by an instability of physiological reactivity may be an important premorbid biological marker of schizophrenia.

Discrepancies between the subjective, expressive and physiological dimensions of emotion, when interpreted within the perspective of systems theory, may become particularly rich sources of data in their own right. From a systems point of view, we must distinguish not only among

physiological, expressive and subjective parameters, but also among the different processes that subjects use to label their affective states and the accuracy with which they do so. An important parameter to consider, if meaningful relationships are to be uncovered, is individual differences in defensiveness.

Emotional responses may be elicited under various conditions. One which is widely used in research on emotion requires subjects to make reference to a situation that either actually happened to them in the past or could plausibly happen to them in the future, and which did or would make them feel extremely happy, sad, angry, etc. Emotional stimuli are also frequently experienced "vicariously". In this condition subjects are required to watch a scene where someone other than themselves experiences a particular emotion. Here the subjects are asked to identify the emotions of others whereas in the first condition subjects are asked to report on their own. What is required to understand someone else's emotions may be quite different from the ingredients needed to understand one's own. In contrast to the self-generated condition, the vicarious condition places information-processing demands including attention to and decoding of external affective stimuli.

There is evidence of differences in physiological reactivity between events which are experienced either



directly or vicariously. The processing of "vicarious" emotional cues, for example, has been associated with heart-rate deceleration which is posited to be instrumental in the facilitation of sensory processing (Cacioppo & Sandman, 1978; Lacey, Kagan, Lacey & Moss, 1963; Libby, Lacey & Lacey, 1973). In contrast, the self-referent affective situation involves the turning inward of attentional capacities and the inhibition of sensory processing that has been associated with heart-rate acceleration in a variety of studies (Cacioppo & Sadman, 1978; Lacey et al., 1963; Lazarus, 1974).

Two parameters of physiological responding, cardiac activity and electrodermal activity have been used extensively as psychophysiological measures and both have long been associated with the concept of arousal. It was generally assumed in earlier studies that the responses innervated by the autonomic nervous system were highly intercorrelated reflecting overall levels of arousal (from deep sleep to states of awake excitement). However, multiple response system recording technology has since made it evident that there are differences in patterns of physiological responses. Moreover, the bidirectional nature of cardiac changes (acceleration and deceleration) has posed problems for arousal theorist who viewed changes in cardiac activity only in terms of energy mobilization. Consequently, several alternative explanations have been

suggested, the most influential being that of situational stereotypy (Lacey, 1967).

Lacey (1967) argued that a situation may be appraised by a subject as one which requires either environmental intake or environmental rejection; heart rate was said to decelerate in situations which required environmental intake, and to accelerate in situations in which environmental rejection was involved. The cardiac deceleration was said to be instrumental in the facilitation of sensory processing. In contrast, cardiac acceleration was said to lead to an inhibition of sensory processing.

In fact, in situations involving aversive stimuli there is a tendency for sympathetic dominance of cardiac function. This tendency has been demonstrated in the aversive conditioning paradigm (Obrist, Sutterer, & Howard, 1972) and also in the cardiovascular changes that occur in response to emotional stressors (Bond, 1943; Ulrych, 1969; Turpin & Siddle, 1978). The sympathetic input results in increases in blood pressure and heart rate. This line of evidence suggests that physiological activity in general and cardiac activity in particular be measured in situations which vary in the probability that they will be appraised by normative individuals as requiring either environmental intake or rejection.

Systematic variations in electrodermal activity as a function of emotional response have also been reported. Ax

(1953) indexed separately the maximum increase (amplitude) and the number of rises (frequency) in skin conductance. He found that not only were these two aspects uncorrelated, but that the maximum increase in skin conductance was significantly higher in situations eliciting fear than in situations which prompted anger, while the number of skin conductance rises was significantly higher in anger than in fear. This pattern of results probably reflects some important set of underlying neurophysiological differences between anger and fear.

Schwartz, Weinberger and Singer (1981) provided an important replication and extension of these findings. Multivariate procedures were applied to the data and revealed that the relations among the measures of systolic pressure, diastolic pressure, and heart rate varied as a function of the type of emotion. For example, high diastolic pressure was uniquely associated with high systolic pressure during anger, and, in turn, high systolic pressure during anger was uniquely associated with lower heart rate. In a study by Ekman, Levenson, and Friesen (1984), subjects were instructed to relive six emotions (happiness, sadness, anger, fear, surprise and disgust), and also to generate overt facial expressions of emotion. Heart rate was found to differentiate between the positive and negative emotions.

These studies clearly support the now well accepted

view that the sympathetic and parasympathetic branches of the autonomic nervous system are capable of very fine regulation of specific peripheral organs. Because most responses are mediated by numerous factors, including sympathetic, parasympathetic and hormonal activities, it is necessary to measure patterns of processes, ideally at different levels.

It has been shown that people's emotions are intimately related to their cognitive appraisals of their circumstances (Smith & Ellsworth, 1985). It appears that a pleasantness dimension and an anticipated effort dimension chunk emotions into good ones (e.g., happiness) and bad ones (e.g., sadness, anger). The anticipated effort dimension is reminiscent of the global activation dimension that is a component of Cannon's (1929) concept of fight or flight. In fight or flight situations the organism anticipates having to do something, to expend effort. However, sadness, in contrast to anger, involves a sense of powerlessness which would temper the fight or flight reaction.

#### The Study

The present study was designed to examine the expressive, physiological, and subjective aspects of direct and vicariously induced sad, angry, and happy reactions in individuals with a history of deviant behavior patterns in childhood.

The sample was drawn from the research population of

the Concordia Longitudinal High-Risk project (Ledingham, 1981; Schwartzman, Ledingham & Serbin, 1985). The investigators of this study hypothesized that the child who is frequently aggressive and frequently withdrawn is at risk for schizophrenia. A review of studies of deviant behavior in children (Bower, Shellhammer & Daily, 1960) indicated that aggression and withdrawal were the two fundamental factors consistently emerging as characteristic of preschizophrenics. Two studies in particular (Michael, Morris, & Soroker, 1957; Robins, 1966) demonstrated that having both aggressive and withdrawn behavior components in combination increases the probability of later schizophrenia more than does having either type alone. Accordingly, the Concordia research sample which was composed of four groups of children, included a group considered at elevated risk for schizophrenia because of frequent aggression and frequent withdrawal. The other three groups consisted of children who were either aggressive, withdrawn, or socially normative respectively.

The goals of the present study were to determine (a) whether high-risk and low-risk young adults differed in terms of expressive, physiological and subjective elicited emotional reactions; (b) whether the affective encoding deficit (flat affect) observed among schizophrenics manifested itself in a high-risk sample; and (c) whether a pattern of emotional reactions could be identified for the

high-risk group. Individuals with a childhood background of aggression or withdrawal served as deviant control groups to determine whether any deficits observed were specific to the group hypothetically at risk for schizophrenia.

The underlying rationale of the study was predicated on the notion that the experience of emotion is a feedback process that serves as a prerequisite for engaging in appropriate behavior, and that it is this feedback process that is disrupted in people who respond inappropriately.

To summarize, the expressive, physiological and subjective emotional responses were examined in a representative subsample of the research sample originally selected for the Concordia Longitudinal High-Risk project. The classification of subjects reflected the behavioral characteristics of aggression and withdrawal they displayed during childhood, and led to the identification of four groups: Aggressive, Withdrawn, Aggressive-Withdrawn, and Normal Controls. The rationale for focussing on the young adults who had been aggressive and withdrawn in childhood was based on the assumption that the combination of aggressive and withdrawn behaviors is a unique pattern representing more than the interactive effect of each behavior and is, in effect, a risk factor for schizophrenia.

The emotional responses were elicited in three contexts: sadness, anger and happiness. The purpose here was to measure physiological activity in situations which

varied in the probability of appraisal leading to environmental intake or rejection. A self-generated "direct" condition and a filmed "vicarious" condition were used to elicit emotional responses involving contrasting modes of information processing.

### Hypotheses

The following hypotheses pertaining to each dimension of emotion were tested:

#### I. Subjective

Young adults with a childhood history of frequent aggression and withdrawal will report less intense feelings than other individuals in each of three emotional contexts: sadness, anger, and happiness.

#### II. Physiological

1. Young adults with a childhood history of frequent aggression and withdrawal will show higher heart-rate and skin conductance levels at rest than other individuals.

2. Young adults with a childhood history of frequent aggression and withdrawal will show smaller heart-rate and skin-conductance changes from baseline than other individuals.

#### III. Expressive

Young adults with a childhood history of frequent aggression and withdrawal will manifest affective flattening reflected by a reduced range of variation in speech characteristics.

#### IV. Secondary hypotheses

1. More intense feelings will be reported in the positive emotional context (Happiness) than in the negative emotional contexts (Sadness, Anger).

2. More intense feelings will be reported in the Self-generated condition than in the Film condition.

3. Larger changes on the heart-rate and skin-conductance parameters relative to baseline will be observed in the Self-generated "direct" affective condition than in the Film "vicarious" affective condition.

4. Heart-Rate acceleration (environmental rejection) will be observed in the Self-generated condition and Heart-Rate deceleration (environmental intake) will be observed in the Film condition.



## METHOD

Subjects

Subjects were 181 French-speaking adults (94 men and 87 women) of the Concordia Longitudinal High Risk Project research population (Schwartzman, Ledingham, & Serbin, 1985) between the ages of 18 and 27 years. They had been identified by their peers in primary school in 1977-78 as aggressive, withdrawn, aggressive-withdrawn, or socially nondeviant. The children were assigned to one of these four categories on the basis of their scores on a French translation of the Pupil Evaluation Inventory (PEI), a peer nomination instrument (Pekarik, Prinz, Liebert, Weintraub, & Neale, 1976), (see Appendix A). The PEI contains 35 items which load onto three factors: aggression, withdrawal, and likability. To administer the PEI, children in the first, fourth and seventh grade were asked to nominate those boys and girls in their class who best fitted the description of each of the 35 items on the questionnaire. Boys and girls were assessed in separate PEI administrations, and for each item, children were allowed to nominate up to four classmates of each sex.

The total number of nominations received by a child was calculated separately for items loading on the aggression factor and the withdrawal factor. Raw scores for each factor were transformed using a square root transformation to reduce skew. The adjusted scores were then converted to

Z scores for each sex within each classroom to remove the effects of age and sex in baseline rates of aggression and withdrawal, and the effects of differences in class size on total scores. In this manner, classification of target subjects took into account age and sex norms for aggression and withdrawal in childhood.

Those subjects who obtained a Z score on the aggression factor exceeding the 95th percentile and a withdrawal Z score below the top quartile were designated as Aggressive. Similarly, those assigned to the Withdrawn group obtained a Z score on the withdrawal factor exceeding the 95th percentile and an aggression Z score below the top quartile. Those scoring in the top quartile on both aggression and withdrawal factors were assigned to the Aggressive-Withdrawn group. Nondeviant subjects were chosen randomly from those children obtaining Z scores below the 75th percentile and above the 25th percentile on both the aggression and withdrawal factors (Ledingham, 1981). The rationale for excluding individuals who fell below the 25th percentile from the nondeviant group was that low scores on aggression and withdrawal may signify behaviors or traits that are as aberrant as do high scores on these factors.

There were 1770 students among the 4000 school children screened who met the above criteria. The number of males and females was approximately the same in each of the four groups that made up the present sample. Table 1 describes

these 181 young adults by PEI group classification, sex and grade.

Preliminary analyses were performed to assess whether the subgroup of subjects selected for this study was representative of the original sample. It was found that the proportion of males and females did not differ from that of the original sample. The proportion of subjects in each peer classification group also reflected the original distribution except for the Control group whose size was intentionally reduced when the present study was designed. In contrast to the original project, where the number of normative Control children understandably exceeded the total number of socially deviant children as part of a community-based sample, the present study was designed to include an approximately equal number of subjects in all four groups. Table 2 presents scores on the aggression and social withdrawal factors for the original sample as well as for the sample used in the present study. Although the ranges of scores are less extreme in the present sample than in the original research population, inspection of the means and standard deviations for each peer classification group in the two samples are very similar. Thus, the present sample appears representative of the original population of the Concordia project on the peer classification criteria of aggression and withdrawal.

Of the 181 subjects, six were dropped because of

Table 1

Sample frequency distribution (and percentage of original sample) by Peer Classification Group, Grade and Sex

	Peer Classification Group			
	Aggressive	Withdrawn	Aggressive -Withdrawn	Control
<b>Sex = male</b>				
Grade 1	6 (50)	5 (33)	10 (19)	7 (5)
Grade 4	6 (17)	8 (23)	7 (23)	11 (8)
Grade 7	9 (18)	10 (17)	5 (20)	10 (4)
<b>Total</b>	<b>21 (22)</b>	<b>23 (21)</b>	<b>22 (20)</b>	<b>28 (5)</b>
<b>Sex = Female</b>				
Grade 1	5 (46)	5 (42)	8 (11)	7 (4)
Grade 4	8 (29)	5 (17)	11 (23)	9 (5)
Grade 7	8 (13)	9 (13)	2 (18)	26 (5)
<b>Total</b>	<b>21 (21)</b>	<b>19 (17)</b>	<b>21 (16)</b>	<b>26 (5)</b>

Total N = 181 (10.2)

Table 2

Representativeness of the Classification Groups with respect to Original Aggressiveness and Social Withdrawal Scores.

		Aggressiveness Scores											
		Aggressive Group		Withdrawn Group		Agg-with Group		Control Group					
		Mean	SD	Mean	SD	Mean	SD	Mean	SD				
		Range	Range	Range	Range	Range	Range	Range	Range				
Current sample		2.17	.38	1.67 to 3.05	-.54	.46	-1.52 to .41	1.57	.51	.74 to 2.96	-.25	.31	-.66 to .61
Original sample		2.14	.38	1.65 to 3.57	-.61	.49	-1.75 to .67	1.60	.61	.68 to 3.59	-.13	.37	-.67 to .67
		Social Withdrawal Scores											
		Aggressive Group		Withdrawn Group		Agg-with Group		Control Group					
		Mean	SD	Mean	SD	Mean	SD	Mean	SD				
		Range	Range	Range	Range	Range	Range	Range	Range				
Current sample		-.30	.60	-1.60 to .66	2.10	.27	1.69 to 2.69	1.46	.53	.74 to 2.64	.04	.34	-.57 to .66
Original sample		-.32	.55	-1.84 to .65	2.14	.36	1.65 to 3.81	1.42	.58	.68 to 3.28	-.10	.37	-.67 to .67

technical difficulties in recording physiological data (two members of the withdrawn group, one from the aggressive-withdrawn group, and three from the control group).

### Measures

#### Vocabulary (Barbeau-Pinard)

Because experimental demands were likely to be influenced by intelligence, the vocabulary subtest of the Barbeau-Pinard Intelligence test (Barbeau & Pinard, 1963) was administered to serve as a control variable (see Appendix A). It consists of 40 words of increasing difficulty which the subject is required to define. A correct answer earns a score of one, so that the maximum possible score is 40. A split-half reliability coefficient of .93 is reported by the authors. The vocabulary scale score correlates .84 with the global I.Q. scale and .91 with the verbal I.Q. scale.

#### Social Desirability Scale (SDS)

The SDS (Crowne & Marlowe, 1964) identifies individuals who describe themselves in favorable, socially desirable terms in order to achieve the approval of others (see Appendix A for the French version of the SDS). The scale was included as a second control variable because it is a reasonably good measure of repressive tendencies that correlates only minimally with scales taping subjective distress (see Weinberger, Schwartz & Davidson, 1979). The need for approval is dependent on an idealized version of

the self that has to be maintained and defended (Crowne & Marlowe, 1964). The scale is a 33-item questionnaire modelled so as to achieve a balance of two types of statements: half are culturally acceptable but probably untrue, the other half true, but undesirable. One point is scored for each response in the socially desirable direction with scores therefore ranging between 0 to 33 (highest social desirability).

Scale norms were developed on a sample of 1,400 students in introductory psychology at Ohio State University. The mean for males was 15 (s.d. = 5.6), for females 16.8 (s.d. = 5.5); internal consistency was .88; test-retest reliability over a one-month interval with 57 college students was .88; the scale has been used extensively and has been consistently shown to have good psychometric properties (Crowne & Marlowe, 1964).

#### Psychophysiological Measures

Heart rate and skin conductance were recorded using the Grass model 79 polygraph. The recording yielded multiple basal and reactive measures. Heart rate was recorded using Medi-Trace 1801 disposable electrodes placed symmetrically across the rib cage. The signal was processed via a 7P3 preamplifier and a 7DA driver-amplifier. This provided beat-to-beat outputs recorded at 2.5 mm/s on chart paper.

Skin conductance was recorded using Beckman silver-silver chloride electrodes attached to the medial

phalanges of the fore and middle fingers of the left hand. Electrodes, electrode placement, electrolyte and all other aspects of skin conductance recording were in accordance with the recommendations contained in the report published by a special committee chaired by D.C. Fowles (Fowles, et al., 1981). A constant voltage system (Venables & Christie, 1973) was used in configuration with a 7P1 preamplifier and a 7DA driver-amplifier. Gain was set originally at .1 mV/cm and readjusted if required. Chart speed was set at 2.5 mm/s.

For all three emotions (sadness, anger, happiness) a baseline skin conductance measure was obtained by identifying the lowest level reached during a 3-minute episode. A baseline heart rate measure was also obtained by averaging heart beats over a 30-second period immediately preceding the identified baseline skin conductance level.

Ten reactive skin conductance measures were obtained by averaging the highest levels reached during three ten-second episodes for each of 10 pre-selected-stimulus-bound periods. Ten reactive heart rate measures were obtained by averaging heart beats over each of the 10 periods.

#### Expressive Measure

Following the elicitation of a response the subjects were invited to talk about their feelings and their voice was recorded. The recording was made using a microphone coupled to a tape-recorder and a polygraph which also



converted speech to a visual analog that could then be studied independent of content.

Speech may be viewed as a rich, highly complex acoustic signal that discloses a good deal of information about the speaker in addition to semantic information. The speech signal consists of a stream of sound pulses and pauses. The pulses vary in intensity (loudness), fundamental frequency (pitch), harmonic structure (quality), and duration, along with a number of other more complex extrasemantic characteristics. The pulses correlate with what we hear as syllables.

In the present study the visual analog of a speech period was divided into five-second runs. The number of runs was used as an index of verbosity. Each run was inspected to identify the smallest and largest peaks in the amplitude signal which corresponded to the softest and loudest syllables. The height of each peak was noted and the difference calculated to represent the range of amplitude (loudness) for the run. Because there was subjectivity in selecting the peaks, 20% of the sample was selected randomly and their speech was re-scored by an independent observer. Inter-rater reliability for this subsample ranged from .96 to 1.00. Because 85% of the subjects in this sample had 5 runs or less, the mean of the first five runs rather than all runs (max. 17) was used as the index of affective blunting. The lower the score the more

pronounced the affective blunting.

#### Subjective Measure

After reporting on their feelings the subjects were asked to estimate the intensity of their feelings. A 5-point visual analog was provided to subjects for each condition. The rating ranged from 1 ("I did not feel anything") to 5 ("My experience was very intense").

#### Experimental Manipulation

Two conditions were used to elicit emotional reactions. In one condition the subjects were asked to remember each of the following situations in sequence: one where they had experienced sadness; one where they had experience anger; one where they had experienced happiness. For each situation they were asked to re-experience the feeling associated to this event. The vicarious condition consisted of 60 second films extracted from commercial movies. The film selected to arouse sadness portrayed a young boy crying over the death of his father. The film selected to arouse anger depicted the anger of a father over the senseless death of his son killed by a kidnapper. The film chosen to arouse happiness portrayed the reunion of a young girl with her family. The three films were retained following viewing by an audience who identified correctly the emotions that the films were designed to convey.

#### Procedure

All measures were administered to the subjects in one

session except for the PEI (Pekarik et al., 1976), the screening instrument which was administered in 1977-78. The initial contact was made by telephone to invite candidates to participate in the study. A brief description of the tasks to be performed was provided at this time. Upon arrival at the laboratory, prospective subjects were given a more detailed explanation of the tasks involved and asked to sign a consent form (see Appendix B). All testing was done individually by the author or a research assistant.

The first test administered was the Barbeau-Pinard Vocabulary subtest battery. The subject was then introduced to the laboratory which consisted of two adjoining rooms. The two rooms were separated by a one-way mirror, to allow for unobtrusive observation. The subject was invited to sit in a comfortable chair, details concerning the physiological recording were given and the electrodes were positioned.

During the initial 10 minute period, the subject completed the Social Desirability Scale. This 10 minute period also served as an adaptation period for physiological recording. The subject was then asked to wear headphones and to wait for instructions delivered through the headphones by the experimenter.

The following 5-step procedure was then repeated three times. The first sequence involved the emotion of sadness, the second, anger and the third, happiness.

Step 1: The subject was asked to relax for 3 minutes to

obtain a baseline recording.

Step 2: The subject was asked to think about being very sad (angry, happy) and to evoke this emotion as strongly as he could for one minute. The subject was then asked to talk about his experience and then to estimate his level of sadness (anger, happiness) on a 5-point scale ranging from "very low" to "very high".

Step 3: The subject was informed that he would watch a short segment of a film on videotape depicting a very sad (angry, happy) experience and that following the presentation he would be asked to report how he felt during the sequence and to estimate the intensity of his feeling. This procedure was then carried out.

Step 4: The subject was asked to picture himself in a nature scene and to evoke this situation as strongly as possible. The subject was then asked to talk about this experience and then to estimate the vividness of the evocation on a 5-point scale ranging from "not vivid at all" to "very vivid".

Step 5: The subject was informed that he would be presented another short segment of a film on videotape. He was also informed that the film would show natural landscapes and that following its presentation he would be asked to comment on the film and to estimate his interest in the film.

Step 4 and 5 were used respectively as neutral self-

generated and vicarious conditions to avoid carried over emotional effect.

Because usage of drugs within the 24 hours before the experiment would have potentially distorting effects on physiological responses, the subject was then presented with a list of drugs and asked to identify which, if any, he had taken in the previous 24 hours. The overall procedure took approximately one hour to complete. Subjects received \$40.00 for their participation in this study.

## RESULTS

Statistical analyses were done separately for men and women in order to avoid confusion introduced by four-way interactions in a context where sex differences were expected but not retained as a focus of the present study.

Preliminary analyses were conducted to determine distribution characteristics (skewness, outliers) on the subjective, physiological and expressive variables. The analyses revealed only minor problems on certain variables, and consequently, few changes were necessary (see Appendix C).

To ensure that the four Peer Classification groups were equivalent, a series of analyses of variance (ANOVA) were conducted to test for differences in age, education, intelligence as measured by the Barbeau-Pinard Vocabulary subtest (Barbeau & Pinard, 1963) and defensive response bias as measured by the SDS (Crowne & Marlowe, 1964). A significant main effect for group was found on age ( $F(3, 171) = 3.59, p > .05$ ). Tukey post hoc tests showed that the Aggressive-Withdrawn group was younger ( $M = 21.00, SD = 2.3$ ) than the Aggressive ( $M = 22.38, SD = 2.3$ ) and Withdrawn ( $M = 22.47, SD = 2.5$ ) groups. A significant main effect of group was also found on education ( $F(3, 171) = 14.86, p < .001$ ), where Tukey tests showed that the Aggressive ( $M = 10.69, SD = 1.7$ ) and the Aggressive-Withdrawn ( $M = 10.16, SD = 1.7$ ) groups completed less schooling than the Withdrawn ( $M$

= 11.85, SD = 1.87) and Control (M = 12.39, SD = 1.87) groups. A significant main effect of group on intelligence was demonstrated ( $F(3, 171) = 3.27, p < .05$ ) and the post hoc tests showed that the Aggressive-Withdrawn group obtained lower scores (M = 20.71, SD = 4.8) than the Control group (M = 23.73, SD = 4.4). No group effect was found in terms of defensive response bias.

Chi-square analyses were conducted to test for a significant association between Peer Classification Group and drug use within the 24 hours prior to testing or coffee consumption within one hour prior to testing. These results were negative. Less than 5% ( $N = 3$ ) of the sample reported drug use and more than 65% ( $N = 111$ ) reported having had coffee.

In summary the Aggressive-Withdrawn group was younger, of lower intelligence and, like the Aggressive group, less educated than the Withdrawn or Normative groups. Because of these group differences, correlations between age, education, IQ and the subjective, physiological and expressive measures were computed to determine whether these variables should be used as covariates in subsequent analyses. The range for these correlations was from .003 to -.280. According to Tabachnick and Fidell (1989), only variables showing substantive correlations (i.e.  $r > .30$ ) are meaningful as covariates. Hence, none of these variables were retained as a covariate.

### Subjective Dimension

The main goal in analysing the subjective data was to determine whether the four Peer Classification groups differed in their subjective evaluation of affective experiences. The hypotheses were as follows: 1) the Aggressive-Withdrawn group was expected to report less intense feelings than the other groups in each of the three emotional contexts, 2) more intense feelings were expected for the Self-generated condition than for the Film condition, and finally 3) more intense feelings were expected for the positive emotion context (i.e. Happiness) than for the negative emotion contexts (i.e. Sadness, Anger).

### Men

A 2 (Condition) x 3 (Emotion) x 4 (Peer Classification Group) ANOVA with Condition and Emotion as repeated measures was performed. The term "Condition" refers to the method used to elicit an emotional reaction, that is, Self-generated, where the subject is asked to re-experience the feeling related to a past event, or the Film condition where the subject is asked to watch a film sequence depicting an emotionally charged event. The variable "Emotion" refers to the three emotions: Sadness, Anger, Happiness.

Peer Classification Group effects were not found but a significant interaction was obtained between Emotion and



Condition ( $F(2, 172) = 3.19, p < .05$ ). Means and standard deviations for the Emotion x Condition interaction are shown in Table 3, and graphically represented in Figure 1. Post hoc tests (repeated measures t-tests with Bonferroni correction) indicated more intense feelings for the Self-generated condition as compared to the Film condition. Furthermore, in both conditions more intense feelings were reported for Happiness than for Sadness or Anger and the difference reached significance in the Film condition.

#### Women

A 2 (Condition) x 3 (Emotion) x 4 (Peer Classification) ANOVA with Condition and Emotion as the repeated measures was conducted. As was the case for the men, Peer Classification effects were not found, but a significant interaction between Emotion and Condition was obtained ( $F(2, 172) = 7.65, p < .001$ ). Table 4 presents means and standard deviations for this interaction and Figure 2 displays these results graphically. Post hoc tests (repeated measures t-tests with Bonferroni correction) showed that overall, women reported more intense feelings for Anger and Happiness in the Self-generated condition as compared to the Film condition. Furthermore, in the Self-generated condition feelings were significantly more intense for Happiness than the two other emotions, whereas in the Film condition Happiness produced more intense feelings only relative to Anger.

Table 3

Males: Means (and standard deviations) for Subjective  
evaluation as a function of Emotion and Condition

<u>Condition</u>	<u>Emotion</u>		
	Sadness	Anger	Happiness
Self-generated	3.21 (1.1)	3.18 (1.2)	3.88 (1.0)
Film	2.64 (1.1)	2.24 (1.2)	3.33 (1.8)

N=90

Figure 1

Males: Subjective evaluation as a function of Emotion and Condition

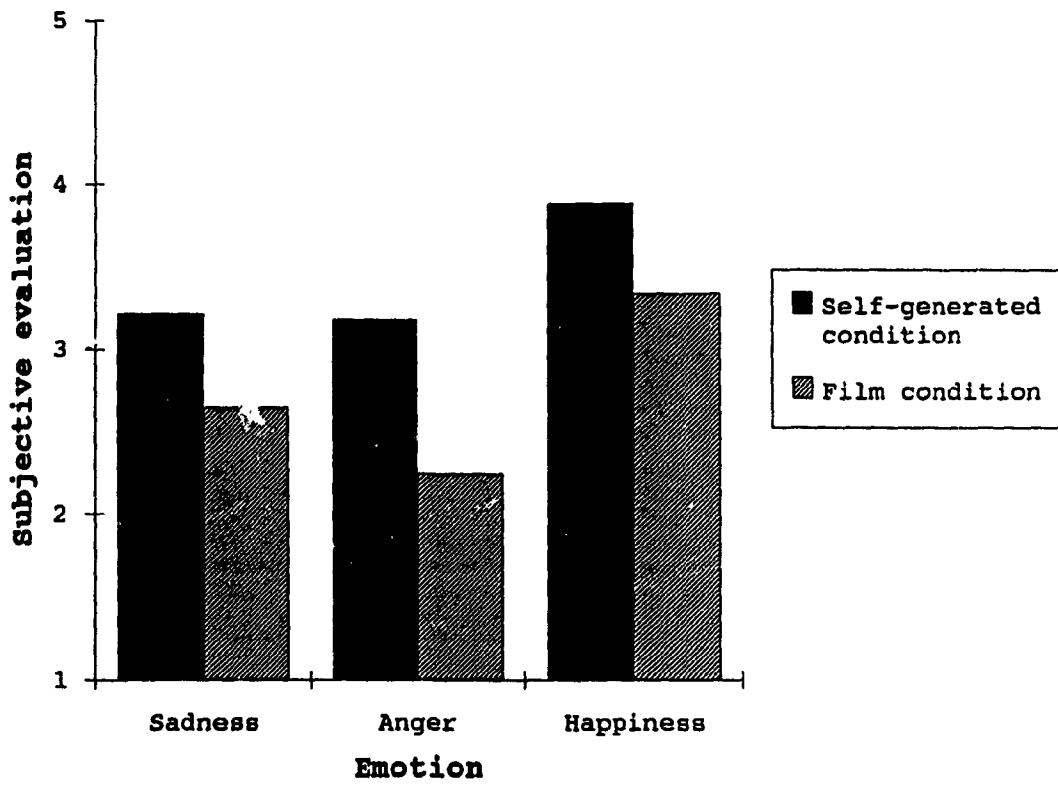


Table 4

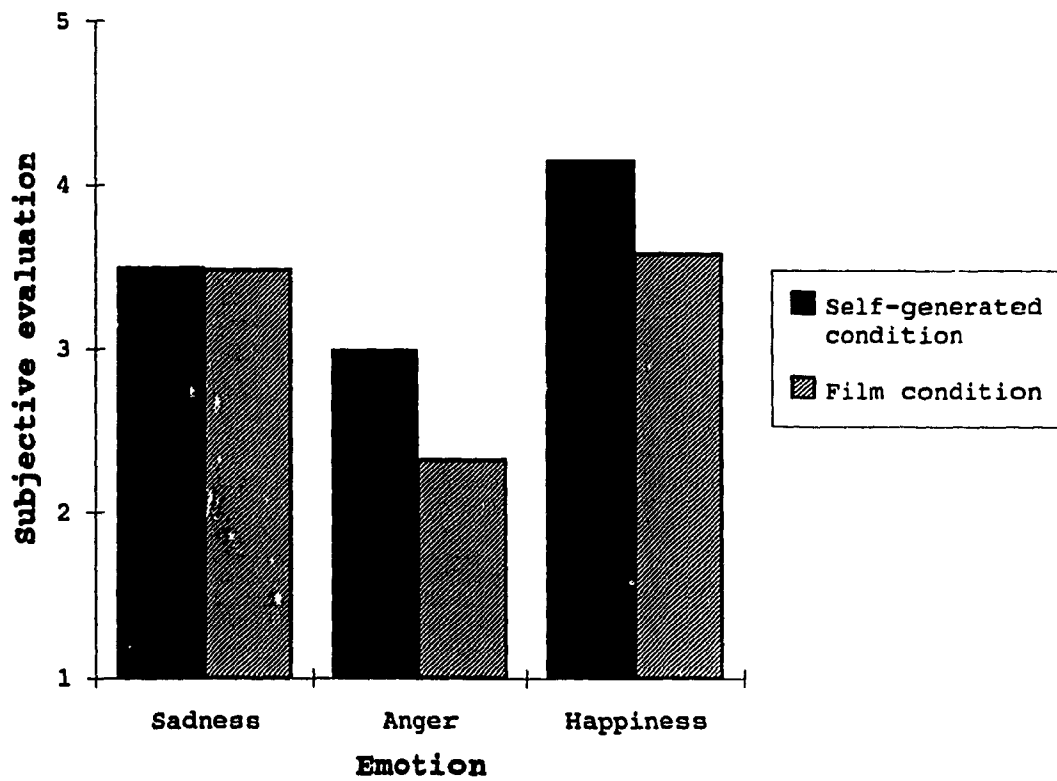
Females: Means (and standard deviations) for Subjective  
evaluation as a function of Emotion and Condition

<u>Condition</u>	<u>Emotion</u>		
	Sadness	Anger	Happiness
Self-generated	3.49 (1.2)	2.99 (1.3)	4.14 (.90)
Film	3.48 (1.1)	2.32 (1.2)	3.58 (1.1)

N=85

Figure 2

Females: Subjective evaluation as a function of Emotion and Condition



In summary, at the subjective level group differences were not found. The hypothesis that more intense feelings would be reported for the Self-generated condition than the Film condition was, for the most part, supported by the results. In fact, only in one emotional context (i.e. Sadness) was the intensity of feeling equivalent for both condition, and this only for women. The hypothesis that more intense feelings would be reported in positive versus negative emotional contexts was also supported overall. Only in the Film condition was it found that happy and sad scenes yielded similarly intense feelings for women.

#### Physiological Dimension

Heart rate (HR) and skin conductance (SC) data were analysed in order to determine whether the four Peer Classification groups differed under baseline (resting) condition and also in terms of physiological reactivity in the context of Sadness, Anger or Happiness.

The hypotheses were as follows: 1) the Aggressive-Withdrawn group was expected to show higher HR and SC levels at rest than other groups, 2) the Aggressive-Withdrawn group was expected to show smaller HR and SC changes from baseline than the other groups, 3) all groups were expected to show greater HR and SC change from baseline in the Self-generated condition than in the Film condition, 4) all groups were expected to show HR acceleration (environmental rejection) in the Self-generated condition

and HR deceleration (environmental intake) in the Film condition.

For HR as well as for SC, change scores from baseline were computed and used as the dependent measures of reactivity. Each change score was computed by taking into account its corresponding baseline.

### Men

#### 1. Heart-Rate

A 3 (Baseline) x 4 (Peer Classification Group) ANOVA with Baseline as the repeated measure was conducted. Under Baseline condition no Peer Classification Group effect was found.

A 2 (Condition) x 3 (Emotion) x 4 (Peer Classification) ANOVA with Condition and Emotion as the repeated measures and HR change score as the dependent measure was conducted. A significant interaction between Peer Classification and Condition was obtained ( $F(3, 86) = 3.46, p < .05$ ). Simple effect tests of group differences showed a main effect of Peer Classification for the Self-generated condition ( $F(3, 86) = 4.83, p < .01$ ) but not for the Film condition ( $F(3, 86) = .84, p = n.s.$ ). Tukey post-hoc tests showed that under the Self-generated condition it was the Aggressive group ( $M = .54, SD = 3.53$ ) but not the Aggressive-Withdrawn group ( $M = 3.37, SD = 4.4$ ), as hypothesized, that had significantly smaller HR change scores than the Control ( $M = 4.12, SD = 3.5$ ) and Withdrawn ( $M = 4.35, SD = 3.4$ )

groups (see Figure 3).

There was also a significant interaction between Peer Classification and Emotion ( $F(6, 172) = 2.98, p < .01$ ). Simple effect tests of group differences showed a main effect of Peer Classification for Sadness ( $F(3, 86) = 3.45, p < .05$ ) and for Anger ( $F(3, 86) = 4.46, p < .01$ ) but not for Happiness ( $F(3, 86) = .38, p = n.s.$ ). Tukey post-hoc tests showed that the mean HR change scores of the Aggressive group was significantly different from the mean HR change scores of the Control group for Sadness. The mean HR change scores of the Aggressive group was also significantly different from the Withdrawn and the Aggressive-Withdrawn groups for Anger (see Table 5 and Figure 4). In fact, the Aggressive group showed HR deceleration for these two negative emotional contexts.

A significant interaction between Emotion and Condition was also obtained ( $F(2, 172) = 9.43, p < .001$ ). Table 6 presents the means and standard deviations for this interaction, and Figure 5 displays these results graphically. Post hoc tests (repeated measures t-tests with Bonferroni correction) indicated that mean HR change scores were significantly different between the Self-generated condition and the Film condition. In fact, the Self-generated condition produced HR acceleration whereas the Film condition produced HR deceleration.

In summary, group differences were not found in terms



Figure 3

Males: Heart Rate change as a function of Peer Classification for the Self-generated condition

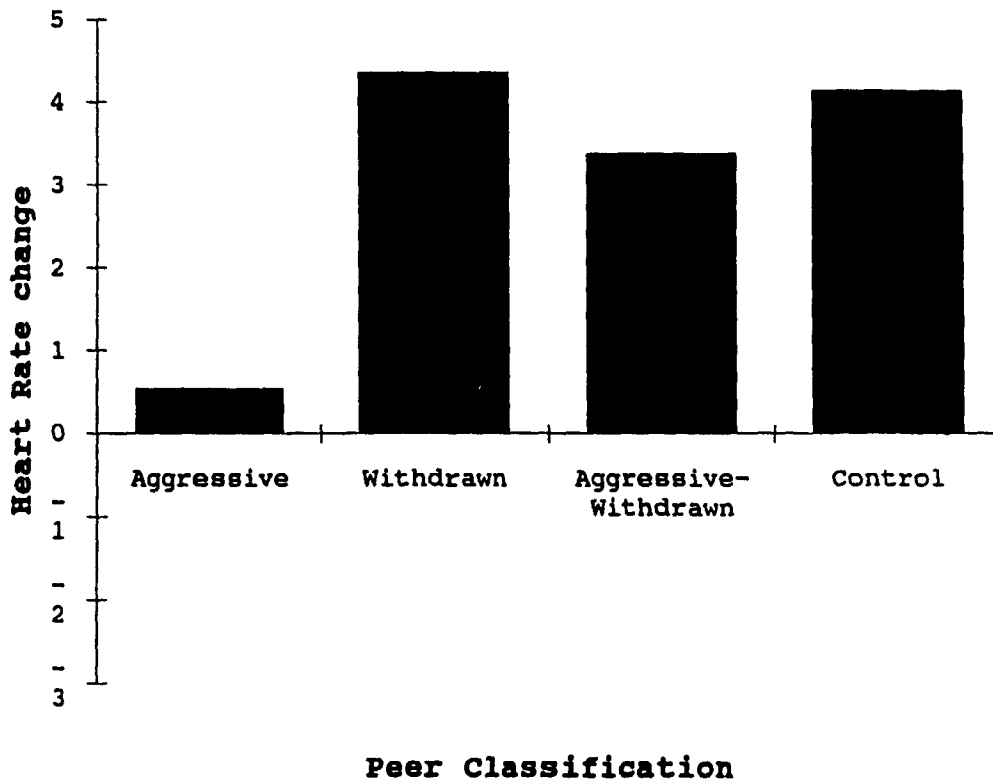


Table 5

Males: Means (and standard deviations) for Heart-Rate change as a function of Peer Classification and Emotion

<u>Emotion</u>	<u>Peer Classification</u>			
	Aggressive	Withdrawn	Aggressive- Withdrawn	Control
Sadness	-1.24(3.3)	2.14(3.8)	0.05( 4.4)	2.15(5.0)
Anger	-2.14(5.5)	1.95(3.8)	2.67(5.3)	1.15(3.8)
Happiness	1.09(3.3)	1.43(4.7)	0.57(4.2)	0.37(2.5)

N=90

Figure 4

Males: Heart Rate change as a function of Peer Classification and Emotion

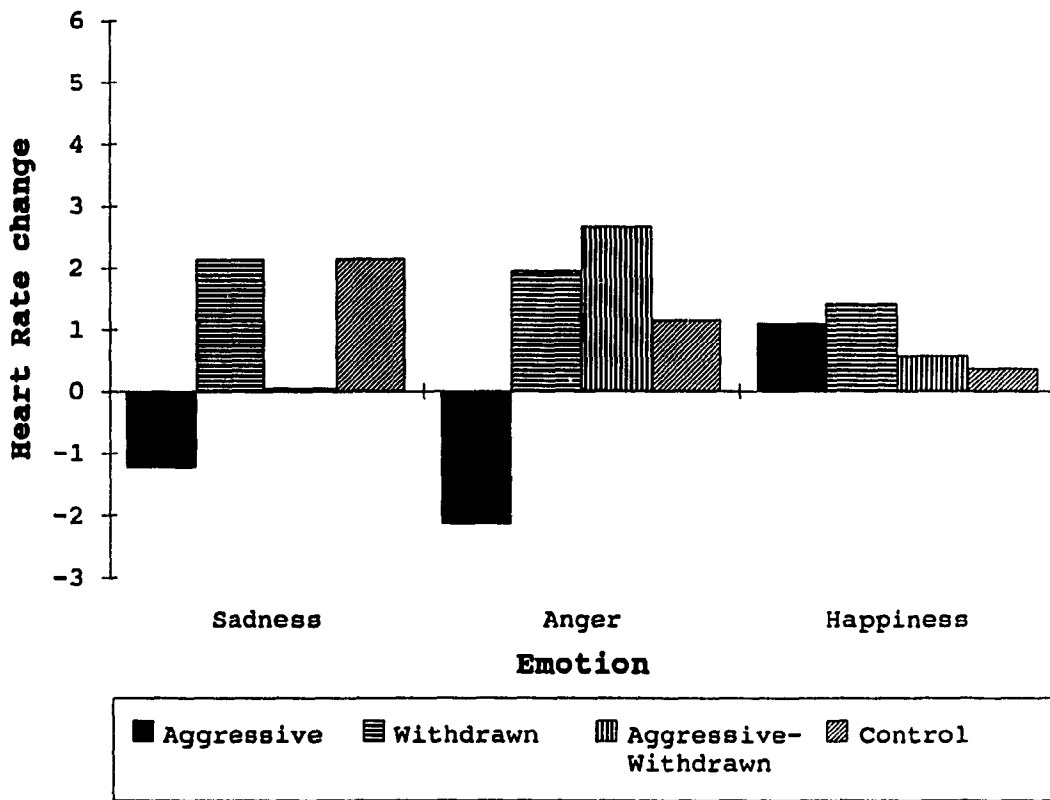


Table 6

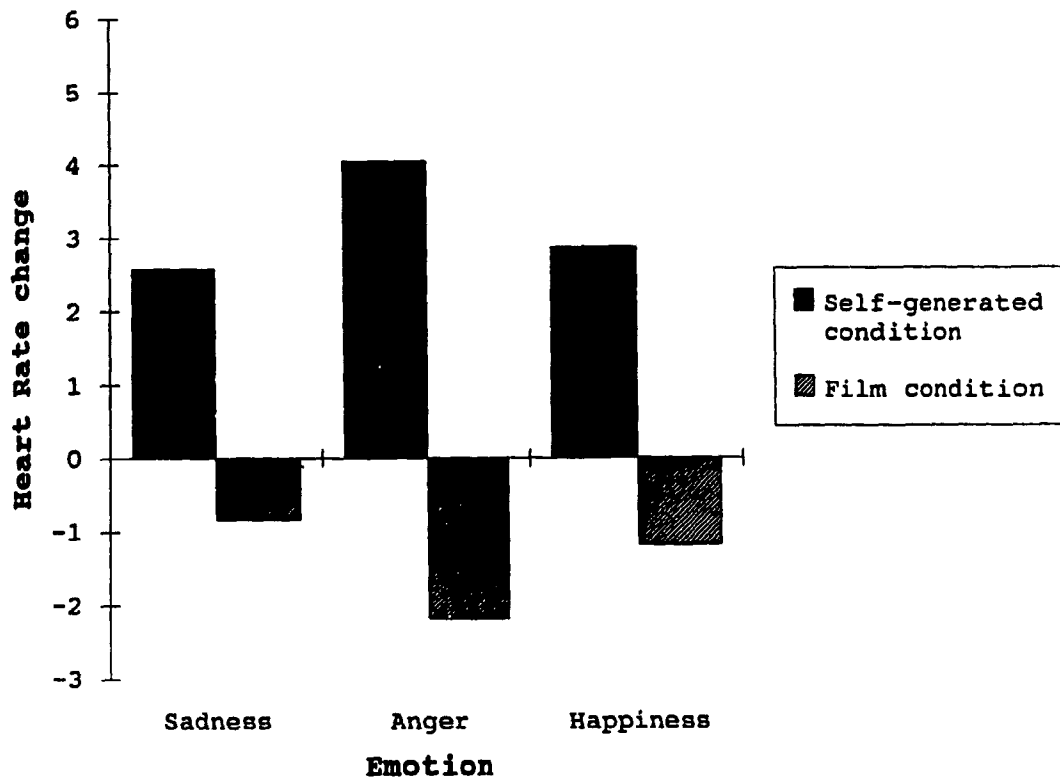
Males: Means (and standard deviations) for Heart Rate change  
as a function of Emotion and Condition

<u>Condition</u>	<u>Emotion</u>		
	Sadness	Anger	Happiness
Self-generated	2.58 (5.7)	4.04 (6.0)	2.87 (4.2)
Film	-.84 (5.0)	-2.20 (4.7)	-1.20 (4.6)

N=90

Figure 5

Males: Heart Rate change as a function of Emotion and Condition



of resting HR. The Aggressive group showed smaller HR change scores than the Control and the Withdrawn groups in the Self-generated condition, and a pattern of HR deceleration in the negative emotional contexts. The only interesting observation for the Aggressive-Withdrawn group was that it showed the strongest HR acceleration in the context of Anger. This strong cardiac acceleration was particularly noteworthy when contrasted to the restricted HR accelerations shown by this group in the other emotional contexts. The hypothesis of greater HR change scores in the Self-generated condition than in the Film condition was supported, as was the hypothesis of HR acceleration in the Self-generated condition and deceleration in the Film condition.

## 2. Skin-Conductance (Men)

A 3 (Baseline) x 4 (Peer Classification) Anova with Baseline as the repeated measure was conducted. A main effect of Baseline was found ( $F(2, 172) = 32.07, p < .001$ ). The post-hoc tests showed an increase in SC level from Baseline 1 ( $M = 81.02, SD = 36.58$ ) to Baseline 2 ( $M = 86.28, SD = 39.38$ ) to Baseline 3 ( $M = 90.41, SD = 41.69$ ). No group differences were found.

A 2 (Condition) x 3 (Emotion) x 4 (Peer Classification) ANOVA with Condition and Emotion as the repeated measures and SC change scores as the dependent measure was conducted. A significant three-way interaction was obtained ( $F(6, 172)$

= 2.38,  $p < .05$ ). Simple effect tests showed a significant two-way interaction of Emotion by Peer Classification for the Film condition ( $F(6, 172) = 4.33, p < .001$ ) but not for the Self-generated condition ( $F(6, 172) = .67, p > .10$ ). Table 7 presents the means and standard deviations for the Film condition; Figure 6 presents these results graphically. Simple comparisons showed that for Sadness, the mean SC change in all deviant groups was smaller than the mean SC change in the Control group. Thus, the hypothesis that a smaller change in SC would be specific to the Aggressive-Withdrawn group was not supported.

#### Women

##### 1. Heart Rate

A 3 (Baseline) x 4 (Peer Classification) ANOVA with Baseline as the repeated measure was conducted. Effects of Baseline or Peer Classification were not significant.

A 2 (Condition) x 3 (Emotion) x 4 (Peer Classification) ANOVA with Condition and Emotion as the repeated measures was conducted. A significant interaction between Emotion and Condition was obtained ( $F(2, 162) = 15.03, p < .001$ ). Table 8 presents the means and standard deviations as a function of Emotion and Condition and Figure 7 displays these results graphically. Post hoc tests (repeated measures t-tests with Bonferroni correction) showed that regardless of Peer Classification, the mean HR change score was greater for the Self-generated condition than for the

Table 7

Males: Means (and standard deviations) for Skin Conductance change as a function of Peer Classification and Emotion in the Film condition

<u>Emotion</u>	<u>Peer Classification</u>			
	Aggressive	Withdrawn	Aggressive- Withdrawn	Control
Sadness	10.19(8.1)	10.43(10.3)	8.19(7.1)	21.30(18.4)
Anger	9.52(7.0)	10.33(11.5)	8.76(6.5)	15.26(10.3)
Happiness	8.43(6.5)	6.04(7.07)	8.91(7.5)	9.95( 6.0)

N=90



Figure 6

Males: Skin Conductance change as a function of Peer Classification and Emotion for the Film condition

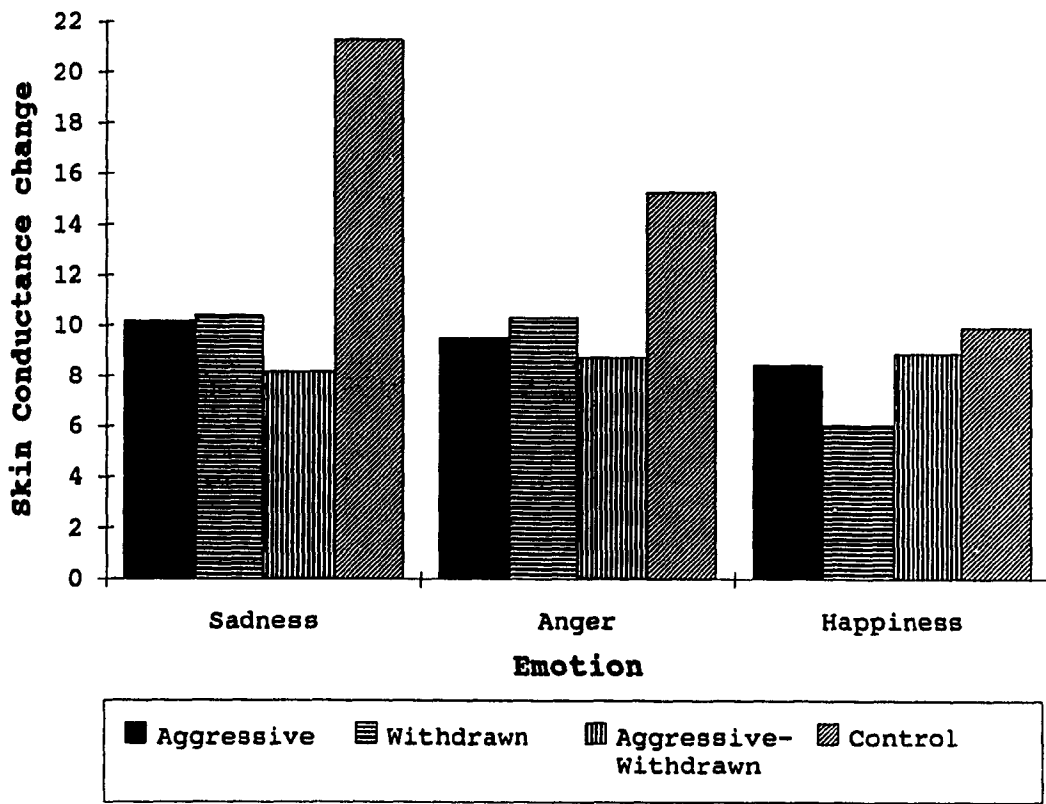


Table 8

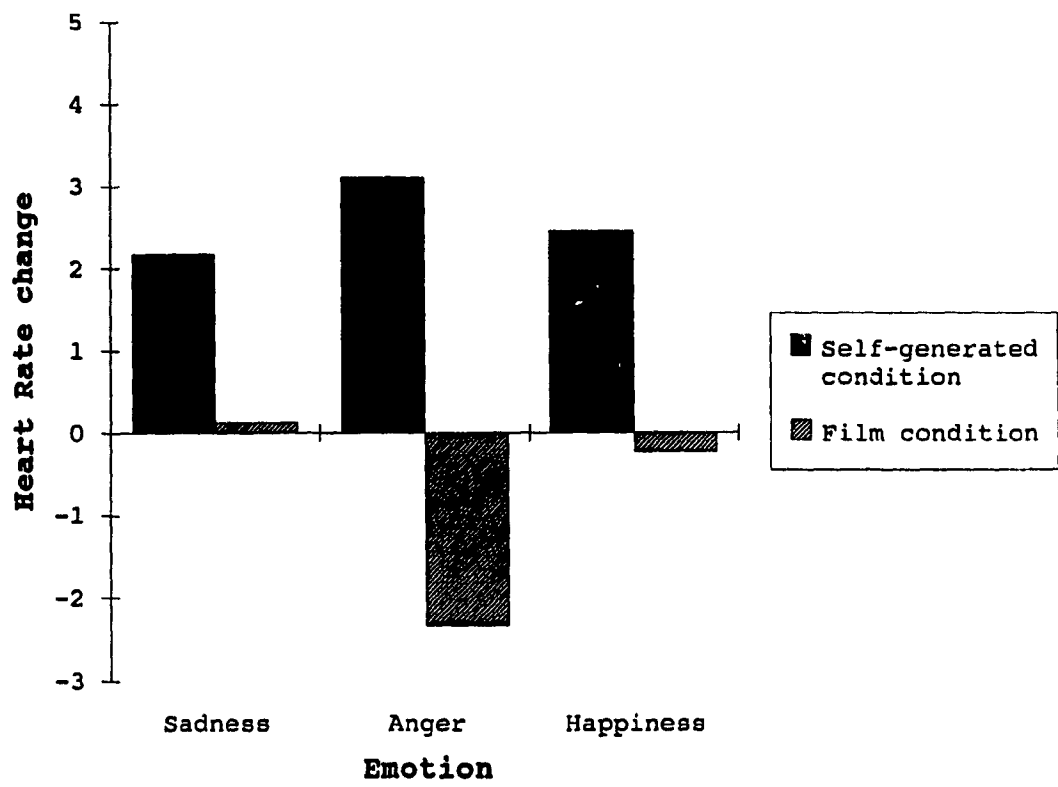
Females: Means (and standard deviations) for Heart Rate change as a function of Emotion and Condition

<u>Condition</u>	<u>Emotion</u>		
	Sadness	Anger	Happiness
Self-Generated	2.17 (5.2)	3.11 (5.2)	2.45 (4.3)
Film	0.13 (5.6)	-2.34 (4.0)	-0.24 (5.2)

N=85

Figure 7

Females: Heart Rate change as a function of Emotion and Condition



Film condition. Moreover, the Self-generated condition produced HR acceleration for the three emotional contexts whereas the Film condition produced HR deceleration in the contexts of Anger and Happiness but not in the context of Sadness.

## 2. Skin conductance (Women)

A 3 (Baseline) x 4 (Peer Classification) ANOVA with Baseline as the repeated measure was conducted. A main effect of Baseline was found ( $F(2, 172) = 32.07, p < .001$ ). Post-hoc tests (repeated measures t-tests with Bonferroni correction) showed an increase in SC level from Baseline 1 ( $M = 57.96, SD = 24.82$ ) to Baseline 2 ( $M = 61.09, SD = 25.92$ ) to Baseline 3 ( $M = 64.20, SD = 27.15$ ). Group differences were not significant.

A 2 (Condition) x 3 (Emotion) x 4 (Peer Classification) ANOVA with Emotion and Condition as the repeated measures and SC change scores as the dependent measure was conducted. A significant main effect of Condition was found ( $F(1, 79) = 72.52, p < .001$ ). Post hoc tests (repeated measures t-tests with Bonferroni correction) showed that regardless of Peer Classification and Emotion, the Film condition produced greater SC change ( $M = 10.83, SD = 7.80$ ) than the Self-generated condition ( $M = 4.83, SD = 5.08$ ).

A significant main effect of Emotion was also found ( $F(2, 158) = 12.11, p < .001$ ). Post-hoc tests showed that regardless of Peer Classification and Condition, the mean SC

change was greater for Sadness ( $M = 9.62$ ,  $SD = 7.90$ ) than for Anger ( $M = 7.58$ ,  $SD = 5.94$ ) or Happiness ( $M = 6.30$ ,  $SD = 6.21$ ). Furthermore, the mean SC change was significantly greater for Anger than for Happiness.

#### Summary

At the physiological level, the expected higher HR and SC levels in the Aggressive-Withdrawn group at baseline were not found. Similarly, the hypothesis of smaller variation in HR and SC from baseline predicted for this group was not supported. In fact, it was the group of men with histories of aggression which showed smaller HR change scores than the Control and Withdrawn men in the Self-generated condition. This group also showed a pattern of HR deceleration in negative emotional contexts.

For both men and women, HR acceleration was generally observed for the Self-generated condition and HR deceleration was generally observed for the Film condition. The only exception was for women in the filmed Sadness condition. It was also in the filmed Sadness condition that the men of the Control group showed greater SC change scores than the deviant groups of men. Finally, the women showed greater SC change scores in the Film condition than in the Self-generated condition, and greater SC change for Sadness than for Anger or Happiness.

#### Expressive Dimension

The goal in analysing the expressive data was to

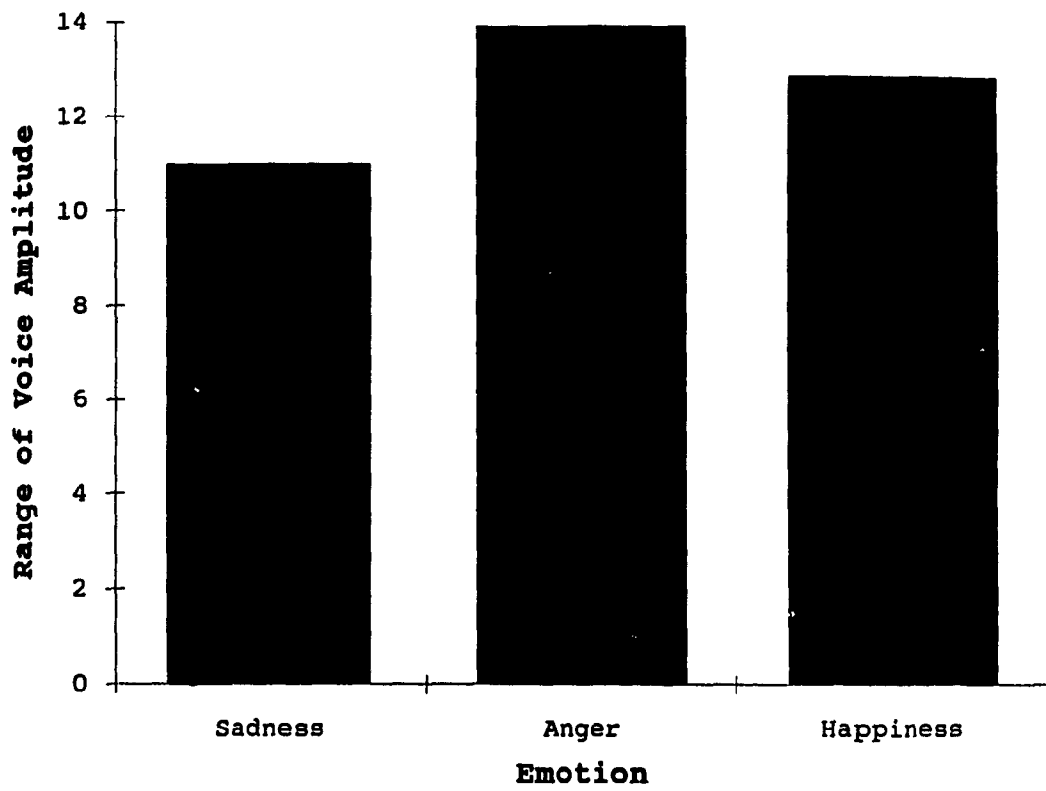
determine whether the four Peer Classification groups differed in terms of Range of Voice Amplitude (RVA). The hypothesis was that the Aggressive-Withdrawn group would show smaller RVA than the other groups. Correlation coefficients were first computed between Verbosity (number of runs) and RVA to examine the possibility that RVA was function of a propensity to verbalize. The range of correlation coefficients across the different emotional contexts was .12 to .26. These correlation were not large enough to justify using verbosity as a covariate for the analyses with RVA (Tabachnick & Fidell, 1989).

#### Men

A 2 (Condition) x 3 (Emotion) x 4 (Peer Classification) ANOVA with Condition and Emotion as the repeated measures and RVA as the dependent measure was conducted. A significant interaction between Condition and Emotion was obtained ( $F(2, 172) = 4.36, p < .05$ ). Simple effect tests showed a main effect of Emotion for the Self-generated condition ( $F(2, 178) = 8.74, p < .001$ ) but not for the Film condition ( $F(2, 178) = .69, p = n.s.$ ). Simple comparisons (repeated measure t-tests with Bonferroni correction) showed that regardless of Peer Classification, the RVA was smaller for Sadness ( $M = 11.00, SD = 6.24$ ) than for Anger ( $M = 13.89, SD = 6.34$ ) or Happiness ( $M = 12.84, SD = 6.50$ ). Figure 8 presents these results graphically.

Figure 8

Males: Range of Voice Amplitude as a function of Emotion



### Women

A 2 (Condition) x 3 (Emotion) x 4 (Peer Classification) ANOVA with Condition and Emotion as the repeated measures and RVA as the dependent measure was conducted. A significant interaction between Peer Classification and Emotion was obtained ( $F(6, 162) = 3.18, p < .01$ ). Tukey post hoc tests examining group differences as a function of Emotion showed that for Happiness the Withdrawn group had smaller mean RVA ( $M = 11.57, SD = 4.58$ ) than the Aggressive-Withdrawn group ( $M = 15.76, SD = 4.49$ ). Table 9 presents means and standard deviations as a function of Peer Classification and Emotion and Figure 9 presents these results graphically.

A main effect of Condition was also found ( $F(1, 81) = 14.00, p < .001$ ). Regardless of Peer Classification or Emotion the RVA was smaller for the Self-generated condition ( $M = 13.24, SD = 4.69$ ) than for the Film condition ( $M = 14.84, SD = 4.54$ ).

In summary, for men, the only RVA difference was that observed in the Self-generated condition where the RVA recorded was smaller in the context of Sadness than in the other emotional contexts of Anger and Happiness. A group difference in RVA was found for women. In fact, the Withdrawn group had a smaller mean RVA than the Aggressive-Withdrawn group for Happiness. The women of the sample also registered smaller RVA's in the Self-generated condition



than in the Film condition.

Table 9

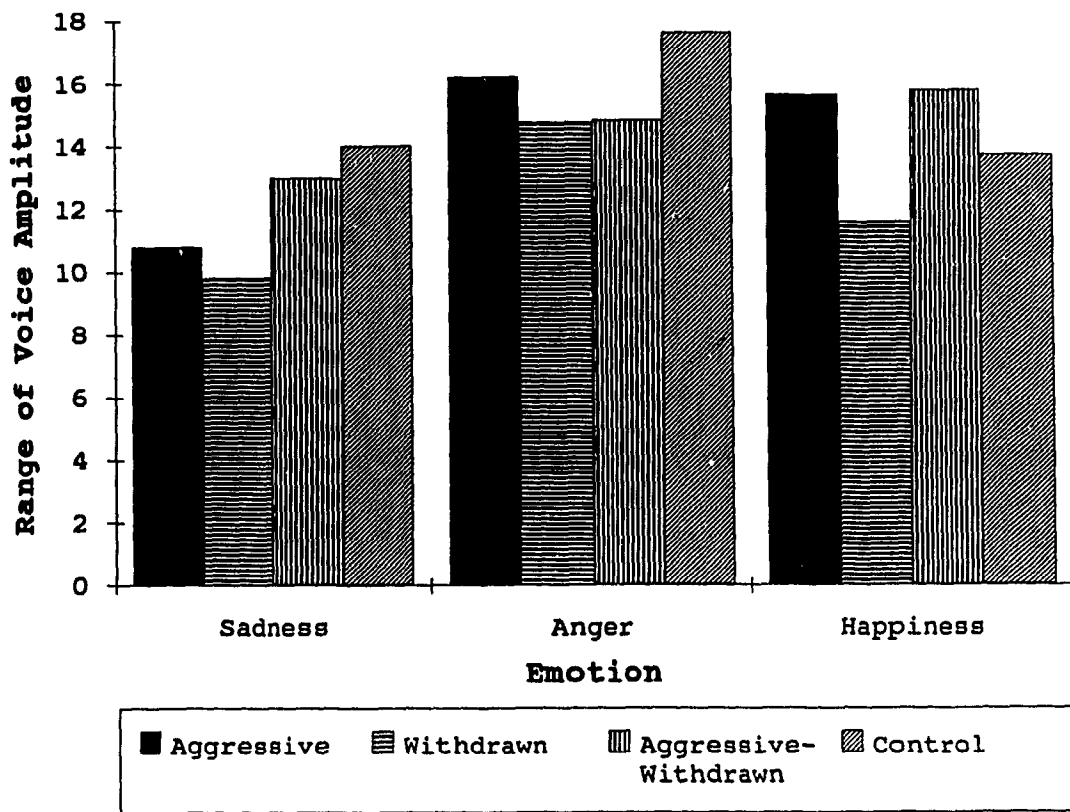
Females: Means (and standard deviations) for Range of Voice Amplitude as a function of Peer Classification and Emotion

<u>Emotion</u>	<u>Peer Classification</u>			
	Aggressive	Withdrawn	Aggressive- Withdrawn	Control
Sadness	10.78(5.0)	9.81(5.2)	12.98(4.5)	14.00(6.0)
Anger	16.18(4.4)	14.71(4.6)	14.79(4.4)	17.57(6.0)
Happiness	15.60(5.0)	11.57(4.6)	15.76(4.5)	13.71(5.5)

N=85

Figure 9

Females: Range of Voice Amplitude as a function of Peer Classification and Emotion



## DISCUSSION

Emotion can be viewed as a biologically adaptive process. The major underlying assumption of the present study was that the adaptive properties of emotion are impaired in individuals who are at risk for schizophrenia; specifically those who, in childhood, display a pattern of frequent aggression and frequent withdrawal. The present results provide partial support for this assumption.

The subjective, physiological and expressive data did not yield the significant group differences expected. The only significant group difference findings were that the group of men with a childhood history of frequent aggression showed less cardiac reactivity than the Control and Withdrawn men in the Self-generated condition and a pattern of cardiac deceleration in negative emotional contexts. The men at risk for schizophrenia, however, showed a pattern of weak cardiac acceleration in the emotional contexts of sadness or happiness and strong cardiac acceleration in the context of anger. The instability in cardiac reactivity is consistent with reports of a mixed pattern of restricted and excessive autonomic reactivity in schizophrenic individuals in response to environmental stimulation (e.g. Zahn, Carpenter & McGlashan, 1981).

This atypical pattern of cardiac reactivity suggests an inefficient physiological regulation of the activating effects of affective stimuli. Johnson (1985) has speculated

that the schizophrenic's inability to adequately regulate the effects of external stimulation can be attributed to a failure of a feed-forward regulating mechanism. In the natural environment, we face an array of stimulation that varies greatly. In order both to extract information from that environment and to avoid being disrupted by it, mechanisms are required that regulate the activation of neural systems. A sophisticated form of regulation tailors its response to each specific event. One form of event-specific regulation is the feed-forward mechanism which is anticipatory, acting before the fact rather than after as in the case of feed-back. The feed-forward mechanism uses leading cues to adjust responses to environmental events. By having its responses linked to specific events, the mechanism allows responses to mild stimuli to be relatively uninhibited, while inhibiting responses to more intense stimuli. A logical consequence of the mechanism's poor functioning is an unstable level of arousal which the individual attempts to stabilize through continuous and indiscriminate inhibition. The result would be abnormal insensitivity to moderate stimulation.

It appears then, from Johnson's perspective, that both hypoarousal and hyperarousal are possible consequences of the same underlying inhibitory deficit. Therefore, it should not be surprising that schizophrenic individuals cluster at both ends of scales of autonomic reactivity

(Gruzelier, 1978) or that they show a combination of restricted reactivity and hyperactivity (Zahn et al., 1981).

Furthermore, since cardiac acceleration has been repeatedly associated with demanding cognitive requirements (e.g., Lacey, 1967), the results of the present study suggest that men at risk for schizophrenia have difficulty regulating their network of associations in emotional contexts. This interpretation is consistent with Frith's (1979) theory that schizophrenics show an impairment in the mechanism that controls and limits mental processes, and Anscombe's (1987) notion that schizophrenics are "passive" in relation to the activity of their own mind. In summary, the finding of both restricted and amplified cardiac acceleration in high-risk subjects suggests an underlying deficit in the ability to regulate emotional stimulation. This finding of a low level of emotional processing efficiency appears to be specific to the high-risk men and, as noted below, is consistent with the literature on sex differences in schizophrenia.

In the present study it was assumed that there are sex differences in the socialization of emotional behavior which have impact on expectancies and anticipated emotional expression. Research has shown sex differences along these lines among college students (Dosser, Balswick, & Halverson, 1983; Fuchs, Thelen, & Wonderlich, 1986). Furthermore, researchers have also been aware of sex differences in the

clinical course of schizophrenia. One major difference is that negative symptoms are more prevalent in schizophrenic males than in schizophrenic females (Carpenter & Stephens, 1982; Goldstein & Link, 1988; Levine, 1981; Pogue-Geile & Harrow, 1984; Zigler & Levine, 1981). Poor premorbid adjustment and poor inhibitory control in male relative to female schizophrenic patients have also been noted (Kloresman, Strauss, & Kokes, 1977; John, Mednick, & Schulsinger, 1982; Zigler & Levine, 1981).

Considerable attention has been focussed recently on the ability of schizophrenic patients to decode affective cues. It has been suggested that a disturbance in the recognition of affect may be one of the most consistent and critical components of their interpersonal difficulties (Feinberg, Rifkin, Shaffer, & Walker, 1986). A number of studies have demonstrated that schizophrenics show a greater deficit in the recognition of negative emotions than of positive emotions (Dougherty, Bartlett, & Izard, 1974; Muzekari & Bates, 1977). Such findings are consistent with previous reports of performance decrements in schizophrenics as a function of negative stimuli (Buss & Lang, 1965). Whether the decrements are associated with the decoding as opposed to the encoding of affective cues has not been well established. Nevertheless, there is evidence of a relation between the negative symptom cluster in schizophrenia and impaired information processing (e.g. Cornblatt et al.,

1985).

In the present study, one of the two conditions used to generate emotional reactions, that is the film presentation, required the ability to decode positive and negative affects. The results showed that it is unlikely that a decoding deficit interfered. In fact, all subjects of the sample registered less affect in the vicarious condition which required decoding abilities than they registered in the self-generated condition in which no decoding is required. Moreover, the present study does not provide any evidence of a specific impairment in the perception of negative affect in high-risk subjects. The finding of a weaker subjective reaction to negative affect in both conditions, however, supplements prior reports that negative affect states may be more difficult to recognize than positive affect states (Ekman, Friesen, & Ellsworth, 1972; Zuckerman, Libets, Koivumaki & Rosenthal, 1975).

The results of the present study indicated that men considered at risk for schizophrenia show a disturbance in the process of regulating the network of associations in response to environmental stimulation. On the other hand, men with a childhood history of frequent aggression show a pattern of cardiac deceleration that is specific to the negative emotional contexts of anger and sadness. This finding suggests that a very limited process of cognitive elaboration takes place. This interpretation is consistent



with Dodge and Somberg's (1987) argument that in self-referent or threat conditions the aggressive individual abandons processes of formal logic and adopts a less sophisticated, more impulsive response pattern (preemptive processing). That is, thoroughness and complexity of processing decrease, and the individual responds with the most accessible or dominant response.

Interestingly, the present study failed to show group differences in neutral (non-emotional) contexts, thus avoiding the potential confound of physiological activity that reflected cognitive-attentional as opposed to affective processing.

#### Methodological considerations

The role of emotion and its associated psychophysiology have received little systematic attention in studies of psychopathology. The present study attempted to examine the nature of emotional responding in individuals likely to develop psychopathology. The investigation of relations among various indices of emotion was expected to lead to a better understanding of the underlying emotional mechanisms involved in schizophrenia.

The main findings of the present study implicated cardiac reactivity. In terms of subjective response, no group differences were found possibly because of a weakness in the discriminatory power of the scale used in this study. The general tendency for subjects to avoid extreme response

choices on the five-point rating scale suggests that a wider range of choice points alternatives would have been preferable. Measuring subjective responses was nonetheless useful because it afforded validation of the emotional stimuli. Moreover, the results provided additional support for the notion that a self-generated stimulus has a more powerful effect than a vicarious stimulus.

In terms of assessing expressive response, the challenge was to find a method to measure flat affect in schizophrenia without recourse to subjective ratings; acoustic analysis of vocal dynamics provided this opportunity. One of the main problems in the present study, however, was that the voice samples were too short to allow for sufficient variability in amplitude. The results are consequently difficult to interpret. Nevertheless, the negative findings should not lessen interest in studying flat affect as a potential precursor of schizophrenic symptomatology using this technology.

An important methodological issue raised by the present study concerns the manifestation of different emotions. Izard (1972) suggests that one pattern of behavior may refer to a wide range of different emotions. Whereas a whole array of emotions may have been responsible for the physiological reactions recorded in the present study, the subjective evaluations required consideration of only one emotion. A simplistic approach is often necessary before

more complex emotional interactions can be examined. Moreover, because it is likely that the first (gut) reaction occurs before conscious awareness, subjective evaluations will consist of conscious reappraisals that are prone to distortion. This issue has also been viewed by Shachter (1964) as central to the relationship between behavior and emotion. Clearly, further research is necessary to determine the significance of this disparity between objective signs of emotion and subjective experience.

#### Suggestions for future research

Other studies have shown that emotions vary in hedonic tone and degree of arousal. The design of the present study does not permit one to disentangle their separate effects. The physiological data obtained in the present study attest to the usefulness of designing investigations which examine the unique contributions of these dimensions of emotions.

The results of the present study also indicate that a self-generated condition is preferable to a vicarious one if intensity of the triggered emotional reaction is the focus of the research. However, the inclusion of the vicarious condition generated important information and allowed for a fine-grained interpretation of the results. The inclusion of a neutral condition in the design was also a strategy that should be retained in future research because it provides the means to test for contextual specificity of emotion.

### Clinical implications

There are implications in the present results which pertain to prevention of adjustment problems in adulthood. Clearly, the ability to react appropriately to emotional stimuli has an important bearing on the individual's social competence. The present data indicate that aggressive boys require interventions aimed at reducing their impulsivity and enhancing their ability to attend to relevant affective cues. On the other hand, aggressive-withdrawn boys require interventions targeted at developing strategies to overcome their deficit in the regulation of emotional stimulation.

### Direction for future studies

The present study underlines the advantages of approaching the study of affect in pathological development from a multitude of perspectives. Affect represents a convergence of neurophysiological, psychological, interpersonal, and sociological factors. Each one of these spheres has been examined quite independently by researchers as a function of their area of interest. What is needed now are more studies designed to integrate data from these different perspectives. This investigative approach should shed light on the links between the inefficient processing of affect that was observed in individuals of the present study who were thought to be at risk for schizophrenia and the affective deficits which are primary features of the disorder itself.

## REFERENCES

- Alpert, M. (1983). Encoding of feelings in voice. In P.J. Clayton & J.E. Barrett (Eds.), Treatment of Depression: Old Controversies and New Approaches, (pp.217-228). New York: Raven Press.
- Alpert, M., & Anderson, L.T. (1977). Imagery mediation of vocal emphasis in flat affect. Archives of General Psychiatry, 34, 208-212.
- Alpert, M., Kurtzberg, R.L. & Friedhoff, A.J. (1963). Transient voice changes associated with emotional stimuli. Archives of General Psychiatry, 8, 362-365.
- American Psychiatric Association. DSM-III: Diagnostic and Statistical Manual of Mental Disorders. 3rd ed. Washington, DC: The Association, 1980.
- American Psychiatric Association. DSM-III-R: Diagnostic and Statistical Manual of Mental Disorders. 3rd ed., revised. Washington, DC: The Association, 1987.
- Andreasen, N.C. (1982). Negative symptoms in schizophrenia: Definition and reliability. Archives of General Psychiatry, 39, 784-788.
- Andreasen, N.C., Ehrhardt, J.C., Swayze, V.W., Alliger, R.J., Yuh, W.T.C., Cohen, G., & Ziebell, G.C. (1990). Magnetic resonance imaging of the brain in schizophrenia. Archives of General Psychiatry, 47, 35-44.
- Andreasen, N.C., & Olsen, S. (1982). Negative versus

- positive schizophrenia: Definition and validation. Archives of General Psychiatry, 39, 789-794.
- Andreasen, N.C., Alpert, M., & Martz, M.J. (1981). Acoustic analysis: An objective measure of affective flattening. Archives of General Psychiatry, 38, 281-285.
- Angrist, B., Rotrosen, J., & Gershon, S. (1980). Response to apomorphine, amphetamine and neuroleptics in schizophrenic subjects. Psychopharmacology, 67, 31-38.
- Anscombe, R. (1987). The disorder of consciousness in schizophrenia. Schizophrenia Bulletin, vol.13 (2), 241-260.
- Asarnow, J.R. (1988). Children at risk for schizophrenia: Converging lines of evidence. Schizophrenia Bulletin, 14(4), 613-631.
- Asendorf, J.B., & Scherer, K.R. (1983). The discrepant repressor: Differentiation between low anxious and repression of anxiety by autonomic-facial-verbal patterns of behavior. Journal of Personality and Social Psychology, 45, 1334-1346.
- Ax, A.F. (1953). The physiological differentiation between fear and anger in humans. Psychosomatic Medicine, 15, 433-442.
- Barbeau, G.L., & Pinard, A. (1963). Épreuve Individuelle d'Intelligence Général. Montréal: Institut de recherches psychologiques.
- Biehl, H., Maurer, K., Juang, E., & Krumm, B. (1989). The

- WHO psychological impairments rating schedule (WHO/PIRS): II. Impairments in schizophrenics in cross-sectional and longitudinal perspective. The Mannheim experience in two independent samples. British Journal of Psychiatry, 155(suppl.7), 71-77.
- Bilder, R.M., Mukherjee, S., Rieder, R.O., & Pandurangi, A.K. (1985). Symptomatic and neuropsychological components of defect states. Schizophrenia Bulletin, 3, 409-419.
- Bleuler, E. (1911/1961). Dementia praecox or the group of schizophrenia. New York: International Universities Press (translated from the 1911 German).
- Bleuler, E. (1978). The schizophrenic disorders: Long-term patient and family studies. New Haven: Yale University Press.
- Bond, D.D. (1943). Sympathetic and vagal interaction in emotional response of the heart rate. American Journal of Physiology, 138, 468-478.
- Bower, E.M., Shellhammer, T.A., & Daily, J.M. (1960). School characteristics of male adolescents who later become schizophrenic. American Journal of Orthopsychiatry, 30, 712-729.
- Breier, A., Wolkowitz, O.M., Doran, A.R., Roy, A., Hommer, D.W., & Pickar, D. (1987). Neuroleptic responsivity of negative and positive symptoms in schizophrenia. American Journal of Psychiatry, 144, 1549-1555.

- Brown, S.L., Schwartz, G.E., & Sweeney, D.R. (1978).  
Dissociation of self-reported and observed pleasure in  
depression. Psychosomatic Medicine, 40, 536-548.
- Brown, S.L., Sweeney, D.R., & Schwartz, G.E. (1979).  
Differences between self-reported and observed pleasure  
in depression and schizophrenia. Journal of Nervous and  
Mental Diseases, 167, 410-415.
- Buck, R.W. (1984). The communication of emotion. New York:  
Guilford.
- Buss, A., & Lang, P. (1965). Psychological deficit in  
schizophrenia. Journal of Abnormal Psychology, 70,  
2-24.
- Cacioppo, J.T., & Sandman, C.A. (1978). Physiological  
differentiation of sensory and cognitive tasks as a  
function of waring, processing demands, and reported  
unpleasantness. Biological Psychology, 6, 181-192.
- Cannon, W.B. (1929). Bodily changes in pain, hunger, fear,  
and rage (2nd ed.). New York: Appleton-Century.
- Carpenter, W.T., Jr, Bartko, J.J., Strauss, J.S., & Hawk,  
A.B. (1978). Signs and symptoms as predictors of  
outcome: A report from the International Pilot Study of  
Schizophrenia. American Journal of Psychiatry, 135,  
940-944.
- Carpenter, W.T., & Stephens, J.H. (1982). Prognosis as the  
critical variable in the classification of the  
functional psychoses. Journal of Nervous and Mental



- Diseases, 170, 688-691.
- Claridge, G.S. (1972). The schizophrenia as nervous types. British Journal of Psychiatry, 112, 1-17.
- Claridge, G.S. (1985). The origins of mental illness: Temperament, deviance and disorder. New York: Basil Blacknel Ltd.
- Claridge, G.S. (1987). Psychoticism and arousal. In J. Strelau & H.J. Eysenck (Eds.), Personality Dimensions and Arousal. New York: Plenum.
- Cornblatt, B.A., Lenzenweger, M.F., Dworkin, R.H., & Erlenmeyer-Kimling, L. (1985). Positive and negative schizophrenic symptoms, attention, and information processing. Schizophrenia Bulletin, 11, 397-408.
- Crowne, D.P., & Marlow, D. (1964). The approval motive. New York: Wiley.
- Depue, R.A., & Fowles, D.C. (1973). Electrodermal activity as an index of arousal in schizophrenics. Psychological Bulletin, 79, 233-238.
- Dodge, K.A., & Somberg, D.R. (1987). Hostile attributional biases among aggressive boys are exarcebated under conditions of threats to the self. Child Development, 58, 213-224.
- Dosser, D.A., Balswick, J.O., & Halverson, C.F. (1983). Situational context of emotional expressiveness. Journal of Counseling Psychology, 30, 375-387.
- Dougherty, J.T., Bartlett, F.S., & Izard, C.E. (1974).

- Response of schizophrenics to expressions of the fundamental emotions. Journal of Clinical Psychology, 30, 243-246.
- Eisenberg, P., & Zalowitz, E. (1938). Judging expressive movement: III. Judgements of dominance feeling from phonograph records of voice. Journal of Applied Psychology, 22, 620-631.
- Ekman, P., Friesen, W.V., & Ellsworth, P. (1972). Emotions in the Human. Elstead, NY: Pergamon Press.
- Ekman, P., Levenson, R., & Friesen, W.V. (1984). Autonomic nervous system activity distinguishes among emotions. Science, 221, 1208-1210.
- Feinberg, T.E., Rifkin, A., Shaffer, C., & Walker, E. (1986). Facial discrimination and emotional recognition in schizophrenia and affective disorders. Archives of General Psychiatry, 43, 276-279.
- Feldman, R., White, J., & Lobato, D. (1982). Social skills and nonverbal behavior. In R. Feldman (Ed.), Development of Nonverbal Behavior in Children, 259-277. New York: Springer-Verlag.
- Foerster, A., Lewis, S., Owen, M., & Murray, R. (1991). Pre-morbid adjustment and personality in psychosis. Effect of sex and diagnosis. British Journal of Psychiatry, 158, 171-176.
- Fowles, D.C., Christie, M.J., Edelberg, R., Grings, W.W., Lykken, D.T., & Venables, P.H. (1981). Publication

recommendations for electrodermal measurements.

Psychophysiology, 18, 232-239.

Frith, C.D. (1979). Consciousness, information processing and schizophrenia. British Journal of Psychiatry, 134, 225-235.

Fuchs, D.L., Thelen, M.H., & Wonderlich, S. (1986). Expected interpersonal consequences and emotional expression.

Paper presented at the Midwestern Psychological Association Annual Convention, Chicago.

Goldstein, J.M. & Link, B. G. (1988). Gender and the expression of schizophrenia. Journal of Psychiatric Research, 22, 144-155.

Gottheil, E., Exline, R.V., & Winkelmayer, R. (1979). Judging emotions of normal and schizophrenic subjects. American Journal of Psychiatry, 136(8), 1049-1054.

Gottheil, E., Thornton, C.C., & Exline, R.V. (1976). Appropriate and background affect in facial displays of emotion: Comparison of normal and schizophrenic males. Archive of General Psychiatry, 33, 565-568.

Gruzelier, J.H. (1978). Bimodal states of arousal and lateralized dysfunction in schizophrenia. In The Nature of Schizophrenia (eds. L. C. Wynne, R. Cromwell & S. Matthysse). New York: Wiley.

Gruzelier, J.H., & Venables, P.H. (1975). Evidence of high and low levels of physiological arousal in schizophrenic. Psychophysiology, 12, 66-73.

- Hargreaves, W.A., Starkweather, J.A. & Blacker, K.H. (1965).  
Voice quality in depression. Journal of Abnormal Psychology, 70, 218-220.
- Hodgson, R., & Rachman, S. (1974). Desynchrony in measures of fear. Behavior Research and Therapy, 12, 319-326.
- Hokanson, J.E., & Burgess, M. (1962). The effects of 3 types of aggression on vascular processes. Journal of Abnormal and Social Psychology, 64, 446-449.
- Hokanson, J.E., & Shetler, S. (1961). The effect of overt aggression on physiological arousal level. Journal of Abnormal and Social Psychology, 63, 446-448.
- Izard, C.E. (1971). The Face of Emotion. New York: Appleton-Century-Crofts.
- Izard, C.E. (1972). Patterns of Emotion. Academic Press, New York.
- Jackson, H. (1887). Remarks on evolution and dissolution of the nervous system. Journal of Mental Science, 33, 25-48.
- John, R.S., Mednick, S.A., & Schulsinger, F. (1982). Teacher reports as a predictor of schizophrenia and borderline schizophrenia: A Bayesian decision analysis. Journal of Abnormal Psychology, 91(6), 399-413.
- Johnson D.J. (1985). A mechanism to inhibit input activation and its dysfunction in schizophrenia. British Journal of Psychiatry, 146, 429-435.
- Johnstone, E.C., Crow, T.J., Frith, C.D., et al. (1978).

- Mechanism of the antipsychotic effect in the treatment of acute schizophrenia. Lancet, 1, 848-851.
- Johnstone, E.C., Frith, C.D., Gold, A., & Stevens, M. (1979). The outcome of severe acute schizophrenic illnesses after one year. British Journal of Psychiatry, 134, 28-33.
- Johnstone, E.C., Owens, D.G., Frith, C.D., & Crow, T.J. (1986). Relative stability of positive and negative features in chronic schizophrenia. British Journal of Psychiatry, 150, 60-64.
- Jones, H.E. (1935). The galvanic skin response as related to overt emotional expression. American Journal of Psychology, 47, 241-251.
- Kay, S.R., Fiszbein, A., & Opler, L.A. (1987). The Positive and Negative Syndrome Scale (PANSS) for schizophrenia. Schizophrenia Bulletin, 13, 261-276.
- Kloremen, R., Strauss, J.S., & Kokes, R.F. (1977). Premorbid adjustments in schizophrenia: Concepts, measures and implications. Schizophrenia Bulletin, 3, 214-220.
- Knight, R.A., Roff, J.D., Barnett, J., & Moss, J.L. (1979). Concurrent and predictive validity of thought disorder and affectivity: A 22-year follow-up of acute schizophrenics. Journal Abnormal Psychology, 88, 1-12.
- Knight, R.A., & Valner, J. (1988). Assessing vocal affective communication in schizophrenics: A cross-cultural study. Paper presented at the 3rd annual meeting of the

society for research in psychopathology. November, 1988.

Kraepelin, E. (1919). Dementia praecox. Edinburgh: E. & S.

Krawiecka, M., Goldberg, D., & Vaughan, M. (1977). A standardized psychiatric assessment scale for rating chronic psychotic patients. Acta Psychiatrica Scandinavica, 55, 299-308.

Kugelmass, S., Marcus, J., & Schmueli, J. (1985). Psychophysiological reactivity in high-risk children. Schizophrenia Bulletin, 11, 66-73.

Lacey, J.I. (1967). Somatic response patterning and stress: Some revisions of activation theory. In M.H. Appley and R. Trumbull (Eds.), Psychological Stress: Issues in Research. Appleton-Century-Crofts. New York, pp. 14-37.

Lacey, J.I., & Lacey, B.L. (1970). Some autonomic central nervous system interrelationships. In P. Block (Ed.): Physiological Correlates of Emotion. New York: Academic Press, Inc., pp. 205-207.

Lacey, J.I., Kagan, J., Lacey, B., & Moss, H.A. (1963). The visceral level: Situational determinants and behavioral correlates of autonomic response patterns. In P.H. Knapp (Ed.), Expression of the emotions in man (pp. 161-196). New York: International Universities Press.

Lazarus, R.S. (1974). A cognitively oriented psychologist looks at biofeedback, American

- Psychologist, 30, 553-561.
- Ledingham, J.E. (1981). Developmental patterns of aggressive and withdrawn behavior in childhood: A possible method for identifying preschizophrenics. Journal of Abnormal Child Psychology, 9, 368-376.
- Levine, D. (1970). Criminal behavior and mental institutionalization. Journal of Clinical Psychology, 26, 279-284.
- Levine, R.J. (1981). Sex differences in schizophrenia: timing or subtypes? Psychological Bulletin, 90, 432-444.
- Lewine, R.J., Fogg, L., & Meltzer, H.Y. (1983). Assessment of negative and positive symptoms in schizophrenia. Schizophrenia Bulletin, 9, 368-376.
- Libby, W.L., Jr, Lacey, B.C., & Lacey J.I. (1973). Pupillary and cardioactivity during visual attention. Psychophysiology, 10, 270-294.
- Liddle, P.F. (1987). The symptoms of chronic schizophrenia: A re-examination of the positive-negative dichotomy. British Journal of Psychiatry, 151, 145-151.
- Mednick, S.A., & Schulsinger, F. (1968). Some premorbid characteristics related to breakdown in children with schizophrenic mothers. Journal of Psychiatric Research, 6, 354-362.
- Michael, C.M., Morris, D.P., & Soroker, E. (1957). Follow-up

- studies of shy, withdrawn children. II: Relative incidence of schizophrenia. American Journal of Orthopsychiatry, 27, 331-337.
- Morrison, R.L., Bellack, A.S., & Mueser, K.T. (1988). Deficits in facial-affect recognition and schizophrenia. Schizophrenia Bulletin, vol. 14(1), 67-83.
- Muntaner, C., Garcia-Sevilla, L., Fernandez, A., & Torrubia, R. (1988). Personality dimensions, schizotypal and borderline personality traits and psychosis proneness. Personality and Individual Differences, 9, 257-268.
- Muzekari, L.H., & Bates, M.E. (1977). Judgment of emotion among chronic schizophrenics. Journal of Clinical Psychology, 33, 662-666.
- Nameche, G., Waring, M., & Ricks, D. (1964). Early indicators of outcome in schizophrenia. Journal of Nervous and Mental Disease, 139, 232-240.
- Obrist, P.A., Sutterer, J.R. & Howard, J.L. (1972). Preparatory cardiac changes: A psychobiological approach. In A.H. Black and W.F. Proka (Eds.), Classical Conditioning II: Current Research and Theory, Appleton-Century-Crofts, New York, pp. 312-340.
- Overall, J.E., & Gorham, D.R. (1962). Brief Psychiatric Rating Scale. Psychological Report, 10, 799-812.
- Parnas, J., Schulsinger, F., Teasdale, T.W., Schulsinger, H., Feldman, P.M., & Mednick, S.A. (1982).



- Perinatal complications and clinical outcome within the schizophrenia spectrum. British Journal of Psychiatry, 140, 416-420.
- Pekarik, E.G., Prinz, R.J., Liebert, D.E., Weintraub, S., & Neale, J.M. (1976). The pupil evaluation inventory: A sociometric technique for assessing children's social behavior. Journal of Abnormal Child Psychology, 4, 83-97,
- Pennebaker, J.W. (1985). Traumatic experience and psychosomatic disease: Exploring the roles of behavioral inhibition, obsession, and confiding. Canadian Psychology, 26, 82-95.
- Philippot, P. & Feldman, R. (1990). Age and social competence in preschoolers' decoding of facial expression. British Journal of Social Psychology, 29, 43-54.
- Piaget, J. & Inhelder, B. (1969). The psychology of the child. New York: Basic Books.
- Pfohl, B., & Winokur, G. (1983). Schizophrenia: Course and outcome. In F. Henn, & H. Nasrallah (Eds.), Schizophrenia as a brain disease. New York: Oxford University Press.
- Pogue-Geile, M.F., & Harrow, M. (1984). Negative and positive symptoms in schizophrenia and depression: A follow-up. Schizophrenia Bulletin, 10, 371-387.
- Pogue-Geile, M.F., & Harrow, M. (1985). Negative symptoms

- in schizophrenia: Their longitudinal course and prognostic implications. Schizophrenia Bulletin, 11, 427-439.
- Robins, L.N. (1966). Deviant Children Grown Up. Baltimore: Williams & Wilkins.
- Rosenthal, R., Hall, J., DiMatteo, Rogers, P., & Archer, D. (1979). Sensitivity to nonverbal communication: The PONS test. Baltimore: Johns Hopkins University Press
- Schachter, S.S. (1964). The interaction of cognitive and physiological determinants of emotional state. In Berkowitz, L., Ed., Advances in Experimental Social Psychology, Vol. 1. Academic Press, New York.
- Schwartz, G.E. (1982). Cardiovascular psychophysiology: A systems perspective. In J.T. Cacioppo & R.E. Petty (Eds.), Focus on cardiovascular psychophysiology. New York: Guilford Press.
- Schwartz, G.E. (1983). Disregulation theory and disease: Applications to the repression/cerebral disconnection/cardiovascular disorder hypothesis (Special edition). International Review of Applied Psychology, 32, 95-118.
- Schwartz, G.E., Weinberger, D.A., & Singer, J.A. (1981). Cardiovascular differentiation of happiness, sadness, anger and fear following imagery and exercise. Psychosomatic Medicine, 43, 343-364.
- Schwartzman, A.E., Ledingham, J.E., & Serbin, L.A. (1985).

- Identification of children at risk for adult schizophrenia. International Review of Applied Psychology, 34, 363-380.
- Singh, M.M., Kay, S.R., & Opler, L.A. (1987). Anticholinergic-neuroleptic antagonism in terms of positive and negative symptoms of schizophrenia: Implications for psychobiological subtyping. Psychological Medicine, 17, 39-48.
- Smith, C.A., & Ellsworth, P.C. (1985). Patterns of cognitive appraisal in emotion. Journal of Personality and Social Psychology, 4, 813-838.
- Soskin, W.F. (1953). Some aspects of communication and interpretation in psychotherapy. Paper read at American Psychology Association, Cleveland, September.
- Spence, S. (1987). The relationship between social-cognitive skills and peer sociometric status. British Journal of Developmental Psychology, 5, 347-356.
- Spohn, H.E., & Patterson, T. (1979). Recent studies of psychophysiology in schizophrenia. Schizophrenia Bulletin, 4, 581-611.
- Sroufe, L.A. (1979). The coherence of individual development: Early care, attachment, and subsequent developmental issues. American Psychologist, 34(10), 834-841.
- Sroufe, L.A. (1982). The organization of emotional development. Psychoanalytic Inquiry, 1, 575-599.

- Strauss, J.S. & Carpenter, W.T. (1974). The evaluation of outcome in schizophrenia. In M. Roff & D.F. Ricks (Eds.), Life history research in psychopathology (Vol.3). Minneapolis: University of Minnesota Press.
- Strauss, J.S., Carpenter, W.T., & Bartko, J. (1974). An approach to the diagnosis and understanding of schizophrenia: Part III. Speculation on the process that underlie schizophrenic symptoms and signs. Schizophrenia Bulletin, 11, 61-69.
- Tabachnik, B.G., & Fidell, L.S. (1983). Using multivariate statistics. New York: Harper & Row Publishers.
- Tarrier, N., Barrowclough, C., Porceddu, K., Watts, S. (1988). The assessment of psychophysiological reactivity to the expressed emotion of the relatives of schizophrenic patients. British Journal of Psychiatry, 152, 618-624.
- Turpin, G., & Siddle, D.A.T. (1978). Cardiac and forearm plethysmograph responses to high intensity auditory stimulation. Biological Psychology, 6, 267-282.
- Ulrych, M. (1969). Changes of general haemodynamics during stressful mental arithmetic and non-stressing quiet conversation and modification of the latter by beta-adrenergic blockade. Clinical Science, 36, 453-461.
- Van Kammen, D.P., & Boronow, J.J. (1988). Dextro-amphetamine diminishes negative symptoms in

- schizophrenia. International Clinical Psychopharmacology, 3, 111-121.
- Venables, P.H. (1966). Psychophysiological aspects of schizophrenia. British Journal of Medical Psychology, 39, 289-297.
- Venables, P.H. (1975). The recovery limb of the skin conductance response in "high risk" research. In S.A. Mednick, F. Schulsinger, J. Higgins, & B. Bell (Eds.): Genetics, Environment and Psychophysiology. Amsterdam: North-Holland/American Elsevier, pp. 117-134.
- Venables, P.H., & Christie, M.J. (1973). Mechanisms, instrumentation, recording techniques and qualification of responses. In: W.F. Prokasy & D.C. Raskin (Eds.). Electrodermal Activity in Psychophysiological Research. New York: Academic Press.
- Weinberger, D.A., Schwartz, G.E., & Davidson, R.J. (1979). Low anxious, high anxious and repressive coping styles: Psychometric patterns and behavioral and physiological responses to stress. Psychophysiology, 88, 369-380.
- Zahn, T.P. (1975). Psychophysiological concomitants of task performance in schizophrenia. In M.L. Keitzman, S. Sutton, and J. Zubin (Eds.): Experimental Approaches to Psychopathology. New York, Academic Press Inc., pp. 109-131.
- Zahn, T.P., Carpenter, W.T. & McGlashan, T.H. (1981). Autonomic nervous system activity in acute

schizophrenia. I. Method and comparison with normal controls. Archives of General Psychiatry, 38, 251-259.

- Zigler, R., & Levine, T. (1981). Age of first hospitalization of schizophrenics: A developmental approach. Journal of Abnormal Psychology, 90, 458-467.
- Zajonc, R.B. (1980). Feeling and thinking: Preferences need no inferences. American Psychologist, 35, 151-175.
- Zuckerman, M., Libets, M.S., Koivumaki, J.H., & Rosenthal, R. (1975). Encoding and decoding nonverbal cues of emotion. Journal of Personality and Social Psychology, 32, 1065-1076.

**APPENDIX A**

**Questionnaires**

## Pupil Evaluation Inventory

Votre Nom: \_\_\_\_\_ Votre Numéro: \_\_\_\_\_

1. Ceux qui sont plus grands que les autres:

-----

2. Ceux qui aident les autres:

-----

3. Ceux qui ne sont pas capables de rester tranquilles:

-----

4. Ceux qui essaient de mettre les autres dans le trouble:

-----

5. Ceux qui sont trop timides pour se faire des amis  
facilement:

-----

6. Ceux qui se sentent trop facilement blessés:

-----

7. Ceux qui prennent des airs supérieurs et qui pensent  
qu'ils valent mieux que tout le monde:

-----

8. Ceux qui font les clowns et qui font rire les autres:

-----

9. Ceux qui commencent la chicane à propos de rien:

-----

10. Ceux qui ne semblent jamais s'amuser:

-----



11. Ceux qui sont bouleversés quand ils ont à répondre aux questions en classe:

-----

12. Ceux qui disent aux autres enfants quoi faire:

-----

13. Ceux qui sont d'habitude les derniers choisis pour participer à des activités de groupe:

-----

14. Ceux que tout le monde aime:

-----

15. Ceux qui s'empêtrent tout le temps et se mettent en difficultés:

-----

16. Ceux qui rient des gens:

-----

17. Ceux qui ont très peu d'amis:

-----

18. Ceux qui font des choses bizarres:

-----

19. Ceux qui sont vos meilleurs amis:

-----

20. Ceux qui ennuiement les gens qui essaient de travailler:

-----

21. Ceux qui se mettent en colère quand ça ne marche pas:

-----

22. Ceux qui ne portent pas attention au professeur:

-----

23. Ceux qui sont impolis avec le professeur:

-----

24. Ceux qui sont malheureux ou tristes:

-----

25. Ceux qui sont particulièrement gentils:

-----

26. Ceux qui se comportent comme des bébés:

-----

27. Ceux qui sont méchants et cruels avec les autres  
enfants:

-----

28. Ceux qui souvent ne veulent pas jouer:

-----

29. Ceux qui vous regardent de travers:

-----

30. Ceux qui veulent faire les fins devant la classe:

-----

31. Ceux qui disent qu'ils peuvent battre tout le monde:

-----

32. Ceux que l'on ne remarque pas beaucoup:

-----

33. Ceux qui exagèrent et racontent des histoires:

-----

34. Ceux qui se plaignent toujours et qui ne sont jamais contents:

-----

35. Ceux qui semblent toujours comprendre ce qui se passe:

-----

## Barbeau-Pinard Vocabulaire

Votre Nom: \_\_\_\_\_ Votre Numéro: \_\_\_\_\_

- \_\_\_\_\_ 1. CERISE: \_\_\_\_\_  
(fruit)
- \_\_\_\_\_ 2. LUNETTE: \_\_\_\_\_  
(instrument d'optique)
- \_\_\_\_\_ 3. FOURMI: \_\_\_\_\_  
(petit animal, insecte)
- \_\_\_\_\_ 4. FERMIER: \_\_\_\_\_  
(homme qui cultive la terre)
- \_\_\_\_\_ 5. DIAMANT: \_\_\_\_\_  
(pierre précieuse)
- \_\_\_\_\_ 6. CINEMA: \_\_\_\_\_  
(appareil ou salle de vues animées)
- \_\_\_\_\_ 7. LAC: \_\_\_\_\_  
(étendue d'eau)
- \_\_\_\_\_ 8. LIBRAIRIE: \_\_\_\_\_  
(magasin de livres)
- \_\_\_\_\_ 9. MOISSON: \_\_\_\_\_  
(récolte)
- \_\_\_\_\_ 10. TELEGRAMME: \_\_\_\_\_  
(message)
- \_\_\_\_\_ 11. FRACTURE: \_\_\_\_\_  
(rupture violente)

- \_\_\_\_\_ 12. CROCODILE: \_\_\_\_\_  
(animal, reptile)
- \_\_\_\_\_ 13. EPIDEMIE: \_\_\_\_\_  
(maladie qui se répand chez plusieurs individus)
- \_\_\_\_\_ 14. ETAU: \_\_\_\_\_  
(instrument pour serrer et tenir)
- \_\_\_\_\_ 15. BREVIAIRE: \_\_\_\_\_  
(livre du prêtre)
- \_\_\_\_\_ 16. AQUEDUC: \_\_\_\_\_  
(réservoir ou conduite d'eau)
- \_\_\_\_\_ 17. SEVE: \_\_\_\_\_  
(liquide des arbres)
- \_\_\_\_\_ 18. CHARDONNET: \_\_\_\_\_  
(oiseau)
- \_\_\_\_\_ 19. NUQUE: \_\_\_\_\_  
(arrière de la tête)
- \_\_\_\_\_ 20. POLICHINELLE: \_\_\_\_\_  
(genre de poupée)
- \_\_\_\_\_ 21. ZINC: \_\_\_\_\_  
(métal)
- \_\_\_\_\_ 22. GUET-APENS: \_\_\_\_\_  
(embûche)
- \_\_\_\_\_ 23. AMNESIE: \_\_\_\_\_  
(perte de mémoire)
- \_\_\_\_\_ 24. METAMORPHOSE: \_\_\_\_\_  
(transformation)

- \_\_\_\_\_ 25. EBENE: \_\_\_\_\_  
(bois précieux)
- \_\_\_\_\_ 26. BOUDDHISME: \_\_\_\_\_  
(religion fondée par Bouddha)
- \_\_\_\_\_ 27. ABBAYE: \_\_\_\_\_  
(monastère)
- \_\_\_\_\_ 28. PARRICIDE: \_\_\_\_\_  
(meurtrier de son père)
- \_\_\_\_\_ 29. JACINTHE: \_\_\_\_\_  
(fleur)
- \_\_\_\_\_ 30. THAUMATURGE: \_\_\_\_\_  
(qui fait des miracles)
- \_\_\_\_\_ 31. ERUDIT: \_\_\_\_\_  
(savant)
- \_\_\_\_\_ 32. SIMOUN: \_\_\_\_\_  
(vent chaud)
- \_\_\_\_\_ 33. POSTHUME: \_\_\_\_\_  
(après la mort)
- \_\_\_\_\_ 34. UTOPIE: \_\_\_\_\_  
(chimère)
- \_\_\_\_\_ 35. OBELISQUE: \_\_\_\_\_  
(monument égyptien)
- \_\_\_\_\_ 36. ARCHAISME: \_\_\_\_\_  
(tournure ancienne)
- \_\_\_\_\_ 37. DOLMEN: \_\_\_\_\_  
(monument druidique)

- \_\_\_\_\_ 38. DOGE: \_\_\_\_\_  
(chef d'anciennes républiques comme celle de Gênes)
- \_\_\_\_\_ 39. PINDARISME: \_\_\_\_\_  
(genre poétique Pindare)
- \_\_\_\_\_ 49. MUSCADIN: \_\_\_\_\_  
(pastille musquée, nom donné à certains  
personnages)

**Inventaire des Réactions Personnelles**  
(Social Desirability Scale)

Votre Nom: \_\_\_\_\_ Votre Numéro: \_\_\_\_\_

Voici quelques phrases portant sur des attitudes et des opinions personnelles. Lis chaque phrase et décide si elle exprime quelque chose qui est VRAI ou FAUX pour toi.

- |    |   |      |      |
|----|---|------|------|
| 1  | Je n'hésite jamais à offrir mon aide à une personne en difficulté.                                  | Vrai | Faux |
| 2  | Parfois, je trouve ça difficile de continuer mon travail si l'on ne m'encourage pas.                | Vrai | Faux |
| 3  | Je n'ai jamais détesté quelqu'un.   | Vrai | Faux |
| 4  | J'ai déjà eu peur de ne pas pouvoir réussir dans la vie.  | Vrai | Faux |
| 5  | Des fois, ça m'irrite quand les choses ne se passent pas comme je le voudrais.                      | Vrai | Faux |
| 6  | Je prends toujours soin de ma tenue vestimentaire.  | Vrai | Faux |
| 7  | Je me conduis aussi bien à table à la maison qu'au restaurant.                                      | Vrai | Faux |
| 8  | S'il m'était possible d'entrer au cinéma sans payer et sans être vu(e), je le ferais probablement.  | Vrai | Faux |
| 9  | Il m'est arrivé quelques fois d'abandonner un ouvrage parce que je ne me pensais pas assez bon(ne). | Vrai | Faux |
| 10 | J'aime bien commérer de temps en temps.   | Vrai | Faux |
| 11 | J'ai déjà eu envie de m'en prendre  | Vrai | Faux |



	à des personnes d'autorité, même si je savais qu'elles avaient raison.		
12	Peu importe avec qui je suis, je sais toujours bien écouter.	Vrai	Faux
13	Je me souviens d'avoir fait semblant d'être malade pour éviter quelque chose.	Vrai	Faux
14	J'ai déjà profité de la bonne volonté de quelqu'un.	Vrai	Faux
15	J'ai toujours été prêt(e) à reconnaître mes erreurs.	Vrai	Faux
16	J'essaie toujours de mettre en pratique ce que je dis.	Vrai	Faux
17	Je peux m'entendre avec tout le monde, même avec les gens prétentieux et désagréables.	Vrai	Faux
18	Je suis parfois porté(e) à prendre ma revanche sur quelqu'un plutôt que de pardonner et oublier.	Vrai	Faux
19	Je ne suis pas gêné(e) de reconnaître mon ignorance sur certains sujets.	Vrai	Faux
20	Je suis toujours poli(e), même envers les gens qui ne le sont pas.	Vrai	Faux
21	J'ai parfois insisté fortement pour que les choses se fassent à ma manière.	Vrai	Faux
22	J'ai déjà eu le goût de détruire des choses.	Vrai	Faux
23	Je ne pourrais pas supporter l'idée de laisser quelqu'un se faire punir à ma place.	Vrai	Faux
24	Ca ne me dérange pas de rendre un service à quelqu'un qui m'en a déjà rendu un.	Vrai	Faux
25	Je ne suis pas agacé(e) quand on	Vrai	Faux

exprime des opinions très  
différentes des miennes.

- |    |  |      |      |
|----|--|------|------|
| 26 | Il m'est déjà arrivé d'être jaloux(se) de la chance des autres.                          | Vrai | Faux |
| 27 | J'ai très rarement eu envie de chicaner quelqu'un.                                       | Vrai | Faux |
| 28 | Parfois, ça m'achale quand on me demande des faveurs.                                    | Vrai | Faux |
| 29 | Je ne me suis jamais senti(e) puni(e) sans raison.                                       | Vrai | Faux |
| 30 | Je suis parfois porté(e) à croire que les gens malchanceux n'ont que ce qu'ils méritent. | Vrai | Faux |
| 31 | Je n'ai jamais volontairement dit quelque chose pour faire de la peine à quelqu'un.      | Vrai | Faux |
| 32 | Avant de voter, j'examine en détails les qualifications de tous les candidats.           | Vrai | Faux |
| 33 | Je ne fais jamais un grand voyage sans vérifier la sécurité de mon automobile.           | Vrai | Faux |

**APPENDIX B**

**Consent Form**

## Appendix B

## Formulaire de consentement

J'accepte de participer à une étude du projet "L'individu dans son milieu". On me demandera de répondre verbalement et par écrit à plusieurs questions.

On enregistrera mes réactions physiques (battement de coeur, température des doigts) au moyen de petits collants qu'on placera sur ma peau. On me fera regarder des vidéos.

Cette série de procédure ne provoque aucune douleur et ne comporte aucun risque pour ma santé.

Toutes les informations obtenues à mon sujet seront absolument confidentielles.

Je recevrai une somme de \$40.00 (quarante) pour ma participation. Je suis libre d'arrêter de participer à cette étude à n'importe quel temps.

Je \_\_\_\_\_ comprends clairement et j'accepte  
(Nom en majuscules)  
les conditions de ma participation à cette étude.

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(j) (m) (a)  
(Date)

Département de psychologie

Expérimentatrice: \_\_\_\_\_

**APPENDIX C**

**Corrections for Statistical Analyses**

## Appendix C

Subjective variables

The significant skewness observed on these variables was due to two outliers. One Aggressive-Withdrawn and one Control subjects obtained a  $Z$  score greater than three standard deviations from the mean (3.33, 3.12 respectively). These scores were pulled to within one unit of the most extreme score in the distribution as recommended by Tabachnick and Fidell (1989, p. 71). Score changes eliminated the skewness.

Physiological variables

The significant skewness observed on these variables was due to six outliers identified in three cells of the design (Female Aggressive and Aggressive-Withdrawn; Male Withdrawn). As recommended by Tabachnick and Fidell (1989, p. 71) when outliers could be pulled to within one unit of the next most extreme score in the distribution, the score was changed. Score changes reduced variable skewness but did not eliminate it. Because the degree of skewness was mild for all variables and consequently would not affect the results of the analyses, no transformation was applied to the skewed distributions.

Expressive variables

There was no outlier on RVA and all distributions were normal. For the variable NRT (# of runs) the distributions for all groups were skewed in the same direction for all cells of the design and for about the same degree. Under such circumstances, no transformation was applied since it would have failed to yield change in the results (Tabachnick and Fidell, 1989, p. 71).