THE DIFFERENTIAL EFFECTS OF COGNITIVE PREPARATION AND SELF-INSTRUCTIONAL TRAINING ON COPING WITH THE STRESS OF FLYING

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ABSTRACT

The effectiveness of two cognitive coping strategies, singly, and in combination, were investigated using 56 undergraduate females with a reported fear of flying. Subjects assigned to four groups: Cognitive preparation training, Self-statement training, Combination (Cognitive preparation and Self-Talk), and Pseudo-treatment control were flown on two consecutive "Short Take-Off and Landing" flights. One-half of the subjects flew with the door to the cockpit open, the other half flew with the door closed. Each flight encountered a planned unexpected missed landing approach. Self-reports of anxiety were obtained before take-off, during the flight, and after landing. It was found that while the cognitive coping strategies were not differentially effective in reducing anxiety during the on-going stress of flying, under serious threat (unexpected event), with cockpit door open, self-statement training and combined training tended to be effective in coping with this additional stress. With the door closed all groups increased in anxiety. At final landing, with door closed, self-statement trained subjects increased in self-reported anxiety. Post-experimental debriefing and 4-1/2 month follow-up were conducted and revealed that all subjects with cognitive coping strategies, regardless of flight conditions, except cognitive preparation (door-closed) significantly decreased in flight apprehension from pretraining levels. The results suggested that the possession of a variety of cognitive coping strategies would be most effective in coping with unexpected stressors as well as for long-term reduction of flight apprehension.

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CURRICULUM STUDIORUM

Julius A. Roehl was born November 17, 1937, in Redfield, South Dakota, U.S.A. He received the Bachelor of Arts degree (cum laude) from Wartburg College, Waverly, Iowa, in 1959. He obtained the Master of Science degree (magna cum laude) from Florida State University, Tallahassee, Florida, in 1962. The title of his thesis was _Marriage Role Expectations of Catholic Adolescents_. In 1965 he was awarded the Master of Divinity degree from Wartburg Theological Seminary, Dubuque, Iowa. The title of his thesis was _Leisure, Recreation and Religion: Implications for Ministry_.

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CHAPTER I

INTRODUCTION AND REVIEW OF THE LITERATURE

The central role of cognitive processes in the perceived experience of stress and the subsequent implementation of coping processes has received increasing emphasis in the last decade. To relate how cognitive variables influence the experience of stress, the concepts of appraisal and reappraisal have been proposed (Arnold, 1960, 1967, 1970). Further, Schachter and Singer (1962) concluded that "cognitive factors appear to be indispensable elements in any formulation of emotion" (p. 398). It has also been suggested by McGrath (1970) that stress does not exist in an imbalance between objective demand and the response capabilities of the organism, but rather in an imbalance between perceived or subjective demand and perceived response capability. He has further stated, "This view makes the cognitive appraisal of a demand-capability imbalance the necessary and sufficient condition for 'threat' or 'psychological stress'" (p. 15).

One of the most cogent descriptions of cognitive factors has developed from the research of Lazarus and Averill (1972). The term appraisal has been employed to indicate the cognitive or psychological mediators which occur between antecedent conditions and subsequent coping response outcomes:

> Three formal kinds of appraisal processes may be distinguished: primary appraisal, secondary appraisal, and reappraisal. Primary appraisal refers to the judgment that a situation is relevant or irrelevant, or that it will have a beneficial or harmful outcome. Secondary appraisal is a judgment about the forms of coping available for mastering anticipated harm, or for facilitating potential benefits. Reappraisal involves changed evaluations based on new cues, feedback from one's response or the effects of the response, or further reflection about the evidence on which the original appraisals were based. (p. 242)

A number of other writers have also offered analogous explanations of the cognitive factors in the coping process (Ax, 1964; Glass & Singer, 1972; Mandler, 1962; Schachter, 1966).

Studies of Cognitive Variables in Perceived Stress

Studies, which have been conducted primarily through laboratory research, have generally investigated cognitive variables in terms of (a) the interaction between arousal and cognitive factors, (b) the role of distraction, and (c) the effect of perceived control over aversive stimuli.

The interaction between arousal and cognitive factors has been researched by Schachter and his colleagues (Nisbett & Schachter, 1966; Schachter & Singer, 1962; Schachter & Wheeler, 1962). Their early findings showed that the different states of euphoria or anger could be produced by cognitive manipulations. Subsequently it was shown that the label an individual attached to his experience of physiological arousal could affect the type of emotion experienced as much as the physiological arousal itself.

Kanfer and Goldfoot (1966) found evidence that distraction was effective in the reduction of stress. They concluded that subjects given external distraction (viewing travel slides) tolerated an aversive event better than those without a distractor or those told to focus on the event itself. Similarly, the strategy of "avoidant thinking" (focusing attention on a neutral or pleasant stimulus rather than on a stressful stimulus) was found more effective for subjects confronted with an unambiguous stressor (shock) than the strategy of "situation redefinition" (reappraisal) (Burish, Blomm, Houston & Holmes, 1975).

Numerous studies have explored the relationship between perceived control and stress tolerance. An extensive review of the literature outlining the complexities of the research on perceived personal control was compiled by Averill (1973). He distinguished three types of personal control: behavioral, cognitive, and decisional, and defined cognitive control as "the processing of potentially threatening information in such a manner as to reduce the net long-term stress and/or the psychic cost of adaptation" (p. 293).

It has been shown that when subjects, rather than the experimenter, control application of shock, it was both less anxiety-arousing as well as preferred by the subject (Pervin, 1963). Other researchers concluded that impending aversive stimuli were rated less stressful when subjects were led to believe they had some control over onset and offset of the stimuli (Bowers, 1968; Corah & Boffa, 1970; Geer, Davison & Gatchel, 1970; Geer & Maisel, 1972; Singer & Friedman, 1969; Hokanson, DeGood, Forrest & Brittain, 1971; Houston, 1972; Kanfer & Seidner, 1973; Staub, Tursky & Schwartz, 1971). Conversely, when subjects did not perceive a sense of control and were faced with an unpredictable aversive event a sense of "learned helplessness" was observed (Seligman, Maier & Solomon, 1969; Thornton & Jacobs, 1971).

The element of temporal certainty vs. uncertainty in stress and coping was investigated by Monat, Averill and Lazarus (1972). It was found that when the subject knew exactly when the aversive event would happen, regardless of how certain or uncertain he was that it would occur, his thoughts turned increasingly toward vigilant examination of the anticipated event as it became increasingly imminent. This increased vigilance was accompanied by an increase in arousal. On the other hand, when there was temporal uncertainty, the person's thoughts turned toward avoidant-coping strategies, with progressively lowered levels of arousal.

The research reviewed to this point has shown the interaction between arousal and cognitive variables, the differential effects on the perception of stimuli and the stress response as a result of the direct manipulation of cognitions, the effectiveness of a distractor in reducing stress, and the reduced stress when subjects are given a sense of perceived control over aversive stimuli. Further support for the importance of cognitive variables in perceived stress may be found in the studies devoted to investigation of the role of cognitive preparation.

Studies of Cognitive Preparation in Modification of Stress

The concept of "preparatory communication" was derived from a study by Janis, Lumsdaine and Gladstone (1951). These authors investigated the impact of a major "bad news" event which was modified by preparatory communication presented four months previously. It was found that the preparatory communication reduced the psychological impact of the "bad news" event when it actually occurred, and it was suggested that the intensity of fear evoked by a stressful event could be reduced by prior exposure to a "preparatory communication" that predicted the event.

On the basis of further field studies of surgical patients and retrospective reports of students who had recently undergone surgery, Janis (1958, 1971) postulated a curvilinear relationship between preoperative fear and post-operative adjustment. Both high and low anticipatory fear resulted in poorer post-operative adjustment while a moderate level of anxiety before surgery was found predictive of more adequate post-surgical adjustment. It was proposed that persons who faced severe stress could be "emotionally inoculated" if given preparatory communications which "give a detailed factual account of the outstanding perceptual experiences that are most likely to occur, concentrating especially on vague and ambiguous events that are most likely to be misinterpreted" (1958, p. 369-370).

A key postulate underlying Janis' hypotheses is the "work of worrying." The "work of worrying" is assumed to begin as soon as an impending potential threat to the self is perceived, and before the actual occurrence of a stressful event. Janis (1965) defined the "work of worrying" as a form of inner preparation increasing the tolerance level for subsequent threat. It was suggested that if the "work of worrying" was thorough, the reassurances the person gave himself would be more reality-based with the result that he could exercise greater emotional control when confronted by a stressor.

Worrying over a realistic threat with consequent averting of an anticipated real trauma, or coping with painful effects of an already experienced stressful situation, has been contrasted with "neurotic" worrying in that realistic worry leads to action and coping with the stressful situation, while "neurotic" worrying does not lead to "inner" mastery of the threat (Marmor, 1958). Janis (1958) also noted that neurotic worrying may lead to incomplete work of worrying due to hypervigilance with the consequent disruptive effects of distracting fantasies, imagining, general agitation and anger. Worry was conceptualized by Breznitz (1971) as an active process involving both a cognitive, reality-testing factor, and an anxiety factor. Breznitz (1967) used the term "incubation of threat" to account for the length of time between the onset of threat and its occurrence, and suggested that as the neurotic worrier became increasingly involved with the threatening and uncertain future he exhibited more anxiety.

The psychological functions that preparatory communications fulfill to successfully promote the "work of worrying" and achieve "emotional inoculation" can be summarized as follows:

> First of all, authoritative information or warnings about impending stressful events are needed in order to counteract the person's tendency to discount the potential danger situation and, thus to modify the person's attitude of complete personal

> invulnerability. . . . A second function . . . is to supplement the person's spontaneous protective measures by teaching him (a) what he can do to help ward off or minimize the objective danger (e.g. who he can call upon for help); and (b) what reassurances he can dependably count upon for reducing his fears at the times when the danger is actually at hand. . . . A third general function . . . is to facilitate reliance on the danger-control authorities. (Janis, 1958, p. 240)

The potential value of preparatory communication (cognitive preparation) to the work of worry and emotional inoculation has been suggested by a number of field studies with surgical patients (Andrew, 1970; Egbert, Battit, Welch & Bartlett, 1964; Healy, 1968; Janis, 1958, 1971; Lindeman & Van Aernam, 1971; Melamed & Siegal, 1975). These studies, however, do not clearly delineate the effects which might be attributable to information which led to emotional inoculation; or to information that was not solely preparatory, but was also repeated post-operatively; or to pain-relieving exercises that may have induced a sense of perceived control in the patient.

The curvilinear relationship between preoperative anxiety and postoperative adjustment postulated by Janis (1958) has been called into question by results from other studies of surgical patients (Cohen & Lazarus, 1973; Johnson, Leventhal & Dabbs, 1971; Levy, 1959; Vernon, 1967; Wolfer & Davis, 1970). In particular, Vernon and Bigelow (1974) found that informed patients seemed to focus more directly on problems relating to the operation, they were more prone to develop reassurances regarding the ability of medical personnel, and showed less episodes of post-operative anger; they did not differ from uninformed patients in a direct measure of worry (self-report of pre-operative fear on the day of surgery). It was suggested that cognitive preparation was not related to anticipatory fear and the consequent "work of worrying" as had been suggested by Janis (1958).

Reports of observations of men who had undergone the stress of combat have suggested the importance of prestress information. Grinker and Spiegel (1945) observed airforce flight crews and noted the amount of preparedness of the individual to react to stimuli specific to the combat situation was a factor in air crew adaptability. Haggard (1949) also concluded that preparatory information regarding a particular combat operation with its inherent risks yielded improved performance, decreased emotional breakdowns, and reduced friction between soldiers. Haggard noted that maximal protection against emotional stress could be attained if an individual experienced similar, but less extreme versions of the anticipated stress.

However, support of a more empirical nature for the role of cognitive preparation in coping with stress is evident from laboratory experiments. It was demonstrated that prior information affected the perception of a stimulus and, in turn, differentially varied the stress reaction elicited. It was found that viewers of a stressful film showed a reduced stress reaction when given information which stated that the primitive subincision rite was harmless (Lazarus & Alfert, 1964; Speisman, Lazarus, Mordkoff & Davison, 1964) or that the injuries seen in an industrial accident were only the result of good acting and not real-life occurrences (Lazarus, Opton, Nomikos, & Rankin, 1965). Conversely, information that emphasized the harmfulness of the operation increased stress reactions in subjects (Speisman et al., 1964). Staub and Kellett (1972) concluded that preparatory information about characteristics of aversive stimuli and their effects, coupled with reassurances of the safety of equipment being used, could result in enhanced tolerance for stress. Conversely, Kanfer and Goldfoot (1966) suggested that preparatory information, by focusing attention on the subject's experiences, could enhance sensitivity to pain and decrease pain tolerance.

It has also been suggested from the literature on behavior therapy procedures that cognitive factors may be a common mediator of the observed behavioral changes elicited by these techniques. Using a modeling procedure, self-statements such as, "If the other client can do it, so can I" have been suggested by Geer and Turtletaub (1971) as mediators of changed behavior. Following flooding, some subjects have reported talking themselves out of feelings, while others reported they used self-statements such as "I'll show him (the therapist)" in order to increase stress tolerance during and after flooding (Marks, Boulougouris & Marset, 1971).

The evidence presented thus far reflects a sound empirical basis for the role of cognitive variables in moderating stress reactions. It was on this base that Meichenbaum and his colleagues conducted research aimed at enhancing treatment effectiveness by directly modifying self-statements. The results of the following investigations eventuated in the development of the self-instructional training procedure entitled "stress inoculation."

An elaboration of the aversive conditioning paradigm with shock contingent on self-statements, images, and thoughts that accompanied the act of smoking found that smoking behavior decreased most for those who were taught to attend to their covert verbalizations (Steffy, Meichenbaum & Best, 1970). Another study with snake phobics compared a mastery model and a coping model and found that the coping model (who used self-statements throughout the task) facilitated the most change in observer behavior, as well as effected the greatest reduction in self-reported fear (Meichenbaum, 1971).

An "insight" procedure based on Rational-Emotive Therapy (Ellis, 1962) (which emphasized making subjects aware of the irrational anxiety-producing self-statements they emitted in interpersonal situations and provided a method to produce incompatible self-statements and incompatible behaviors) was found to be as effective as desensitization in the reduction of speech anxiety. It was further shown that the "insight" procedure was most effective with clients who experienced anxiety in many interpersonal situations, while desensitization was most effective for those whose speech anxiety was confined to formal speech situations (Meichenbaum, Gilmore & Fedoravicius, 1971). The effectiveness of cognitive modification through the acquisition of positive coping self-statements has received further support from the results of studies with hyperactive children (Meichenbaum & Goodman, 1971), test-anxious adolescents (Meichenbaum, 1972; Wine, 1971), and hospitalized schizophrenics (Meichenbaum & Cameron, 1973).

The evolution of stress inoculation training from behavior therapy techniques has been traced and attention will now be directed to the specific studies which developed stress inoculation training.

Studies of Stress Inoculation Training in the Management of Stress

Meichenbaum and Cameron (1972) reported on the specific development of stress inoculation training as a coping with stress technique in three experiments. The first study compared anxiety relief conditioning (Wolpe & Lazarus, 1966) with a self-instruction rehearsal group and waiting list control group in the reduction of the fear of snakes. The anxiety relief treatment procedure involved pairing the client's coping self-statements ("relax, calm") with the offset of electric shock, and was shown to be superior to rehearsal and waiting list control groups. The second experiment examined the efficacy of an elaborated anxiety-relief paradigm in which the client made negative self-statements prior to shock onset and followed this with positive coping self-statements (e.g., "Relax, I can touch it, I'm in control") which was paired with shock offset. As well, an inverted anxiety relief procedure was added to assess the conditioning aspects of the anxiety relief paradigm. It was found that although exposure to the stressor of electric shock enhanced the efficacy of the treatment, the contingency of shock was unimportant. The results indicated that the two most important elements in observed behavior change were: (a) the rehearsal of coping self-statements, and (b) practice using these self-statements in an actual stress situation. These results suggested that phobic clients might be taught general skills for coping with stress. This training would then have as its ideal goal "to 'inoculate' the client against stress (i.e. to have him acquire skills which would enable him to deal with stress in general and his phobias in particular)" (Meichenbaum & Cameron, 1972, p. 3).

The third study tested a stress inoculation training procedure to treat clients phobic to laboratory rats and harmless snakes. Results indicated that stress inoculation was most effective in reducing avoidance behaviors and yielded the most generalization of the treatment procedure. Systematic desensitization was effective in reducing fear only to the desensitized object with minimal treatment generalization to the nondesensitized object. On the other hand, both self-instructional procedures showed generalization. It was suggested that training subjects "to emit a set of coping self-statements which can be used as responses across stressful situations will likely enhance treatment generalization" (Meichenbaum & Cameron, 1972, p. 27).

In order to provide the reader with further information about stress inoculation training it will be described in greater detail at this point. Stress inoculation training procedure was designed to accomplish three goals: (1) to educate subjects about the nature of stressful reactions; (2) to rehearse various coping behaviors; and, (3) to practice newly acquired coping skills in a stressful situation. The educational phase consisted of a discussion of the client's fears, how he felt, what he thought about when confronted by phobic objects, and how he was currently coping with stressors in general, and his phobias in particular. The client was given an explanation of emotional arousal in terms of a Schachterian model. The therapist presented two central elements: (a) heightened arousal (heart-rate increase, sweaty palms, increase in respiration, etc.), and (b) anxiety-engendering thoughts and self-statements (disgust at sight of phobic object, panicky thoughts, desire to run, etc.). The researchers noted that this explanation was used because it had face validity and helped subjects understand the treatment procedure. The subject was then given practice in controlling arousal by means of relaxation and slow deep breathing. Emphasis was placed on the latter because of its effect on heart rate and accompanying experience of anxiety.

The rehearsal phase, or self-instructional training phase, involved practice in rehearsing self-statements to cope with stress. The first step involved training the subject to view his stress reaction not as a massive panic reaction, but rather as a series of phases. Four phases were suggested: preparing for a stressor, confronting or handling a stressor; possibly being overwhelmed by a stressor; and finally reinforcing oneself for having coped. The subject was encouraged to offer examples of coping self-statements he could use during each phase. For three sessions subjects practiced self-statements, progressing from overt to covert rehearsal. This was done in conjunction with muscle relaxation and slow deep breathing exercises.

The final phase involved practicing with coping skills under stressful conditions. Unpredictable shock was employed as the stressor in practice sessions. In each session the subject received 10 one-second shocks ranging in intensity from .5 milliamps to 3 MA, with one minute between trials. Before shock trials began, the therapist modelled using coping skills. The subject then rehearsed his coping strategies with overt self-instruction progressing to covert self-talk.

In a further development of stress inoculation training, subjects were presented a "cafeteria-like" variety of cognitive coping strategies to be employed when confronted with a stressor. It was found that subjects who used these coping techniques showed increased ability to tolerate pain, and reported lower levels of perceived pain intensity than subjects given only cognitive preparation without coping techniques (Turk, 1975).

A cognitive theory of self-control has been proposed by Meichenbaum (1975) as an explanation of the psychological mechanisms underlying the use of self-statements in coping with stress. He theorized that (a) self-instructions play a direct role in changing behavior analogous to that of Interpersonal Instructions; (b) self-instructions and images affect behavior through influencing attentional direction; and (c) self-instructions also influence a client's interpretation and experience of his physiological state.

Langer, Janis and Wolfer (1975) used a naturalistic setting (adult surgical patients) to compare two strategies for reducing stress, one by providing realistic information and reassurance without explicit coping strategies, and the other emphasizing cognitive control over potentially aversive events. In the first strategy, preparatory information was provided which consisted of the presentation of the simple facts concerning normal pre- and post-operative procedures. The anticipated pain and discomfort were made analogous to experiences common to everyone which were rarely accompanied by stress. Potential reassurances were given in the form of statements emphasizing the outstanding quality of hospital staff members (i.e., danger-control authorities [Janis, 1958]).

The second strategy trained patients in the use of a coping device which included: cognitive reappraisal of anxiety-provoking events and cognitive control through selective attention. Patients were told that most people are somewhat anxious before surgery, but that they can often control their own emotions if they know how to. Subjects were also told that stress is rarely caused by events themselves, but rather by the views people take of them and the attention they give to these views. By the employment of fantasy it was shown that subjects controlled the amount of stress they experienced. Patients were asked to find examples of apparently negative events from their own lives and generated positive alternative views of these events. An emphasis was placed on the positive aspects of undergoing surgery in a good hospital. It was suggested that the patient rehearse these positive aspects whenever he began to feel distressed about the surgical experience.

This research found that the cognitive coping device was more effective in coping with post-operative stress than information and reassurance. However, a group which received a combination of information and cognitive re-appraisal training showed the greatest percentage decrement in post-operative rated anxiety. A second finding appears to contradict the "work of worry" hypothesis of Janis (1958). It was found that preparatory information increased pre-operative anxiety, initially, as reflected in behavior ratings obtained from nurses and as would be anticipated from Janis' hypothesis. However, as indicated above, when post-operative assessments were made, information group subjects did not cope as well as those in the cognitive appraisal group. The authors suggested that while patients may have acquired more realistic conceptions of anticipated post-operative discomfort and may have spontaneously developed coping mechanisms, the "work of worrying" did not seem to take place and in fact subjects may have directed their attention to their experience of pain and discomfort. Thus it was concluded that focusing on anticipated stress may be less effective than directing attention elsewhere.

It should be noted that a portion of the study by Langer et al. (1975), as well as the field studies cited previously, utilized preparatory information in which the content transmitted was primarily factual and described the external situation (i.e., the nature of and reasons for standard pre-operative procedures, sequence of events, some physical side-effects from surgery, prediction of pain, etc.). In some approaches attention may have been directed to the competency of medical authorities in an effort to enhance the production of self-delivered reassurances. However, little or no attempt was made to provide the patient with information on how to specifically cope with his own feelings and thoughts--the cognitive components associated with a stressful situation.

Other studies raise the question whether preparatory communication leads in fact to the "work of worrying" and subsequent lessened anxiety and lowered arousal; or leads to mobilization of defenses of denial-avoidance or reaction-formation and a type of "emotional insulation"; or even leads to decreased stress tolerance because attention is focused directly upon the experience of stress; or results in some interaction of these depending upon task or situational variables.

The cognitive strategies required to cope with painful but harmless shocks, a hand in ice water, an arm with a tight blood pressure cuff, or a snake in a cage (all used as stressors in laboratory studies) may be different from the cognitive strategies required to cope with more naturally occurring stressful events. Laboratory stressors are generally more discrete than real-life stressors in terms of identifiability, duration and intensity, and less threatening to the person's future or survival. A real-life stressor (flying in an airplane for someone who is afraid) may combine the features of both laboratory stressors --in terms of discreteness, duration, and intensity, and field stressors--in terms of posing a perceived threat to a subject's future or survival.

Investigations of Components of Stress While Flying

While there are numerous studies which have investigated coping with the stress of flying, and while the majority of these studies have involved phobic populations, only two experiments conducted in a naturalistic setting are particularly germane to this study. These studies were selected because they reported responses to a simulated and a real emergency with implications for further study of cognitive preparation. Berkun, Bialek, Kern, and Yagi (1962) contrived stressful situations which met the criteria of (a) a cognigive stressor in which the essential element was the cognition where the subject "figured out" that he was in trouble, (b) clearly involved serious fear or guilt reactions, and (c) contained possibilities for observing performance during as well as after the stress. In one of the stressful situations the subjects in the experimental group were flown in an aircraft and exposed to a simulated emergency which would necessitate "ditching" into the ocean.

The experimental flying group, who were exposed to the emergency, decreased significantly in performance on a test of Arithmetic Reasoning, self-reported significantly more negative affect, and produced higher output of 17-hydroxycorticosteroids (as a physiological measure of stress) than did a flying group who were not exposed to the emergency.

Fenz and Epstein (1967) compared self-ratings of fear-avoidance for experienced and novice parachutists and found that in both groups the peak of anxiety occurred before rather than at the actual act of parachuting. Yet the peak of fear occurred earlier for the experienced parachutist with the result that the experienced parachutist jumped in a less anxious state. It was suggested that the early peak of fear may have adaptive consequences for the experienced parachutist in that it serves as an early warning signal to assist in preparing for the jump. Physiological evidence in the form of heart-rate indicated that both novice and experienced parachutists showed equal heart-rate increases until the time the aircraft was boarded. However, after this event the heart rate of novice jumpers rose continuously up to final altitude (before parachuting), while the heart rate of experienced parachutists tended to level off and even declined from the point of taxiing to the point of jumping when final altitude was reached.

The contribution of cognitive preparation is seen when the authors discuss this phenomenon:

> The early fear and arousal reactions demonstrated by the experienced parachutists and their corresponding early inhibitions have some interesting implications for the mastery of anxiety. The simultaneous expansion of gradients of anxiety and of inhibition, the latter with steeper slope, serves to generate earlier and earlier warning signals at reduced levels of intensity. Thus, the adaptive consequences of anxiety are retained while its disruptive potential is contained. The early warning signals provide an opportunity for dealing with the stressful situation in advance in small doses, and for establishing adequate defenses that need not be extreme. (Fenz & Epstein, 1967, p. 49)

Implications for the "work of worry" hypothesis (Janis, 1958) were also found in the same study which reported an unexpected development when experienced jumpers were confronted with an engine failure prior to reaching the scheduled final jumping altitude. "The jumpers froze, jumping only after a serious delay. Some of them later acknowledged that it was one of the most frightening jumps they had ever made. Apparently they were not able to mentally prepare themselves for jumping under different circumstances from those to which they were accustomed" (Fenz & Epstein, p. 49).

Recently it has been speculated that the acquisition of self-statements explicates the "work of worrying" (Janis, 1958) by conveying to the subject a sense of control over his own thoughts and feelings (Meichenbaum & Turk, 1975). This suggested relationship necessitates further investigation which this study explored in a naturalistic setting.

The stressor chosen for investigation in this study was flying. As a real-life stressor, flying offered many advantages over previous research in naturalistic settings by permitting the manipulation of at least four variables:

(1) Long-term exposure and short-term exposure to stress. Previous field studies have not assessed anxiety in response to both long- and short-term stress. In this study it was possible to monitor, at discrete points, the amount of anxiety aroused as well as the subject's mode of coping when exposed to basically two types of stressors (a) ongoing--which included extended periods of cruising, and (b) short-term--which included relatively discrete events such as Take-Off and Landing.

(2) Two-trial exposure to stress. In studies with hospital or dental patients, etc., assessments have been made on "one-trial" with one exposure to the anticipated stressor. This study uniquely exposed subjects to two trials (two flights) with the resultant distinct advantage of recording observations under conditions of repeated exposure to basically identical stressors.

(3) Cockpit area (and flight crew) open to view or closed. By the manipulation of the door to the cockpit (open or closed) it was possible to study cognitive variables associated with expectancy and unexpectancy, and perceived control while flying.

(4) Anticipated events vs. unexpected events. The maneuverability of the aircraft for Short Take-Off and Landing also made it possible to investigate variables of expectancy and unexpectancy by a planned unexpected event in each return flight.

Statement of the Problem and Hypotheses to be Tested

The purpose of the present experiment was (1) to test the generality and applicability of pertinent laboratory findings of cognitive components and cognitive coping strategies in a naturalistic setting--flying; and (2) to examine the efficacy of two cognitive coping-with-stress strategies on subjects exposed to manipulation of the above-mentioned variables related to flying (a) throughout exposure to an ongoing stressor, (b) at points of severe threat or peak-anxiety moments, (c) to assess throughout the differential effects of coping strategy or manipulation of flight variables, and (d) to assess the short-term and long-term consequences of these treatments.

Hypothesis 1. On the basis of evidence from previous investigations which showed the superiority of self-talk as a coping with stress strategy, in both the laboratory and field setting, it was predicted that positive coping self-talk alone would be more effective in coping with stress of flying than preparatory information alone, a combination of self-talk and information, or pseudo-treatment control group, as measured by self-report of anxiety during the flight, following the flight, and at follow-up.

Hypothesis 2. Since research has shown the efficacy of self-talk as a coping with stress strategy it was predicted that a strategy which included self-talk with additional preparatory cognitive information would be more effective as a coping strategy than preparatory information alone or pseudo-treatment control group as measured by self-report of anxiety during the flight, following the flight, and at follow-up.

Hypothesis 3. In light of the equivocal findings for the procedure of presenting preparatory information as a coping with stress strategy it was predicted that preparatory information would be more effective in coping with the stress of flying than no information at all in the pseudo-treatment control group as measured by self-report of anxiety during the flight, following the flight, and at follow-up.

Hypothesis 4. The manipulation of the cockpit door on the aircraft added another dimension of cognitive variables to be investigated. On the basis of research on temporal certainty and uncertainty it was inferred that the door closed would place subjects in a situation of temporal uncertainty regarding the occurrence of a stressor. In this condition subjects would not be able to respond to cues from the flight crew which might provide information as to when a potentially stressful event might occur. Thus it was predicted that subjects who flew with the cockpit door closed would respond with less anxiety than subjects who flew with the door open.

Hypothesis 5. Under the condition of being confronted with an unexpected stressor, with the cockpit door open, it was predicted that subjects who perceived a sense of personal control (self-talk, and a combination of self-talk plus information) or who perceived a sense of control from "danger-control authorities" (Janis, 1958) (Information) would manifest less self-reported anxiety than control group subjects.

Hypothesis 6. Further, under the condition of the cockpit door closed, and confronted with an unexpected stressor, it was predicted that subjects who could not perceive a sense of control from danger-control authorities (because the door was closed), or who were not trained (Control) would show a greater increase in anxiety than subjects who perceived a sense of personal control (self-talk and/or self-talk plus information).

Hypothesis 7. Since some studies have suggested that cognitive preparation led to an early warning signal or the "work of worrying" it was predicted that subjects given preparatory information training would show an initial increase in self-reported anxiety after the exposure to information in training when compared to other subjects who would show a decrease or no change in self-report of anxiety.

CHAPTER II

METHOD

The present experiment was concerned with examining the differential effectiveness of two cognitive coping strategies singly and in combination among persons with a fear of flying. Subjects were non-paid volunteers who reported significant amounts of apprehension about flying. On the day prior to the flight they were exposed to two hours of training.

All subjects were flown in Short Take-Off and Landing (STOL) aircraft from Ottawa to Montreal and returned to Ottawa the same day. The flight from Ottawa to Montreal (Trial 1) lasted approximately 45 minutes, while the return flight from Montreal to Ottawa (Trial 2) lasted approximately 47 minutes. One-half of all subjects experienced the flight with the door to the cockpit open. The other half of the subjects flew with the cockpit door closed. On all flights, prior to final landing in Ottawa, subjects experienced an unexpected event--a missed landing approach.

Assessments of subjective report of anxiety were made pre- and post-training, and preflight; as well as after boarding, but prior to take-off; on three occasions during 30 minutes of cruising; and, immediately following landing. The effectiveness of treatment manipulations was assessed by a post-experimental questionnaire. A tape-recorded post-experimental inquiry was also administered. A follow-up questionnaire assessed potential harmful effects from the unexpected event. Figure 1 depicts the nature of the events that took place following training on the day of the flight.

Subjects

Subjects were selected from undergraduates enrolled at Algonquin College, Carleton University, and the University of Ottawa. Following a set of standardized instructions (Appendix 1), read by the experimenter, a three-page "screening" questionnaire (Appendix 2) was completed by 1,526 students. For the purposes of this study, only the questionnaires of the 1,151 females were considered. Two hundred and eight questionnaires of those who had never previously flown in an airplane were eliminated. Of the remaining 943 females, 678 (72%) indicated a willingness to "participate in a study which would actually involve flying in an airplane." Ninety-two females were selected for consideration in the study. They had (a) previously flown, and (b) scored 6 or more on the Flight Apprehension Inventory (FLAPI) (see below).

The experimenter contacted potential participants by telephone. He read a standard statement (Appendix 3) designed to fix a time for meeting those subjects who volunteered. All flights were scheduled for Sunday and all subjects participated in training on Saturday. Thirty-four potential participants

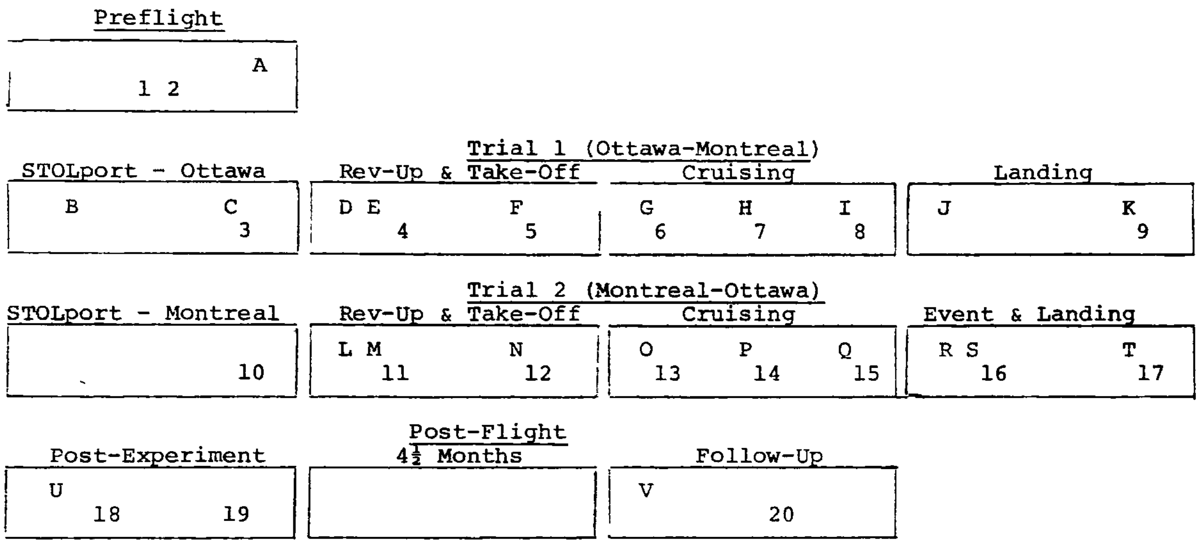

Figure 1. Events and Assessments following Training.

Assessments

1 SRAI
2 Flight Anticipation Scale
3 SRAI-STOLport-Ottawa
4 SRAI-Rev-Up 1
5 SRAI-Take-Off
6 7 8 SRAI-10, 20, 30 min. cruising periods
9 SRAI-Post-Landing
10 SRAI-STOLport-Montreal
11 SRAI-Rev-Up 2
12 SRAI-Take-Off
13 14 15 SRAI-10, 20, 30 min. cruising periods
16 SRAI-Unexpected Event
17 SRAI-Landing 2
18 PEQ-Post-Experimental Questionnaire
19 Post-Experimental Inquiry (Taped)
20 Follow-Up Questionnaire

Events

A Transport to STOLport
B Electrodes attached
C Electronic screening
D Boarding aircraft
E Pre take-off announcement
F Take-off
G H I 10, 20, 30 min. cruising periods
J Descent & landing
K Post-flight announcement
L Boarding aircraft
M Pre take-off announcement
N Take-off
O P Q 10, 20, 30 min. cruising periods
R Pilot's pre-landing announcement
S Unexpected event
T Landing 2
U Return to training site
V Follow-up letter to all subjects

were excluded because they were unavailable for Saturday and Sunday. A reminder phone call was made to each subject either Thursday or Friday evening prior to the weekend of the experiment. One subject who had been trained (Information group) telephoned the experimenter early Sunday morning and stated that she was ill and would not be able to fly that day.

The final sample was composed of 56 females.[1] They qualified on the basis of three selection criterion measures: (1) scored 6 or more on the FLAPI (M = 6.84), (2) had previously flown (M # of flights = 5.48), and (3) had not flown between Ottawa and Montreal via Airtransit (Short Take-Off and Landing). The age range of these 56 subjects was 18 to 34 with an average age of 21.

Apparatus

The aircraft and flight crew used in this study were supplied by Airtransit's STOL operation. The Short Take-Off and Landing (STOL) involves taking off and landing in a very short distance of approximately 1,500 feet. The STOL aircraft also climbs and descends at steeper angles than conventional aircraft (6 degree slope instead of the conventional 3 degrees). The aircraft was a DeHavilland Twin Otter with capacity for 11 passengers. All flights were flown by the same captain (pilot), while first officers (co-pilots) were rotated according to normal scheduling by the airline.

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[1]Subjects were not phobic in the clinical sense. While they reported flight apprehension, they were willing to actually fly in an aircraft.

In addition to the standard equipment for instrument flying, the aircraft was outfitted with a package of specialized avionics. The Air Data Acquisition System (ADAS) was of particular assistance to this study. ADAS data were collected on 43 performance parameters of the flight and recorded on magnetic tape. The data were analyzed by computer and graphic plots were obtained. Parameters charted included: altitude changes, engine torque, degrees of bank (left or right), and amount of pitch, roll and yaw.

Special attention was devoted to the parameter of Vertical Deviation. Vertical Deviation is a measure of the amount of changes in altitude (in feet) during flight. After consultation with flight engineers at Airtransit it was concluded that the single most comprehensive measure of encountered turbulence would be Vertical Deviation. On this parameter, the ADAS recorded four samples per second. A mean and standard deviation for every 128 samples (32 seconds of elapsed time) was computed. A computer printout of these calculations, across the entire 30-minute cruising period of every flight, was made available to the experimenter. Further description and results from instrument-rated turbulence will be reported in the results section.

Two minor modifications were made to the aircraft for this study. A set of headphones and hand-held microphone were installed at the rear of the cabin where the experimenter sat. This allowed communication between experimenter and pilot, and made it possible to instruct subjects to complete questionnaires during the flight. Also, a sliding door separating pilot area from passenger area was used under certain treatment manipulation conditions.

Procedure

Training

Subjects were randomly assigned to one of four training groups: (a) Information, (b) Self-Talk, (c) Combined (Information + Self-Talk), and (d) Pseudo-Treatment Control. Every group was composed of 14 subjects. Each subject received two hours of training on the Saturday prior to the Sunday flight. All subjects were instructed in groups ranging in size from two to five members. The number of subjects in each group as well as order of training is presented in Table 1.

The experimenter greeted all subjects when they arrived at the classroom. In order to standardize procedures, all instructions were pre-recorded and replayed on a tape recorder. All subjects heard the same introduction (Appendix 4). The experimenter instructed subjects not to disclose details of the experiment to anyone. Subjects were assured that their responses would be kept confidential and that no harm would be done to them in the normal course of the experiment.

Table 1

Order of Training and Number of Subjects per Group by Flight and Cockpit Door condition

Flight	Door	Training Group	No. of Subjects
1	Open	Self-Talk	5
		Information	5
2	Closed	Information	5
		Self-Talk	5
3	Closed	Combined	5
		Control	3
4	Open	Combined	5
		Control	5
5	Closed	Information	2
		Combined	2
		Self-Talk	2
		Control	4
6	Open	Information	3
		Combined	2
		Self-Talk	2
		Control	3

Following the introduction all subjects completed a series of three instruments. In order of administration they were: (1) Self-Report Anxiety Inventory (SRAI) (Appendix 5), (2) Flight Apprehension Inventory (FLAPI) (Appendix 6), and (3) Consent Form (Appendix 7).

Subjects were given motivational instructions to the effect that their ability to manage the stress of flying would be dependent upon how well they learned the coping strategy in the training session. Further, all subjects were told they would have electrodes attached for heart-rate monitoring.

Training continued with tape-recorded instructions. Every subject, in all training groups, interacted with the experimenter and contributed material which was recorded on the blackboard.

Information Training Procedure. A transcript of the instructions to the Information training group is included in Appendix 8. This procedure stressed the prior acquisition of information about potentially stressful events as a method for coping with stress. All subjects were instructed to share events in which they experienced anxiety. Subjects then contributed what knowledge they had about these anxiety-provoking events. The experimenter illustrated the effectiveness of prior information for test anxiety.

The tape was reactivated at the conclusion of this exercise and the effectiveness of the technique of acquiring information about an anticipated stressful situation was re-emphasized. The theoretical rationale and reports of Irving Janis were cited as evidence of the effectiveness of this training procedure.

Subjects received a detailed description of the events of the day of the flight. This description included: transportation to the airport, pre-boarding procedures, exterior and interior of the aircraft, training and experience of the pilots, take-off, cruising, and landing. Colored slides, provided by Airtransit, were shown at appropriate points in the presentation.

In order to control for time with the experimenter, the detailed description of the events was presented twice. The Information training procedure included giving subjects reassurances about the qualifications of the pilots and the presentation of information about normally anticipated events in the flight.

Self-Talk Training Procedure. The transcript of the instructions to the Self-Talk training group is included in Appendix 9. This procedure stressed the learning of positive self-statements as a method for coping with stress. All subjects were instructed to cite events in which they experienced nervousness or anxiety. The experimenter asked subjects to recall the negative thoughts that accompanied these stressful situations. Subjects were then asked to relate the reassurances they gave themselves when faced with those stressors.

The tape was reactivated following this exercise and a brief theoretical explanation of anxiety, comprised of physical and cognitive components, was presented. The device of taking a slow, deep breath was presented as being effective in coping with the physical component of anxiety while evidence of the effectiveness of self-talk for coping with the cognitive component of anxiety was cited from the theoretical rationale and reports of Albert Ellis and Donald Meichenbaum. The experimenter modelled writing an exam using negative self-statements and feeling anxiety as cues for emitting positive coping self-statements. Following this, subjects were given a prepared list of coping self-statements (Appendix 10). They were also instructed to imagine a stressful situation and to prepare their own list of coping self-statements. At the conclusion of a 10-minute session, subjects were retested on their recall of the self-statements.

In order to review and consolidate the training procedure, the fantasy of an imaginary horseback ride, for a person who was fearful of horses, was employed to provide practice and rehearsal in emitting the recently acquired self-statements. Following this exercise, subjects compiled a list of self-statements to be used while flying on Sunday. Each individual shared their self-statements with the group. Subjects were instructed to rehearse coping self-talk between the end of the training session and the flight on Sunday.

Combined (Self-Talk + Information) Training Procedure. This training procedure was comprised of a combination of Self-Talk and Information procedures. In order to control for equal time with the experimenter the Information procedure was presented once, followed by the entire Self-Talk procedure.

Pseudo-Treatment Control Training Procedure.[2] A trancript of the instructions given to the Pseudo-Treatment Control group is included in Appendix 11. This procedure stressed the knowledge of the history of aviation as helpful in coping with the stress of flying. All subjects were instructed to recall situations in which they experienced anxiety or nervousness. Subjects shared with the group how they "felt" and what they "thought" when in those stressful situations. The experimenter then instructed subjects to express their feelings about flying. Ventilation of affect related to these fears was the only psychological process permitted in reacting to these expressed fears.

Three films were shown. A description of the films (National Film Board Catalogue, 1975), in the order in which they were shown, is included in Appendix 12. Subjects completed a modified self-report anxiety inventory after each film (Appendix 13), in which they were asked to rate how they "felt while watching the film you just saw." Each subject was instructed to relate to the group what they liked least and most about each film. This procedure was designed to control for time with the experimenter and interaction

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[2]This procedure might also be considered an information group. However, they were not provided information relevant to coping with the forthcoming flight.

with the group while appearing to be a treatment with some face validity.

All subjects in the four groups were given specific instructions and practice with the Self-Report Anxiety Inventory which would be utilized the following day. The transcript of this portion of the training is contained in Appendix 14. In order to assure that subjects from different training groups, who would be on the same flight, would not exchange information about the flight events or coping devices, subjects were instructed not to talk to each other at any time during the bus ride to the airport, while at the STOLport, or during the flight.

Flight Procedures

Preflight and Preboarding. All subjects scheduled for the day of the flight met at the training site at 9:15 a.m. Two questionnaires were completed, in this order: (1) Self-Report Anxiety Inventory (SRAI) (Appendix 5), and (2) Flight Anticipation Scale (Appendix 15), which was identical to the SRAI except for instructions which stated, "How you have been feeling since yesterday afternoon in anticipation of the flight today."

Subjects left the training classroom together with the experimenter for the STOLport. At the STOLport electrodes were attached to the wrists and left ankle of the subjects for heart-rate monitoring. Appendix 16 describes in detail the apparatus used for this procedure. Following this, all subjects passed through the standard electronic screening and completed the SRAI.

Trial 1 (Ottawa-Montreal). Groups were randomly assigned to one side or the other of the cabin. Within these groups subjects were randomly assigned their seats. This procedure was followed in order to avoid possible social comparison processes between members of the same training group. Each subject was given an Arch-File clipboard with a packet of sealed questionnaires. The heart-rate leads were connected to the Converter by the experimenter or his assistant.

Prior to take-off the captain made the standard pre-take-off announcement (Appendix 17). For Flights 2, 3, and 5 the door to the cockpit was closed, while it remained open for Flights 1, 4, and 6; that is, subjects flew both trials in either a door-open or door-closed condition. The aircraft followed standard approach and landing procedures in Montreal after a flight duration of 45 minutes. One variation from normal procedures occurred on the fourth weekend. In Flight 4 a landing did not take place in Montreal because crosswinds on the runway exceeded safety limits of the aircraft.

Self-Report of Anxiety Assessments. Self-Report measures of anxiety were obtained at six points during the flight from Ottawa to Montreal (Trial 1): (1) Rev-Up (Appendix 18)--after seat belts were fastened and before engines were started, (2) Take-Off (Appendix 19)--four to five minutes after take-off, when the aircraft reached cruising altitude, (3) Cruising 1 (Appendix 20)--after 10 minutes of cruising, (4) Cruising 2 (Appendix 20)--after 20 minutes of cruising, (5) Cruising 3 (Appendix 20)--after 30 minutes of cruising, and (6) Landing 1 (Appendix 21)--immediately upon landing and while taxiing to the terminal.

Trial 2 (Montreal-Ottawa). All subjects completed an SRAI prior to reboarding. After reboarding, the experimenter connected the HR leads to the Converter and the same procedure used in Ottawa was repeated prior to departure in Montreal. Normal take-off, cruising altitudes, flight paths, and approach procedures were followed on all flights. Flying time averaged 47 minutes.

On the return trip all flights included an unexpected event--a standard missed approach. This event occurred as follows:

(1) As the plane made its final approach into Ottawa the captain read the standard announcement prior to landing (Appendix 17).

(2) The aircraft descended in a normal landing pattern to an altitude of 100 feet.

(3) A stall warning horn sounded in the cockpit.

(4) The pitch of the propellors was changed and full power was applied to the engines.

(5) The nose of the aircraft rose abruptly.

(6) The aircraft climbed steadily to an altitude of 2,000 feet.

(7) The captain explained, "We apologize for the missed approach. A light aircraft taxied onto the runway without authorization from the control tower. We will be landing in about five minutes."

(8) The experimenter announced that he "wanted to take advantage of this situation and record reactions on additional questionnaires," which were distributed at that time.

(9) Standard approach and normal landing procedures terminated the flight.

Self-Report of Anxiety Assessments. Measures of self-reported anxiety were obtained at seven points during the flight from Montreal to Ottawa (Trial 2): (1) Rev-Up (Appendix 18)--after seat belts were fastened and before engines were started, (2) Take-Off (Appendix 19)--four to five minutes after take-off, when the aircraft reached cruising altitude, (3) Cruising 1 (Appendix 20)--after 10 minutes of cruising, (4) Cruising 2 (Appendix 20)--after 20 minutes of cruising, (5) Cruising 3 (Appendix 20)--after 30 minutes of cruising, (6) Unexpected Event (SRAI)--after the missed landing approach, (7) Landing 2 (Appendix 21)--immediately upon final landing and while taxiing to the terminal.

Fifteen to 30 minutes after landing all subjects and the experimenter were transported by shuttlebus to the training site. All subjects completed a Post-Experimental Questionnaire (PEQ) (Appendix 22). The experimenter also conducted a Post-Experimental Inquiry where a series of previously prepared open-ended questions were read out loud

(Appendix 23). Responses to the Inquiry were tape-recorded. All subjects were thanked as a group for their participation and were instructed not to disclose the nature of their training or the experiment to anyone.

Dependent Measures

Flight Apprehension Inventory (FLAPI). This instrument served as the major screening device for selection of subjects. The FLAPI (Appendix 6) is a single bipolar scale of 11 points. Potential participants rated their degree of flight apprehension ("How you usually feel while flying in an airplane") on the scale ranging from "very calm, relaxed" at one end to "very nervous, tense" at the other. In order to assess the stability of the instrument, a test-retest reliability estimate was obtained from 62 of the possible participants who were not selected as subjects. A test-retest reliability coefficient (Pearson r) of .87 was obtained.

Standard scores were computed to determine whether a score of 6 or higher was representative of an extreme score on the FLAPI. In the distribution of all females screened which had a mean of 3.0 and a standard deviation of 2.28, the score of 6 may be expressed as a z score of 1.29. This corresponds to an area under the normal curve of .0985. Therefore it was concluded that subjects selected for participation in this study (a score of 6 or above on the FLAPI) represented the upper 10% in self-rated flight apprehension of the total female population (943) originally screened.

Self-Report Anxiety Inventory (SRAI). The Self-Report Anxiety Inventory (SRAI) (Appendix 5) was utilized as a criterion measure of anxiety. Composite mean anxiety scores were obtained throughout the study with this instrument. The SRAI consists of four 11-point scales anchored at each end. The decision to use these scales was based on previous research (cf. Girodo, 1974) which demonstrated the utility of the scales in assessing anxiety. The SRAI was designed to measure two components of anxiety (cognitive and somatic) after the symptom clusters of Buss (1966). Two scales measured cognitive components of anxiety through self-evaluation of (a) worry and apprehension and (b) anxiety and nervousness. Similarly, two scales measured somatic components of anxiety through self-evaluation of (a) calmness and relaxation and (b) tenseness and trembling.

The four individual scales were correlated with composite anxiety scores. Statistically significant correlation coefficients were obtained ranging from .89 to .97. Inter-scale correlations were also computed and found statistically significant ranging from .79 to .97. Table 2 summarizes these Pearson r results. To assess the internal consistency of the SRAI,scores of all 56 subjects on dependent measures taken during the flight experience were divided in an "odd-even" manner (i.e., "odd" = Rev-Up, "even" = Take-Off, etc.). Using the Flanagan formula a split-half estimate of reliability (internal consistency) of .97 was obtained.

Table 2

Pearson Correlation and Intercorrelation Coefficients on SRAI Total Score with Individual Scale Scores

	SRAI total	Individual Scales			
		Calmness	Worry	Anxiety	Tenseness
SRAI total	-				
Calmness	.95*	-			
Worry	.97*	.93*	-		
Anxiety	.97*	.92*	.97*	-	
Tenseness	.89*	.79*	.86*	.85*	-

df = 54
**p* < .001
All tests: two-tailed

Flight Crew Rating of Turbulence.[3] Two rating scales were devised to obtain estimates of turbulence from the flight crew (Appendix 24). Flight crews were asked to rate "How much turbulence was encountered this flight" on an 11-point scale anchored by "none" (0) at one end and "extreme amount" (10) at the other, as well as to rate turbulence on a 7-point scale with adjectives under each numeral ranging from "none" (1) to "extreme amount" (7). The first officer and captain on each flight completed these scales immediately after landing in Montreal and again after landing in Ottawa. Ratings of the flight crew were compared with instrument-rated turbulence (Vertical Deviation) and no significant correlations were obtained for Trial 1 (Ottawa-Montreal) $r(36) = .001$, or Trial 2 (Montreal-Ottawa) $r(36) = .26$.

Measure of Treatment Effectiveness. An 8-item Post-Experimental Questionnaire (PEQ) (Appendix 22) was devised to check on the effectiveness of treatment manipulations. The questionnaire was divided into three parts. Section 1 was designed to measure the effectiveness of self-statements in coping with the stress of flying. Subjects were asked to: (a) list the self-statements they emitted during the flight, (b) indicate the percentage of time self-talk was utilized, (c) rate the effectiveness of self-talk as a coping device on an 11-point scale ranging from "not at all helpful & useful" at one end to "very helpful & useful" at the other end. Section 2 was designed to measure the effectiveness of

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[3]This rating was to be used as a dependent variable in a covariate analysis, if turbulence was seen to affect SRAI scores.

information as a coping device. Subjects were asked to: (a) indicate if they had spent any time in worry or anticipation of the flight, (b) estimate the percentage of time they spent anticipating the flight, (c) rate the effectiveness of information as a coping device on an 11-point scale ranging from "not at all helpful & useful" at one end to "very helpful & useful" at the other. Section 3 was designed to compare pseudo-treatment control subjects with other treatment groups. Subjects were asked to: (a) indicate if they desired more information prior to the flight, and (b) supply what information might have been beneficial to them.

Post-Experimental Inquiry. This measure consisted of a series of 14 open-ended questions read by the experimenter to all subjects following each flight (Appendix 23). Responses to the questions were tape-recorded and transcriptions were made of each subject's responses.

Three questions were of primary interest to this study and were analyzed in detail. The questions probed into: (1) how subjects reacted to having the cockpit door open or closed during the flight, (2) which subjects desired more communication from the pilots, and (3) reactions of subjects to the missed approach prior to final landing in Ottawa.

Follow-Up. A follow-up letter (Appendix 24) and questionnaire (Appendix 25) were mailed to all subjects 4½ months after the conclusion of the experiment. This was designed to assess any negative or untoward effects of participating in the experiment. The questionnaire inquired into six areas: (1) current flight apprehension of subjects, (2) whether subjects had flown since the experiment, (3) if subjects had flown, how they felt while flying, (4) if subjects had flown, how they rated the effectiveness of their training, (5) subjects' self-rating of "How you feel about flying generally as a result of your experience in our study" on an 11-point scale ranging from "much less afraid" (0) at one end to "much more afraid" (10) at the other, and (6) whether their general well-being had been affected either positively or negatively.

CHAPTER III

RESULTS

The assessment of the effects of differential training, cockpit door condition, and flight manipulations was conducted by considering the events to which subjects were exposed. These events were: (a) Pretraining, (b) Training and Preflight, (c) Rev-Up and Take-Off, (d) three 10-minute cruising periods, (e) Unexpected Event (Trial 2 only), and (f) Landing.

The major dependent measure in this study was the Self-Report Anxiety Inventory (SRAI). It was employed to obtain subjective reports of anxiety for each of the above periods. Other dependent measures were designed to assess perceived turbulence, to check on the effectiveness of training, to assess postflight reactions, and to determine untoward adverse effects as a result of the experimental manipulations.[1]

Pretraining

One-way analysis of variance of pretraining scores was performed on two measures. No significant differences between

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[1]The malfunctioning of heart-rate monitoring and recording equipment, which occurred across all flights and in all trials, resulted in a loss of over 50% of the HR data. As a result the proposed analysis of heart-rate was not conducted.

groups were found on (1) Self-Report Anxiety Inventory (SRAI), and (2) Flight Apprehension Inventory (FLAPI). These results are shown in Table 3.[2]

Training and Preflight Assessments

Before proceeding to report on the anxiety scores for flight events, it may be of interest to examine post-training and preflight anxiety scores as they relate to Janis-derived hypotheses of the "work of worry" which persons supposedly engage in prior to facing a stressor provided they acquire information prior to the stressful situation. While subjects did not differ in the self-report of anxiety prior to training, one-way analysis of variance performed on SRAI scores obtained after training indicated that treatment manipulations produced significant differences between groups, ($F(3, 52) = 8.83$, $p < .001$. Table 4 summarizes these results, and Table 5 presents the means of pre- and post-training SRAI scores. As can be seen, all groups tended to decrease in self-report of anxiety, except the Self-Talk subjects. At post-training, post hoc analysis using the Tukey method (Tukey, 1949) indicated Control group subjects as well as Information group subjects differed significantly from Combined group subjects and Self-Talk group subjects,

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[2]Because of the large number of tables presented in this study, and for the convenience of the reader, Appendix 27 contains all the tables for analyses of data reported in this study.

p <.05. Subjects in both the Self-Talk and Combined groups reported significantly more anxiety than subjects in the Control and Information groups. It should be noted that the former two groups were instructed to attend to their internal states, as well as practice coping self-statements.

Subjects also completed the SRAI at the initial contact point the morning of the flight and again 15 minutes prior to boarding at the airport. While no overall significant F was obtained for self-reported anxiety scores at the contact point, Duncan's Multiple Range Test (Duncan, 1955) suggested that Self-Talk subjects were still slightly more aroused than Information subjects. A similar univariate analysis of variance on SRAI scores obtained 15 minutes prior to departure yielded a similar nonsignificant F. However, Duncan's test suggested that Self-Talk subjects were slightly more aroused than Combined group subjects. Table 6 shows the means and significance test results for SRAI scores at these two occasions. As can be seen, Self-Talk subjects generally were more aroused than subjects in the other three groups.

At the initial contact point, the morning of the flight, subjects responded to the Flight Anticipation Scale which asked them to rate "How you have been feeling since yesterday afternoon in anticipation of the flight today." One-way analysis of variance performed on reported amount of "work of worry" showed significant differences between treatment groups, $F(3, 52) = 6.96$, p <.001. Analysis by the Tukey post hoc method indicated that Self-Talk subjects had engaged in significantly more "work of worrying" than subjects in the other three groups. Table 7 summarizes this finding and shows the means for Flight Anticipation scores on this occasion.

Flight Assessments

In view of the fact that the 12 flights differed in flight crew assessed turbulence when a crew by flights (2 X 6) analysis of variance was performed on rated turbulence, $F(5, 36) = 18.23$, $p < .001$; and that no significant differences were shown between turbulence ratings of captain and first officer (as summarized in Table 8); and, in order to take into account the SRAI variance associated with flight turbulence, the following analyses and data considerations were undertaken on various estimates of flight turbulence. An averaged Vertical Deviation (VD) mean score for mean VD in each of the three 10-minute segments of the cruising period was computed. Similarly, a mean of VD standard deviations for each 10-minute segment of cruising was obtained. Both averaged VD means and averaged VD standard deviations were correlated with mean composite SRAI scores, as well as with assessments of turbulence by flight crews. This was done in the hope of using turbulence indices as a covariate in analyses of self-reported anxiety.

Turbulence data from instrument and flight crew assessments were analyzed and no psychological or self-report of anxiety effects were found. Thus, while turbulence did exist, and was perceptible by pilots, this had no significant relation to SRAI reports. Appendix 28 contains a complete description of the turbulence instrumentation, graphs, data, pilot turbulence estimates, and results of analyses performed to examine relationships between VD turbulence and SRAI scores.

Trial 1 (Ottawa-Montreal)

In order to assess the effects of different training procedures, door manipulations, and the six separate events in Trial 1, a groups by door by events (4 X 2 X 6) analysis of variance was performed on subjective reports of anxiety scores. A significant main effect of events, $F(5, 48) = 35.96$, $p < .001$ was obtained. No significant effects of training groups or door condition were shown. Table 9 summarizes these results which indicate that subjective self-reports of anxiety varied as an effect of the events to which subjects were exposed throughout Trial 1.

Rev-Up and Take-Off

Self-report of anxiety scores were obtained after seat belts were fastened, but before engines were started (Rev-Up), and again five minutes after take-off, upon reaching cruising altitude (Take-Off). One-way analyses of variance on SRAI scores were performed. No significant differences were found between groups whether at Rev-Up or in response to the Take-Off. Table 10 summarizes these results. The possible effect of door condition (open or closed), during Take-Off, was also investigated with a groups by door (4 X 2) analysis of variance performed on SRAI scores and no significant main effects of door or treatment group, or interaction effects between the two were found. These results are shown in Table 11.

Cruising Periods

SRAI scores were obtained at three 10-minute intervals during cruising. A 4 X 2 X 3 (groups by door by cruising periods) analysis of variance was performed on self-report of anxiety scores in order to determine the effect of cruising (over 30 minutes of time) excluding the events of Rev-Up and Take-Off, and Landing. A significant main effect for cruising events was found, $F(2, 48) = 8.31$, $p < .001$. These results are summarized in Table 12 and suggest that self-reports of anxiety varied among the three cruising periods; and further, that habituation was occurring in that subjects reported decreasing amounts of anxiety from the first to the second to the third 10-minute period of cruising.

The effects of the condition of door-open or door-closed and training procedures were assessed by 4 X 2 (groups by door) analyses of variance performed on SRAI scores obtained at three 10-minute intervals during the cruising period. As summarized in Table 13, a significant main effect of door was found only at the third cruising period, $F(1, 48) = 4.73$, $p < .03$. While there were no differences between treatment groups, subjects who flew with the cockpit door-open reported significantly more arousal than subjects under door-closed condition. Figure 2 illustrates the pattern of SRAI scores (for door condition) across the six events of Trial 1.

Landing

Testing for the effects of door condition and training procedures by a groups by door (4 X 2) analysis of variance performed on SRAI scores revealed no significant differences between treatment groups and no significant differences between subjects who flew either with the door-open or door-closed. Table 14 shows these results. Thus, while all subjects reported increases in self-reported anxiety at Landing, they did not differ as a result of training; and although subjects in the door-open condition reported more anxiety than subjects who flew with the door closed (cf. Figure 2), the difference was not statistically significant.

Seating. Seating assignment as a possible source of SRAI variance was also examined. For this analysis, seats were divided into two groups: (1) Front--comprised of the

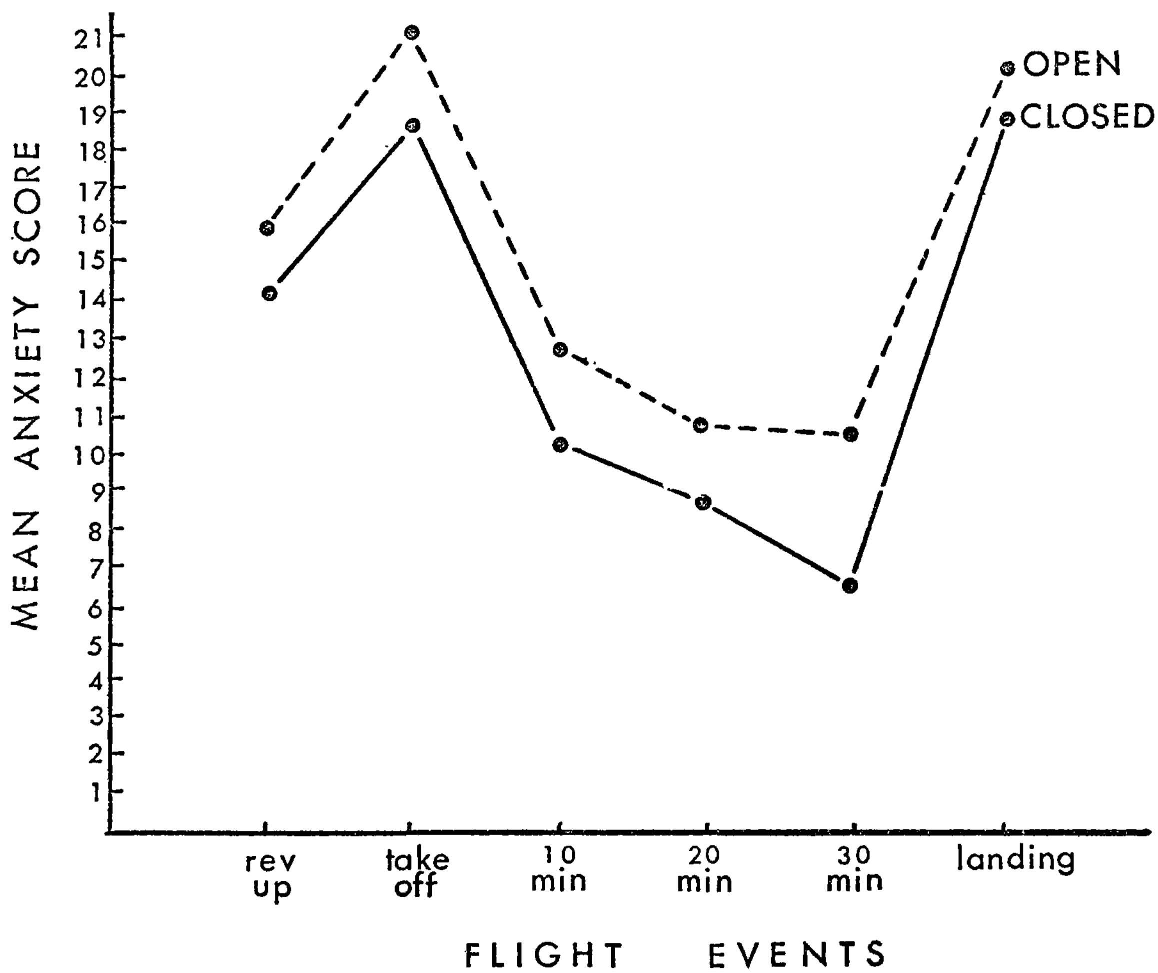

Figure 2. SRAI Scores for Door Condition (Trial 1).

four seats nearest the cockpit on the aircraft, and (2) Rear--the remaining six seats on the aircraft. A groups by door by seats (4 X 2 X 2) analysis of variance was performed on subjective ratings of anxiety for all events during Trial 1. No main effect of seating or group was found. Similarly, no group by seating interaction or door by seating interaction was found. The single significant finding duplicated the main effect of door (reported above) shown at the third 10-minute cruising period, $F(1, 40) = 5.03$, $p < .03$. These results are summarized in Table 15.

Trial 2 (Montreal-Ottawa)

Self-report of anxiety scores were obtained from subjects at the STOLport in Montreal immediately prior to reboarding for the return flight. One-way analysis of variance of SRAI scores found no significant differences between treatment groups. This result is shown in Table 16.

In order to assess the differential effects of training, door manipulations, and six events in Trial 2, a groups by door by events (4 X 2 X 6) analysis of variance was performed on SRAI scores. As summarized in Table 17, a main effect of door, $F(1, 48) = 5.48$, $p < .03$, and a main effect of events, $F(5, 48) = 47.69$, $p < .001$ was obtained. These results indicate that across Trial 2, self-reports of anxiety varied with events experienced by subjects; further, subjective reports of anxiety were influenced by flying with the cockpit door open or closed. Figure 3 illustrates the pattern of subjective reports of anxiety, for door condition, across all events in Trial 2.

Rev-Up and Take-Off

Subjects rated subjective anxiety after their seatbelts were fastened, but before engines were started (Rev-Up), and again five minutes after take-off, upon reaching cruising altitude (Take-Off). Univariate analyses of variance were performed on SRAI scores and no significant differences were found between groups either at Rev-Up or Take-Off, as summarized in Table 18. The possible effect of door condition (open or closed) during Take-Off was tested on SRAI scores with a groups by door (4 X 2) analysis of variance. No significant differences were found between treatment groups, or as a result of flying with the door open or closed, as summarized in Table 19.

Cruising Periods

The effect of the three cruising periods, door condition, and training procedures on self-report of anxiety scores was assessed by a groups by door by cruising periods (4 X 2 X 3) analysis of variance. Table 20 summarizes these findings which show a significant main effect for door, $\underline{F}(1, 48) = 8.90$, $\underline{p} < .004$, and for cruising period events, $\underline{F}(2, 48) = 11.46$, $\underline{p} < .0001$. These results indicate that

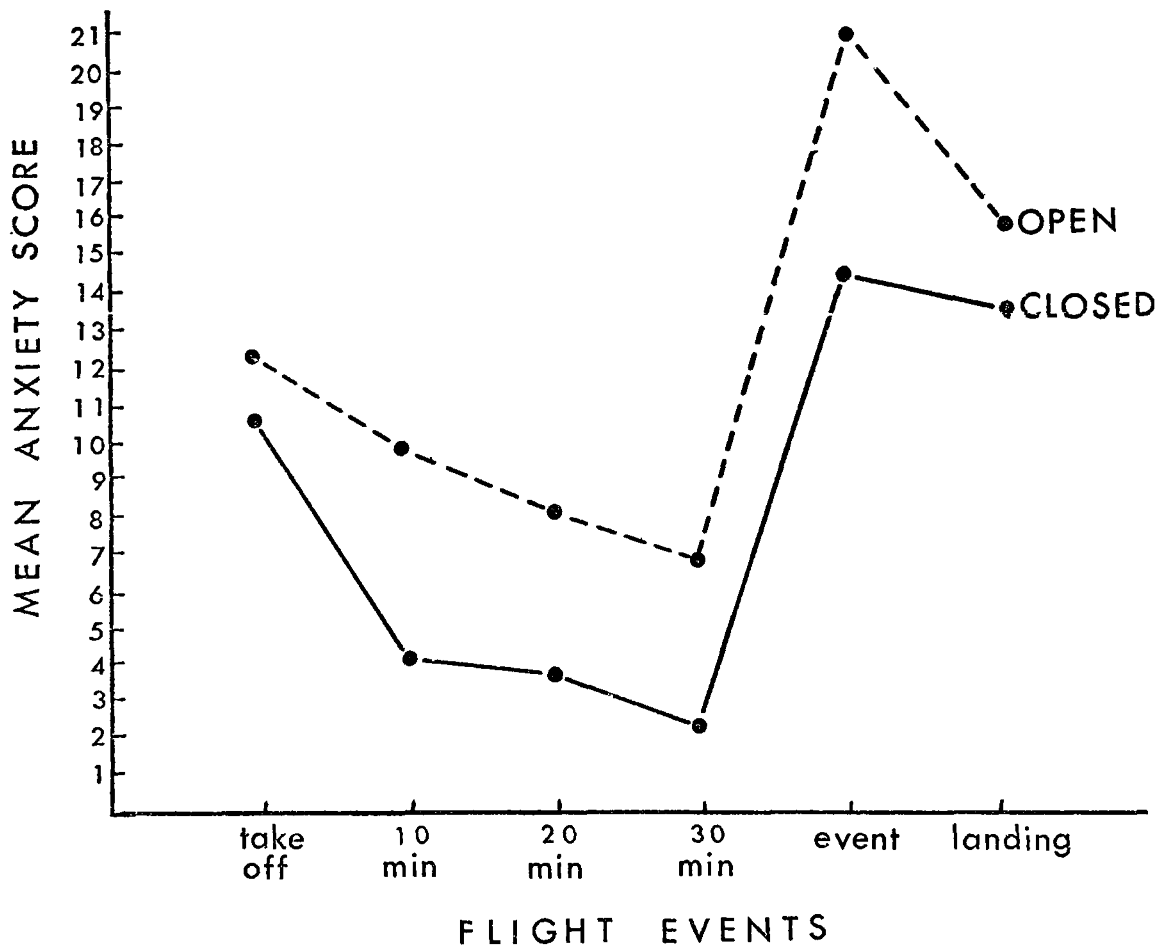

Figure 3. SRAI Scores for Door Condition (Trial 2).

SRAI scores of subjects varied significantly between those who flew under door-open condition or door-closed condition. Furthermore, subjects' SRAI scores were also affected by differences in the cruising period events, suggesting again that habituation was occurring as subjects' scores decreased continuously across the 30-minute cruising period.

To examine further the effect of door-open or door-closed condition, as well as treatment manipulations, a groups by door (4 X 2) analysis of variance was performed on SRAI scores for each of the three cruising periods. A significant main effect of door was found at all three cruising periods: at 10 minutes, $F(1, 48) = 10.32$, $p < .003$; at 20 minutes, $F(1, 48) = 5.90$, $p < .02$; and at 30 minutes, $F(1, 48) = 8.20$, $p < .006$. These results are shown in Table 21 and indicate that subjects who flew under the door-open condition were responding with significantly more arousal throughout the cruising period than subjects who flew with the cockpit door closed.

Unexpected Event (Missed Approach) and Final Landing

In order to assess the effect of training procedures and/or door condition, groups by door (4 X 2) analyses of variance were performed on subjective reports of anxiety obtained at the missed approach (Unexpected Event) and immediately after landing (Landing). No significant differences were found between groups for either event; however, a significant main effect of door was found at the Unexpected Event, $F(1, 48) = 4.25$, $p < .04$. These results are shown in Table 22. Those subjects who flew with the cockpit door open continued to report significantly more arousal than subjects who flew with the door closed when confronted by the missed approach (cf. Figure 3). At Landing, subjects under door-open condition obtained higher SRAI scores, but not to a significant degree, than subjects who flew with the door closed.

Subjective self-report of anxiety scores preceding, following, and including the missed approach (Unexpected Event) are illustrated in Figure 4. As a result of the previously presented results which indicated a significant main effect of door, separate analyses were conducted for door-open or door-closed condition. Univariate analyses of variance performed on SRAI scores, obtained at the Unexpected Event and Landing, assessed the effects of training and showed no significant differences between training groups for either door-open or door-closed condition at these two events. (Table 23 summarizes these results.)

Comparisons of treatment groups, under door conditions, by t tests, showed a significant difference between Self-Talk subjects and Control group subjects only at the Unexpected Event, and only under door-open condition, $t(12) = 3.10$, $p < .009$. Thus, when the cockpit door was open, at the Unexpected Event, of the four groups, Control

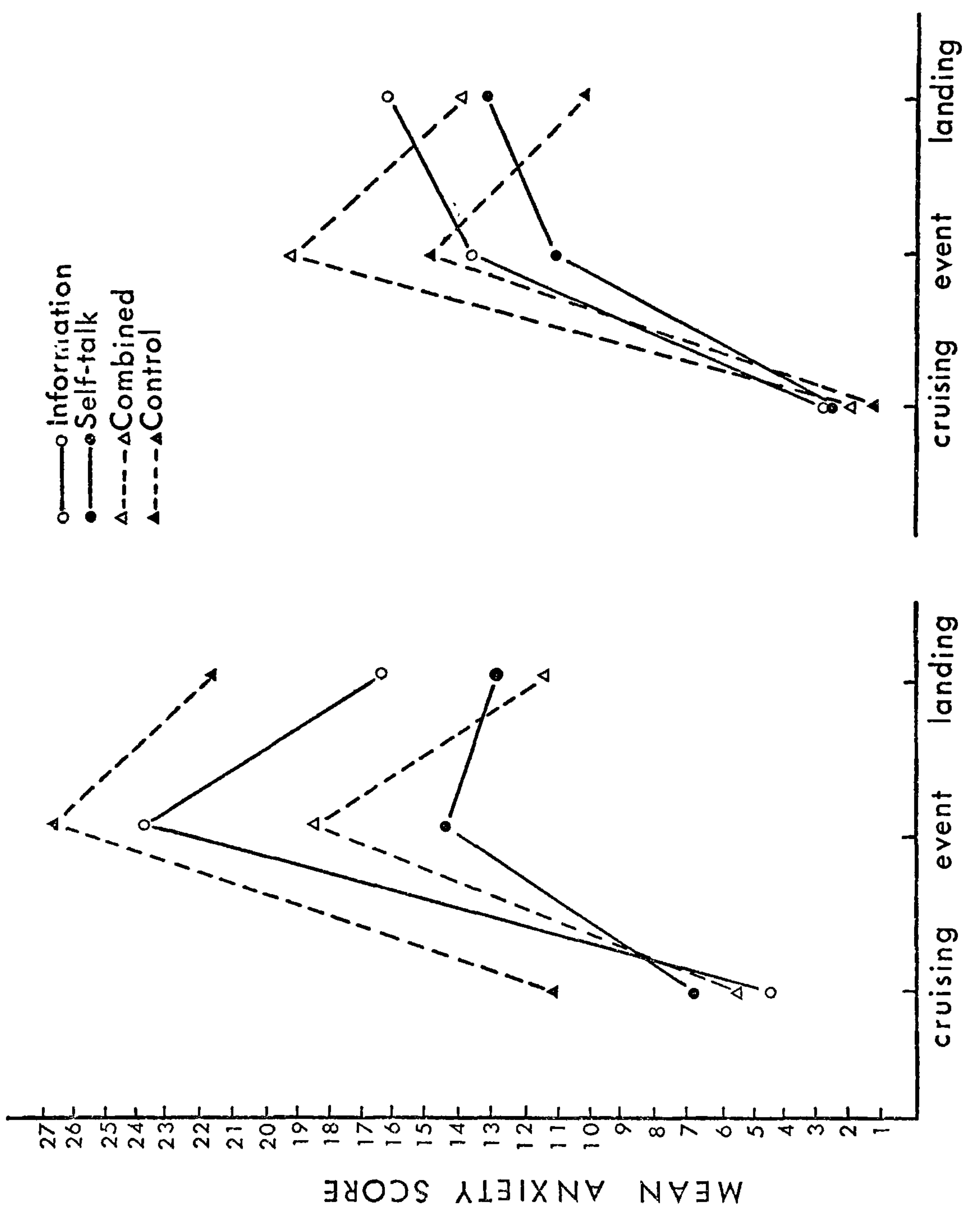

Figure 4. SRAI Scores by Door, for Cruising Unexpected Event, and Final Landing (Trial 2).

group subjects reported the highest SRAI scores while Self-Talk subjects reported the lowest SRAI scores. These results are shown in Table 24.

Comparisons of SRAI scores obtained at the third Cruising period, Unexpected Event, and final Landing were made by *t* tests of means for correlated samples for each group. Separate comparisons were made for the door-open or door-closed condition. Table 25 summarizes the means and significance tests for results at these three events.

For door-open condition, from Cruising to Unexpected Event, *t* tests on SRAI scores for correlated samples indicated that subjects in the Control group self-reported significantly increased levels of anxiety, $t(6) = -4.99$, $p < .02$; and that subjects in the Information group also showed significant increases on SRAI scores, $t(6) = -3.39$, $p < .002$. While Self-Talk and Combined group subjects also tended to increase in SRAI scores, they did not increase significantly. For door-open condition, from Unexpected Event to final Landing, all groups tended to show decreases in SRAI scores; however, only Control group subjects' decreases were significant when SRAI scores were compared by correlated *t* tests, $t(6) = 2.53$, $p < .05$ (cf. Table 25).

For door-closed condition, from Cruising to Unexpected Event, *t* tests for correlated samples on SRAI scores showed subjects in all four groups reported significant increases in arousal in response to the missed approach (cf. Table 25).

For door-closed condition, from Unexpected Event to final Landing, two groups decreased in SRAI scores (Combined and Control) and two groups increased in SRAI scores (Information and Self-Talk). A *t* test for correlated samples found that the decrease in self-reported anxiety was significant only for subjects in the Control group, $t(6) = 2.48$, $p < .05$, while another correlated *t* test found that the increase in reported anxiety was significant only for subjects in the Self-Talk group, $t(6) = -4.58$, $p < .004$ (cf. Table 25).

The data from SRAI scores preceding, following, and including the missed approach may be further analyzed by dividing subjects into those who reported decreased anxiety, and those who showed no change or an increase in anxiety. From Cruising to Unexpected Event a decrease in SRAI scores was reported by only one subject. She belonged to the Self-Talk group, door-open condition. All other subjects reported no change or an increase in anxiety on the SRAI. Complex X^2 analyses (Siegel, 1958) were performed on the number of subjects whose SRAI scores decreased as compared to the number of subjects whose SRAI scores did not change or increased. When all subjects were considered, no significant differences between training groups were obtained, as well as no significant differences between groups for door-open condition or for door-closed condition were found. This X^2 analysis is shown in Table 26.

Changes in SRAI scores from Unexpected Event to Landing were also analyzed by a X^2 procedure. When all subjects were considered, significant differences were indicated between the number of subjects who increased in SRAI scores or decreased in SRAI scores, $X^2(3) = 18.89$, $p < .005$. Eleven of 14 subjects in the Control group and 11 of 14 subjects in the Combined group decreased in SRAI scores of anxiety from Unexpected Event to Landing, while only 3 of 14 Self-Talk group subjects decreased in SRAI scores and 7 of 14 Information group subjects decreased. No significant differences were found between groups of subjects who increased or decreased in SRAI scores under door-open condition. Under door-closed condition, X^2 analysis suggested significant differences between groups when the number of subjects who increased or decreased in SRAI scores were considered, $X^2(3) = 15.43$, $p < .02$. With the cockpit door closed, 5 of 7 subjects in the Control group and 5 of 7 subjects in the Combined group showed decreases in anxiety, while 3 of 7 subjects in the Information group showed decreases in SRAI scores and none of the Self-Talk subjects reported decreases. Table 27 summarizes these results. Because expected cell frequencies from X^2 analysis, under door-closed condition, were less than 5, a Fisher's Exact Test (Fisher, 1966) was performed on these data in order to determine more exactly which groups differed. It was found that, under door-closed condition, significantly more subjects decreased in SRAI scores in both the Control group (5) and the Combined group (5) than did subjects in the Self-Talk group (0). These results are shown in Table 28.

Seating. Seating assignment as a possible source of SRAI variance was also considered for Trial 2. A groups by door by seat (4 X 2 X 2) analysis of variance was performed on self-rated anxiety for six events during Trial 2. No significant differences were found between groups at any event. Significant main effects for door duplicated findings reported previously and were shown: at 10 minutes cruising, $F(1, 40) = 9.89$, $p < .003$; at 20 minutes cruising, $F(1, 40) = 6.45$, $p < .01$, at 30 minutes cruising, $F(1, 40) = 8.97$, $p < .005$; and at Unexpected Event, $F(1, 40) = 4.20$, $p < .04$. Table 29 summarizes these findings. A significant training group by seat interaction was also obtained at final Landing, $F(3, 40) = 4.39$, $p < .009$. These results are summarized in Table 30 and depicted in Figure 5.

It might be expected that seating arrangement would have an effect on self-report of anxiety scores; however, generally, it had no effect at any period of either flight except at final Landing. It is reasonable to expect that there may be different effects when subjects are able to view the ground differentially and, at Landing, this effect may be a most salient feature of seating. It is of interest to note that at final Landing (cf. Figure 5), subjects in the Information group who sat in front reported the lowest

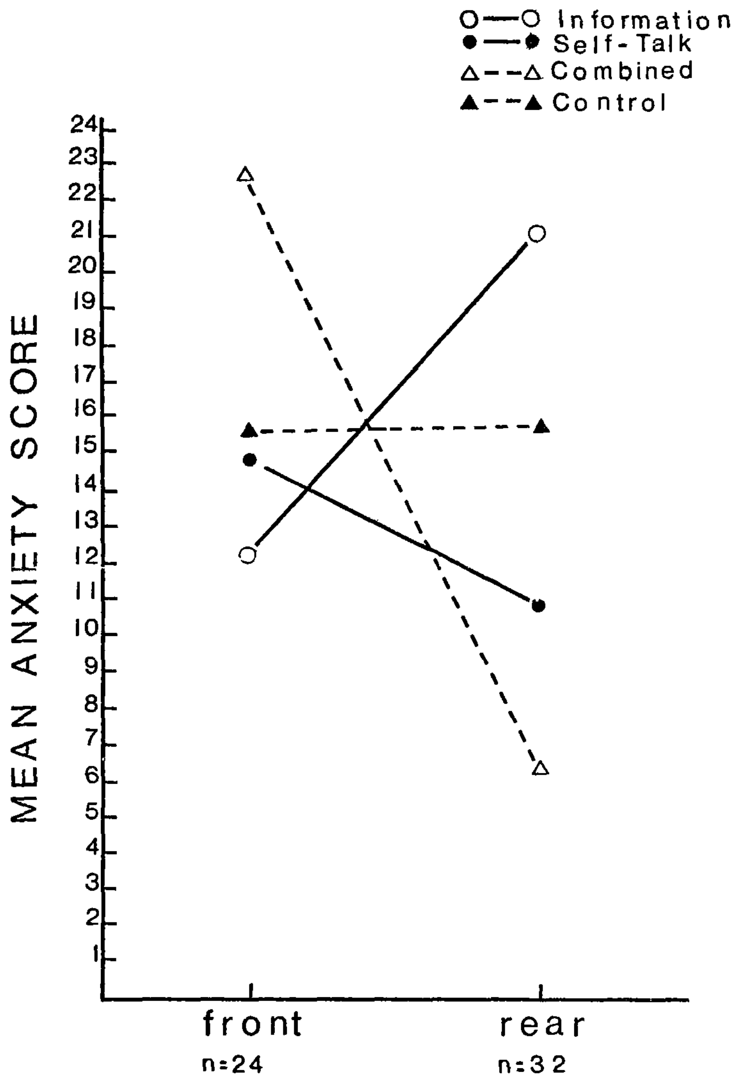

Figure 5. SRAI Scores by Seat, for Final Landing (Trial 2).

SRAI scores, while those in the Information group seated at the back reported the highest SRAI scores. Further, subjects in the Combined group and in the Self-Talk group, who were seated in front at final Landing, reported higher SRAI scores than subjects in those identical groups who were assigned seats in the rear of the aircraft. Control group subjects, without any coping procedure training, did not appear to be differentially affected by seating. Univariate analyses of variance were performed on SRAI scores to test differences between groups under door-open or door-closed condition, and no significant differences were indicated. Table 30 summarizes these results.

Post-Experimental Questionnaire (PEQ)

When subjects were asked: "Do you wish you had acquired more information and known better what to anticipate today?" 7 out of 14 Control group subjects expressed the need for more information prior to the flight experience, as compared to 2 out of 14 Information group subjects and 2 out of 14 Combined group subjects. A complex X^2 analysis showed the groups to differ significantly in terms of the number in each group who expressed a need for more preflight information, $X^2(2) = 6.16$, $p < .05$. Table 31 summarizes these results. Because of expected cell frequencies of less than 5, Fisher's Exact Test was employed to compare groups. Significantly more subjects in the Information group (12) expressed satisfaction with the amount of information they had acquired prior to the flight compared with subjects in the Control group (7), $p < .05$. These results are shown in Table 32.

On the measure "rate how effective you found the technique of providing information about what to anticipate in helping you cope with the stress of flying," differences in perceived effectiveness were reported between subjects exposed to door-open vs. door-closed. One-way analysis of variance performed on "effectiveness of providing information" scores showed no significant differences between groups under door-closed condition. Under door-open condition, univariate analysis of variance performed on ratings of "effectiveness of providing information" found significant differences between groups, $F(2, 18) = 12.12$, $p < .001$. A post hoc Tukey procedure found that Information and Combined group subjects did not differ significantly in their rated effectiveness of acquiring information as a coping device in the stress of flying. However, the Tukey method showed that Control group subjects rated acquired information as a coping device significantly lower in effectiveness than either Information group subjects or Combined group subjects, $p < .05$. Table 33 shows the results for this measure.

Self-Talk and Combined group subjects rated the percentage of time during the flight in which they emitted positive coping self-statements. Analysis by *t* test of the percentage of time devoted to emitting self-statements found that Self-Talk group subjects did not differ significantly from Combined group subjects in amount of self-talk utilized within door-open or door-closed conditions. Furthermore, no significant differences on this measure were obtained when those who practised self-talk were compared across door-open or door-closed conditions. Table 34 shows these results.

Subjects also rated "how effective you found the technique of using positive self-statements in coping with the stress of flying." The rated effectiveness of self-statements of subjects in the Self-Talk group and in the Combined group was compared by *t* tests within door-open and door-closed conditions and no significant differences were found between these groups. While possibly inappropriate, when the ratings of self-statement effectiveness of Control group subjects were included in the comparison, significant differences were found only under door-open condition. Under door-open condition, Self-Talk subjects rated effectiveness of self-statements significantly higher than Control group subjects, $t(12) = 2.36$, $p < .04$. As well, Combined group subjects rated self-statements as a coping device significantly higher than Control group subjects, $t(12) = 2.39$, $p < .03$. Table 35 shows these results.

A significant relationship (Pearson Product-Moment Correlation) between percentage of time spent in using self-statements and the rated effectiveness of self-statements was found for Self-Talk subjects and Combined group subjects, $\underline{r}(26) = .61$, $\underline{p} < .001$. As estimates of time spent in emitting self-statements went up, so did the rating of perceived effectiveness of making self-statements in coping with the stress.

Post-Experimental Inquiry

Subjects were asked to state their preference regarding cockpit door condition. Of those who had flown with the door open, only one out of 28 expressed a preference that it be closed. Of those who had flown with the door closed, 12 out of 28 preferred it closed, while the remainder (16) expressed a preference for the door to be open instead. Having the door open was a stated preference by 43 out of 56 of the subjects who flew under either condition. Table 36 summarizes X^2 analysis of these data in which a significant difference between those subjects who flew with door open and those subjects who flew with door closed was indicated, $X^2(1) = 19.01$, $\underline{p} < .001$. Fisher's Exact Test was performed on stated door preference in order to investigate differences between groups. It was found that groups did not differ significantly in door preference under either door-open or door-closed condition. Comparisons made between groups, but across door condition, with Fisher's Exact Test showed that significantly more Information, Self-Talk, and Combined group subjects who flew with cockpit door open preferred that door condition than did the number of their counterparts, as well as Control group subjects, who flew with the door closed and expressed a preference that the door be open. The results are shown in Table 37.

The possibility of reliance on the pilot for more communication was also investigated. Because of expected cell frequencies of less than 5, Fisher's Exact Test was employed to test for differences between groups and across door condition to the question "Do you wish the pilot would have communicated more to the passengers on the flight?" No significant differences were found between treatment groups or across door condition. Table 38 shows these results.

When subjects responded to "What thoughts went through your mind on the missed landing?", responses fell into these four categories: (1) subjects thought it was a "trick"; (2) subjects were very upset and did not cope well; (3) subjects were querulous, puzzled and wondering but coped, and (4) subjects referred to previous personal experiences of missed approaches. Table 39 presents the data in these categories. A comparison between door-open and door-closed condition was performed with Fisher's Exact Test. Significantly more subjects in the door-closed condition (11 out of 28) considered the missed approach a "trick" than subjects in the door-open condition (5 out of 28), $p < .03$. The missed approach was upsetting to significantly more subjects (14 out of 28) who flew under door-open condition than it was to the subjects (7 out of 28) who flew with the cockpit door closed, $p < .05$. These results are shown in Table 40.

Subjects who expressed the belief that the Unexpected Event was a "trick" were compared with those who did not consider it a "trick." SRAI scores were the dependent variable for t test computations preceding, following, and including the Unexpected Event. At Cruising, subjects who considered the missed landing a "trick," under door-open condition, reported significantly higher anxiety scores than subjects who considered it a "trick" under door-closed, $t(14) = 2.96$, $p < .02$. No significant differences were found within door conditions between subjects who considered the missed approach a "trick" and those who did not consider it a "trick."

At the Unexpected Event, subjects who considered the missed landing a "trick" under door-open condition reported higher SRAI scores than those under door-closed condition who considered it a "trick," $t(14) = 2.42$, $p < .05$. Within door-open condition, subjects who considered the missed approach a "trick" scored higher on self-reported anxiety than subjects who did not consider it a "trick,"

$\underline{t}(26) = 4.03$, $\underline{p} < .001$. Subjects under door-closed condition who considered the missed approach rigged did not differ in SRAI scores from those subjects who did not consider it a "trick."

At final Landing, $\underline{t}$ tests showed no significant differences on subjective report of anxiety between subjects who believed the missed approach was rigged and subjects who did not consider it a "trick" either within door conditions or between door conditions. Table 41 summarizes the means and significance tests of these results.

Follow-Up

A follow-up questionnaire was mailed to all subjects 4½ months after the completion of the experiment and 53 out of 56 (95%) of the questionnaires were returned. Results will be presented in the order in which the items appeared on the questionnaire.

Subjects completed an item on current flight apprehension asking them to rate, "How you feel, now, if you were to fly." Because a significant main effect of door had been found on SRAI scores during flight events, a treatment groups by door (4 X 2) analysis of variance was performed on follow-up flight apprehension scores and found no significant differences between training groups or differences between subjects who flew with the door open or door closed. Table 42 summarizes these results. One-way analysis of variance performed on follow-up flight apprehension scores comparing treatment groups under door-open condition found no significant differences, although Duncan's test suggested that subjects in the Combined group reported significantly less flight apprehension at follow-up than subjects in the Control group, $p < .05$. Univariate analysis of variance performed on follow-up flight apprehension scores comparing treatment groups who flew with the door closed found no differences between groups. These results are summarized in Table 43. The possible influence of seating arrangement on follow-up flight apprehension was assessed by a groups by seat (4 X 2) analysis of variance and no significant differences were found between treatment groups or between those subjects seated at the front or the rear of the aircraft. These findings are shown in Table 44. One-way analyses of variance were performed on follow-up flight apprehension scores in order to compare differences between treatment groups on the basis of seating. No differences of reported flight apprehension at follow-up were found between training groups of subjects who were seated at the front of the aircraft; however, significant differences in reported flight apprehension at follow-up were found between treatment groups of those subjects seated at the rear of the aircraft, $F(3, 25) = 3.12$, $p < .04$. In post hoc analysis, Duncan's test suggested that subjects in the Combined group were reporting significantly less flight apprehension at follow-up than subjects in the Control group, $p < .05$. Table 45 shows these results.

Subjects rated any after-effects from the experiment on an 11-point scale on which they responded to the statement to rate "how you feel about flying generally as a result of your experience in our study." Univariate analysis of variance performed on self-rated feelings about flying as a result of the experiment found significant differences between treatment groups, $F(3, 49) = 4.57$, $p < .007$. Post hoc analysis with Duncan's test showed that subjects in both the Self-Talk and the Combined groups reported being significantly "much less afraid" of flying generally as a result of this study than subjects in the Information group or Control group, $p < .05$. In order to assess training group differences under door-open condition, one-way analyses of variance were performed on rated fear of flying as a result of this experiment and no significant differences between groups were found. One-way analysis of variance performed on reported fear of flying as a result of this study found a significant difference between treatment groups who flew under door-closed condition, $F(3, 21) = 3.43$, $p < .04$. Post hoc analysis with Duncan's test showed that both Self-Talk group subjects and Combined group subjects differed significantly (reporting being much less afraid of flying as a result of this experiment) from Information group subjects or Control group subjects,

$p < .05$. Table 46 summarizes these results. The possible effect of seating arrangement was also investigated when a groups by seat (4 X 2) analysis of variance was performed on reported fear of flying as a result of this study and a main effect of treatment groups was obtained, $F(3, 45) = 4.36$, $p < .009$, as well as for seats, $F(1, 45) = 4.13$, $p < .05$. These results are shown in Table 47. To further assess the effects of seating arrangement, one-way analysis of variance was performed on rated scores of fear of flying after the experiment for subjects seated at the front of the aircraft, and no differences between treatment groups were shown. Univariate analysis of variance performed on rating scores of fear of flying after the experiment for subjects seated at the rear of the aircraft showed significant differences between treatment groups, $F(3, 25) = 3.67$, $p < .03$. Duncan's test, employed for post hoc analysis, suggested that subjects in the Self-Talk group as well as subjects in the Combined group, who sat in the rear of the plane, rated themselves much less afraid of flying as a result of this study than did Control group subjects. Table 48 summarizes these results.

Finally, subjects were asked to report any adverse untoward effects as a result of the experiment. Three out of the 53 respondents (all in Control group) reported negative effects. Although they rated their feelings about flying as a result of this study no higher than 6--in the direction of "much more afraid"--(with 5 being the mid-point on the 11-point scale), these subjects were contacted by telephone by the experimenter to ascertain the degree of this adverse effect. In answer to the question of untoward effects, 10 subjects made no comment and the remainder--40 (74%)--reported being positively affected by the experiment spontaneously reporting the application of the learned coping procedures to other anticipated stressful situations in everyday life.

The long-term differential effectiveness of the training procedures was assessed by comparing pretraining flight apprehension scores (FLAPI) with current flight apprehension scores obtained on the follow-up questionnaire 4½ months after the experiment was concluded. Separate comparisons were made for door-open or door-closed conditions.

Subjects in all four treatment groups reported lower flight apprehension scores at follow-up than at pretraining; however, it is interesting to note which groups showed significant decreases in reported flight apprehension. For door-open condition, t tests for correlated samples on change scores of flight apprehension from pretraining to follow-up found significant decreases for subjects in three groups: Information, $t(6) = 3.58$, $p < .01$, Self-Talk, $t(6) = 4.46$, $p < .004$, and Combined, $t(6) = 4.70$, $p < .003$. While Control group subjects, under door-open condition, also tended to decrease in flight apprehension scores, t tests for correlated samples indicated the decrease was not significant.

For door-closed condition, t tests for correlated samples on change scores of flight apprehension from pretraining to follow-up found significant decreases for subjects in two groups: Self-Talk, $t(6) = 6.30$, $p < .001$, and Combined, $t(6) = 3.12$, $p < .03$. Correlated t tests on differences between pretraining FLAPI scores and flight apprehension scores at follow-up indicated that Information group subjects and Control group subjects who had flown with the cockpit door closed did not show significant decreases in reported flight apprehension. Table 49 shows the means and significance tests of these results.

It can be seen that subjects in treatment groups which involved self-statement training (Self-Talk and Combined) reported significant reductions in reported flight apprehension 4½ months after the experiment, regardless of the door condition to which they were exposed. As might be expected, those subjects in the Information group who showed a significant decrease in flight apprehension were those who flew with the cockpit door open. It is of interest to note that subjects in the Control group without specific training in coping failed to show significant decrements in reported flight apprehension from pretraining to follow-up regardless of the door condition to which they were exposed.

In order to assess possible differential decreases in flight apprehension between groups from pretraining to follow-up, a groups by door (4 X 2) analysis of variance was performed on the change scores in flight apprehension from pretraining to follow-up and no significant main effects of door or training group were found. While training group differences approached significance, Duncan's Multiple Range Test suggested that only subjects in the Combined treatment group, who reported the largest decrement in flight apprehension from pretraining to follow-up, differed significantly from Control group subjects who reported the smallest decrease in flight apprehension over the period from pretraining to follow-up, $p < .05$. These results are summarized in Table 50.

These data on changes in flight apprehension were further analyzed by dividing the groups into those subjects who had flown with the door open or those who had flown with the door closed. Univariate analysis performed on change scores in flight apprehension from pretraining to follow-up for subjects under door-open condition showed nonsignificant differences between groups. Duncan's test, however, suggested that Combined group subjects differed significantly from Control group subjects, $p < .05$, with Combined group subjects who flew with the door open reporting significantly larger decreases in flight apprehension than Control group subjects. One-way analysis of variance performed on change scores in flight apprehension from pretraining to follow-up, for subjects who flew with the door closed, indicated no significant differences between groups. Table 51 shows these results.

It should be further noted that a *t* test performed on flight apprehension change scores from pretraining to follow-up, comparing subjects who flew with the door open with those who flew with the door closed, showed no significant differences. Furthermore, a *t* test found no significant differences on current flight apprehension ratings (follow-up) between subjects who had flown in the door-open condition or in the door-closed condition. These data suggest that long-term effects of decrement in flight apprehension may not have been a function of the manipulation of door-open or door-closed condition but, rather, may have resulted from the differential training procedures to which subjects were exposed prior to the flight experience. Table 52 shows the means and significance tests for these *t* test comparisons.

CHAPTER IV

DISCUSSION

To recapitulate, the major findings of the experiment were as follows: (1) In terms of whether subjects flew with the door open or door closed, throughout the course of the flight subjects who flew with door open showed more anxiety than subjects who flew with the door closed. While all subjects tended to decrease in anxiety in the form of possible habituation effects, door-closed subjects habituated faster to the extent that during the return flight, door-closed subjects were markedly less anxious compared with door-open subjects. (2) The various treatment manipulations represented by the stress training groups generally failed to demonstrate differential coping effectiveness. It appears that, at least for the cruising portions of the flight, self-statement training or cognitive preparation in the form of information or a combination of both of these did not help subjects to cope better during the flight. (3) The various additional stressors throughout the flight such as Take-Off, Landing, and Unexpected Event produced increases in anxiety for all subjects. These additional stressors were found to interact with the other variables in the experiment. Specifically, (a) the Unexpected Event produced differential anxiety responses depending upon whether subjects flew with door open or door closed; (b) the Unexpected Event produced differential anxiety responses between treatment groups, again depending upon whether subjects flew with the door open or closed; and (c) reactions to the Unexpected Event appeared to have produced further differential anxiety responses among the groups on the subsequent final Landing, again depending upon the door-open or door-closed manipulation. Thus, the major findings, as they relate to the hypothesized effect of the treatment manipulations are located in the obtained interaction between these variables. Prior to discussing the significance of these and other findings we shall first examine the effect of the training in coping strategies on anxiety prior to the flights.

No evidence was found to support the hypothesis that Information group subjects would show higher anxiety either after training or prior to the flight as a result of the "work of worrying." Following training and immediately prior to departure for the STOLport differential effects on SRAI scores among treatment groups were found. However, it was Self-Talk subjects who reported significantly higher levels of anxiety than subjects in other groups. Furthermore, Self-Talk subjects also reported a significantly greater amount of "worry and anticipation from yesterday afternoon to this morning in preparation for the flight." There are implications here for the theorizing of Meichenbaum (1975), who has stated that self-statements make explicit the "work of worrying." When subjects rehearse and practise self-statements they engage in the work of worrying and convey to themselves a sense of control over their own thoughts and feelings. Self-Talk subjects were specifically instructed to rehearse and practise coping self-statements following training. It is possible that this rehearsal was directly related to doing the "work of worrying." In point of fact it may have had a direct effect on the coping ability that Self-Talk subjects exhibited specifically in response to the Unexpected Event. Any self-statement rehearsal prior to the flight likely included rehearsing events which were unknown to the subjects. They had never flown in the STOL aircraft and could not know what to anticipate particularly during Take-Off and Landing--procedures which vary considerably from normal commercial aircraft. Thus, conceivably when they were confronted with the Unexpected Event they were not as aroused because they had already engaged in the "work of worrying." Conceivably, because of the rehearsal of self-statements to unknown events they were better prepared to cope with unanticipated occurrences.

An alternative explanation can be offered. One wonders whether the increased self-reported anxiety actually reflected increased anxiety due to the "work of worrying" or if it was an artifact of the demands of the training procedure. Recall that Self-Talk subjects were given specific instructions to rehearse using self-statements in the interim period from training to flying. These subjects therefore would have been more attentive to their internal state. It may be that the Self-Talk group was not in fact more anxious than subjects in other groups but, that as a result of having them attend to their internal state, in comparison with other groups, this may have made internal events more salient. Consequently, they may have remembered internal events and their arousal state better and self-reported higher levels of anxiety.

The above discussion does not explain why Combined group subjects, who were also given self-statement training, failed to show significant amounts of "work of worry" prior to the flight. If one considers the hypothesis that the Combined group subjects rehearsed self-statements equally as well as Self-Talk subjects but that the rehearsal was to different types of events, then Self-Talk subjects rehearsed self-statements to unknown events, whereas Combined group subjects rehearsed self-statements to the known information about the flight they had acquired in training. Alternatively, it can be hypothesized that Combined group subjects did not rehearse self-statements at all because they felt confident they had acquired enough information to cope adequately with the anticipated flight experience. Further attention will be directed to this question when the interaction effects are discussed in the next section.

Door-Open Condition. The fact that differential treatment group effects occurred before, after, and at the Unexpected Event is evidenced in the manner in which Control group subjects responded to these events. Notwithstanding having reported the highest anxiety of all subjects at Cruising, at the Unexpected Event Control group subjects showed a significant peak of anxiety (cf. Figure 4). It can be seen that Control group subjects responded to the event in the manner that one would expect untreated persons to respond.

As might be expected, when confronted with the Unexpected Event, cognitive preparation (Information group subjects) was not an adequate coping strategy. Information group subjects were not prepared and they responded in a manner similar to Control group subjects with significant increases in anxiety. Furthermore, although the flight crew ("danger-control authorities" [Janis, 1958]) were visible they did not appear to be adequate as external sources of potential reassurance. An alternative possibility one could suggest, which applies to Control group subjects as well, is that Information group subjects with the door open were exposed to the information of flight crew manipulating levers, etc, all of which could serve as cues to the approach of a stressor. At a cognitive level the findings of Monat et al. (1972) offer some explanation when it was suggested that as the time of confrontation with a stressor approaches, anticipatory stress occurs and there is a shift in the amount of attention to "vigilant-like" thoughts with an increase in arousal. Thus, as Information group subjects attempted to process cues from the flight crew as the Unexpected Event occurred this cognitive shift to vigilance possibly led to an increase in arousal and higher levels of self-reported anxiety.

At this point of peak anxiety, under door-open condition, the data indicate that emitting positive coping self-statements was the most effective coping strategy. Self-Talk and Combined group subjects did not increase significantly in self-report of anxiety at the Unexpected Event. This may be considered a result of their attending to internal events and coping, while not being exclusively dependent upon or respondent to the external environmental cues that could have triggered an increase in "vigilant-like" thoughts.

Door-Closed Condition. Once again, Control group subjects under door-closed condition responded like untreated subjects with a significant increase in anxiety at the Unexpected Event. At the Unexpected Event, cognitive preparation (Information group) again was not adequate in preparing subjects to cope with an unexpected stressor. In addition to the explanations offered for the increase in Information group anxiety at the Unexpected Event for door-open condition (and which would also seem appropriate for door-closed) an alternative explanation may be offered from the point of view of the theory of disconfirmation of expectancies. Prior to the Unexpected Event it might be considered that the repeated occurrence of "invariant" events, all of which the cognitive preparation procedure had previously presented to subjects in training, had been instrumental in forming an expectancy that the announced landing would occur as invariantly as had all the preceding events. When the expectancy was disconfirmed a significant rise in anxiety resulted. This suggestion can be supported from the research of Carlsmith and Aronson (1963) who demonstrated that under certain conditions the disconfirmation of a strong expectancy led to negative affect. This explanation would seem appropriate under door-closed condition since these subjects could not monitor pilot behavior and had to rely exclusively on information given to them.

Much like the Information and Control group subjects, at the Unexpected Event subjects in both self-statement training groups (Self-Talk and Combined) responded with significant increases in anxiety. These findings are somewhat puzzling. It may be that under door-closed condition the importance of being able to process information about the significance of a stressor may take precedence over any attempted coping strategy. While, generally, self-statements can help one cope with anxiety, in the present experiment certain events such as the Unexpected Event may have an overriding arousing effect. Subjects with door closed at the Unexpected Event were uncertain about future events and were not able to monitor what was happening. Therefore, at that point no amount of self-talk alone was adequate for coping. This contention may be further supported in the finding that the Information group also increased significantly at this point possibly due to the need for more information concerning the significance of what was occurring.

At final Landing, once again Control group subjects responded with a significant decrease in anxiety. Conversely, at final Landing, under door-closed condition Self-Talk subjects reported a significant increase in anxiety.

It is interesting to speculate what may have happened to Self-Talk subjects from the Unexpected Event to final Landing under the door-closed condition. It is reasonable to assume, particularly with the door closed, that Self-Talk subjects were attending to their internal state. Yet, attending to and monitoring their internal state may in fact have been detrimental. Undoubtedly, the Unexpected Event caused an increase in arousal (as all subjects reported significant increases in anxiety), particularly when access to information was restricted. Self-Talk subjects were following their training and monitoring their internal state. A number of explanations for this phenomenon can be offered. (1) In response to the Unexpected Event and the perceived increased arousal, Self-Talk subjects may simply have abandoned their coping strategy because they perceived it to have failed at the Unexpected Event. This may have been true especially if they compared their level of arousal at the Unexpected

Event to the Cruising periods when they may have been less aroused and thought they were coping very adequately. This abandonment of a coping strategy may have resulted in increased anxiety at the final Landing. (2) Another alternative is that supported by findings from the research of Sarason (1975). He suggested that excessive self-preoccupation, which can result from a variety of factors (including unexpected events such as illnesses) can interfere at three points with adequate information processing and subseuqent coping processes: (a) self-preoccupation can interfere with attention to cues and generate physiological arousal; (b) self-preoccupation may interfere with information processing and planning strategies for coping; and (c) self-preoccupation may interfere with overt activities such as behavior or task performance. Recall that Self-Talk subjects were instructed to attend to internal states (i.e., given a set to preoccupation) which was then enhanced by the occurrence of the Unexpected Event. The conditions for self-preoccupation would appear to be met by: (a) the door-closed condition in which subjects had no access to environmental cues, neither could they direct their attention to the flight crew as possible sources of reassurance; and (b) the self-statement coping strategy which instructed already aroused subjects to attend to their internal state. In this condition subjects directed attention to themselves which may then have interfered with attention to and the processing of the information that the aircraft was following a normal landing procedure. Furthermore, this self-preoccupation may have interfered with the adequate generation of learned coping strategies and the task of coping with the additional stressor of final Landing. (3) It is further suggested that at final Landing (a) self-statement training interfered with seeking external reassurances as it emphasized attending to internal cues, (b) the door-closed condition prevented moment-to-moment monitoring of pilot's behavior from which reassurances could be sought, and (c) the door-closed prevented the processing of information concerning the final Landing. In this latter interpretation, perhaps what is desperately needed is access to information from moment to moment concerning the state of the aircraft together with reassurances which can only be provided by the presence and visibility of the pilots. Self-Talk subjects, in door-closed condition, had neither of these sources of information available to them.

The effect of seating arrangment should also be mentioned in relation to the final Landing. Information group subjects were most affected by seating differences at final Landing (cf. Figure 5). At final Landing those Information group subjects seated in the front of the aircraft reported the lowest SRAI scores of all treatment groups, while those Information group subjects seated at the rear reported the highest SRAI scores. These data suggest that Information group subjects coped most adequately when they were able to process information (front seat), confirm expectancies, and rely on cues from the flight crew ("danger-control authorities" [Janis, 1958]) for reassurance. If reassurance and information processing can serve as a major source of coping, then such factors as distance from danger control authorities and from sources of information about the safety of the flight can assume a role of compelling importance. Information group subjects seated at the rear of the aircraft where information was limited coped less adequately than untreated Control group subjects also seated at the rear of the aircraft.

At closer examination it appears as if sitting in back regardless of whether the door is open or not produces more negative reactions at final Landing as opposed to sitting in front. Furthermore, the changes in anxiety from Unexpected Event to final Landing are more adverse if one sits in the back with the door closed as opposed to door open. Conversely, sitting in the front with the door open results in greatest anxiety decrement from Unexpected Event to final Landing compared with subjects' reactions when they are sitting in the front with the door closed.

Results from the 4½ month follow-up suggest that both cognitive preparation and self-statement training were equally effective in the long-term reduction of flight apprehension. This reduction in flight apprehension does not (a) appear to be exclusively a function of reactions to events which occurred during the flight, or (b) depend exclusively upon a single coping strategy. Rather, the reduction seems to depend upon an interaction of coping strategy and flying experience of door open or door closed.

It is to be noted that rated flight apprehension from pre-training to follow-up tended to decrease for all subjects.[4] While this decrement could be attributed to the phenomenon of "regression to the mean," recall that Combined group subjects (door open) had differed significantly from Control group subjects in the amount of decrease in rated flight apprehension from pre-training to follow-up. Therefore it would appear more likely that decrements in flight apprehension in the Combined treatment group are the result of differential treatment effects rather than solely the result of "regression to the mean."

It was found that regardless of door condition both groups which had been exposed to instruction which included self-statement training (Self-Talk and Combined) reported significant decrements in flight apprehension from pre-training to follow-up. Furthermore, cognitive preparation (Information group) subjects also showed a decrease in flight apprehension from pre-training to follow-up, but <u>only</u> under door-open condition. Information group subjects who flew with the door closed <u>did not</u> report a significant decrease in flight apprehension at follow-up.

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[4]The possibility of an habituation effect for all subjects cannot be discounted. Solyom, Shugar, Bryntwick, and Solyom (1973) reported a significant decrease in air phobia as a result of a strong habituation effect.

Under door-open condition, the long-term decrease in flight apprehension in Information group subjects may be accounted for in part by the fact that these subjects were able to process information and confirm their expectancies throughout the flight. This finding may be supported from the suggestion by Averill (1973) that information may have value in helping a person cope. However, before information can be an effective control device there must be validation by experience and reduction of objective worry. Both of these conditions could be met by Information group subjects who flew with the door open. In addition, recall that a portion of the cognitive preparation training instructed Information group subjects to seek external reassurances from danger-control authorities (the flight crew). Under door-open condition Information group subjects could also exercise the option of seeking reassurance from the flight crew throughout the flight experience.

Self-Talk and Combined group subjects also decreased significantly in flight apprehension from pre-training to follow-up. The Combined group subjects were equipped with the widest variety of coping strategies, all of which could be employed with the door open. Combined group subjects could rely on confirmation of expectancies, information processing, positive coping self-statements, or seeking reassurances from external sources by relying on the flight crew.

Under door-closed condition, Self-Talk and Combined group subjects decreased significantly in flight apprehension from pre-training to follow-up. However, the decreases were not significantly lower than those of the comparable Control group. Information group subjects did not show a significant decrease in flight apprehension. Information group subjects with the door closed were exposed to the worst possible combination of conditions. They had been given information and instructed to seek reassurances from danger-control authorities. Yet under actual flight conditions, not only could they not process information, but their expectancies were disconfirmed by the Unexpected Event, and furthermore they did not have access to information from the pilot from whom reassurances could be sought.

CONCLUSIONS AND IMPLICATIONS FOR FUTURE RESEARCH

The conclusions from this research comparing cognitive coping strategies under the stress of flying are summarized as follows.

(1) In this experiment, it was not possible to demonstrate differences between the effects of the various cognitive coping strategies in coping with the stress of flying among persons who had expressed a fear of flying.

(2) In this particular study, cognitive preparation was not found to be a dramatically effective coping strategy for the ongoing stress of flying. (The ongoing stress of flying can be contrasted with flight apprehension. The latter anticipates future events and represents a different stressor from actual exposure to the stress of flying.) Neither was it demonstrated to be an effective device when subjects were confronted with unexpected events.

(3) In this particular research, there were no differences between coping self-talk and any other strategies for the ongoing stress of flying. However, self-talk might be considered an effective coping strategy when dealing with unexpected events, if the individual has access to information about present and forthcoming events. Under conditions where individuals are not deprived of information as to how to evaluate the significance of events, self-talk may serve

simply as attention-diversion away from anticipating the severity of the stress.

(4) Training in the strategy of using self-statements may have deleterious effects if the individual is dedicated to the technique of emitting self-statements, when the appropriate device is to have access to information and reassurance from external sources. There are times when self-talk may not be the strategy of choice; in fact, being instructed to use self-talk and employing self-talk may be more harmful than having access to other strategies and may prevent access to sources of external reassurances.

(5) In this research, it was not possible to demonstrate any difference between cognitive preparation and coping self-statements in long-term reduction of flight apprehension (pre-training to follow-up) among persons who had expressed fear of flying. It is suggested that a repertoire of cognitive coping skills may be more effective in long-term reduction of flight apprehension than the possession of a single coping strategy.

Since subjects in the Combined group reported a greater decrement in flight apprehension at follow-up, compared to Control group subjects, it implies that having a variety of coping skills to draw upon can be advantageous. Therefore, it is suggested that further research be devoted to equipping persons with a repertoire of cognitive coping skills. These skills could include self-statements, cognitive preparation, and in particular the component of seeking reassurance from external sources. Another type of external reassurance that might be provided focuses on imparting accurate information concerning the strength, durability and safety of the aircraft, in addition to information that turbulence is a natural phenomenon in flying and that the aircraft will not disintegrate or crash when turbulence is encountered.

Further it should be borne in mind that the measures of anxiety utilized in this study may have had reactive effects in that subjects were asked to respond to the scales so often during the course of the flights. Unobtrusive measures such as heart rate which utilize amplification and transduction of brachial pulse rate would not force reliance solely upon subjective measures of self-reported anxiety.

It is noteworthy to recall that the STOL aircraft is peculiar in that normal flights occur with the door to the cockpit area open. Generalization of these results to larger commercial flights, which operate with the cockpit door closed, should be tentative, and studies with different types of aircraft ought to be conducted to test this generality. If future research is to be carried out with the STOL aircraft, eliminating the cockpit door manipulation would allow for additional subjects per treatment group. However, this would not allow for the possibility of obtaining the interaction effects which were the main and essential findings of the present experiment.

Finally, in evaluating this research it should be borne in mind that, with reference to these findings, the statistical power of the $\underline{F}$ tests was of the order of .31. Because of small sample size in this research, it implies that sample size increase may have led to other significant findings beyond those which this experiment produced. Therefore, nonsignificant findings in this study should be interpreted with caution.

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Appendix 1

DIRECTIONS GIVEN FOR INITIAL SCREENING QUESTIONNAIRE

My name is Julius Roehl. I am at the Faculty of Psychology at the University of Ottawa. I am here today because we are interested in learning about the attitudes of people who fly in airplanes. How much we learn depends on how honestly and straightforwardly people respond to the questions we ask them. I have a very brief questionnaire that I would like you to complete for me. Please do so as thoughtfully and honestly as you can. Please be sure to answer all the questions and do them in order. Before you begin, wait for my instructions.

Please begin by reading the two paragraphs at the top of the first page. Now, print your name and put your phone number, and age, and circle your sex in the places provided. Also, fill in the name of this class and catalogue number in the proper blank. Now, go ahead and complete the rest of the questionnaire. Be sure to read the directions carefully. After you have finished, turn over the questionnaire and wait for further instructions. Do not discuss your answers with your neighbors.

I want to thank you and professor (name of instructor) for taking the time to participate in our study. Your co-operation is deeply appreciated.

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Appendix 2

INITIAL SCREENING QUESTIONNAIRE

This project is sponsored by the Faculty of Psychology. We would appreciate your full co-operation and ask you to complete all the items as carefully and truthfully as you can.

Please be assured that your responses will remain confidential and will not be disclosed to anyone. Thank you for participating.

Name______________________________

Phone No.__________ Age____ M___ F___ Course__________________

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you <u>generally</u> feel.

There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

	Not at all	Somewhat	Moderately so	Very much so
1. I am tense	1	2	3	4
2. I feel at ease	1	2	3	4
3. I am relaxed	1	2	3	4
4. I feel calm	1	2	3	4
5. I am jittery	1	2	3	4

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you <u>feel</u> right now, that is, <u>at this moment</u>.

There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	Not at all	Somewhat	Moderately so	Very much so
1. I am tense	1	2	3	4
2. I feel at ease	1	2	3	4
3. I am relaxed	1	2	3	4
4. I feel calm	1	2	3	4
5. I am jittery	1	2	3	4

1. Please circle how many times you have flown in an airplane:

   0 1 2 3 4 5 6-10 11-or-more

2. Please check the size of the plane(s) you have flown in and circle how often you have flown in them:

Single-engine, 2-seat (Piper cub)	0	1-5	6-10	11-or-more
Single-engine, 4-seat (Cessna)	0	1-5	6- 0	11-or-more
Other single-engine (Specify)	0	1-5	6- 0	11-or-more
2-engine, propellor	0	1-5	6- 0	11-or-more
4-engine, propellor	0	1-5	6- 0	11-or-more
Large commercial jet	0	1-5	6- 0	11-or-more

3. Please circle how long it has been since you last flew in an airplane:

1-7 days	2 weeks	3 weeks	1 mos.	2-3 mos.	4-6 mos.	7-12 mos.	1-2 years	2-or-more years

4. Have you taken lessons to become, or are you a licensed pilot? Yes___ No___

5. As honestly and truthfully as possible, please circle HOW YOU USUALLY FEEL while flying in an airplane:

   very calm, relaxed 0 1 2 3 4 5 6 7 8 9 10 very nervous, tense

6. Have you ever flown in the STOL (short take-off landing) aircraft between Ottawa and Montreal? Yes___ No___

7. Would you be willing to participate in an experiment which actually involved flying in an airplane? Yes___ No___

8. Are you an habitual cigarette smoker? Yes___ No___

9. Have you ever been treated for:

   rheumatic fever Yes___ No___

   problems with your heart Yes___ No___

   Are you currently being treated for:

   an ear infection Yes___ No___

Appendix 3

TELEPHONE STATEMENT READ TO POTENTIAL SUBJECTS

Hello? (Name of potential participant) I am Julius Roehl at the University of Ottawa. A little while ago, you completed a questionnaire for me in one of your classes. On it, you indicated you would be willing to participate in an experiment that actually involved flying. Do you remember that questionnaire? Well, I am calling to invite you to participate in that kind of experiment for the Faculty of Psychology at the University of Ottawa. Would you be free to participate this Saturday and Sunday? If not, how about next week end?, etc.

You will be given training in ways to deal with anxiety and stressful situations on Saturday afternoon. This will involve about two hours of your time. On Sunday, we will all be flying to Montreal and back. That will take about four hours of your time from 9:15 a.m. to about 1:30 p.m. We are paying for the flight ourselves and are trying to keep expenses down, so it is very important to get a definite commitment from you. You will be expected to be available for part of two week end days, Saturday for training and Sunday for flying.

Because of the time invested in you for your training, it is important to know whether you can participate for both days. We are paying for only a limited number of seats each Sunday and would not want someone to be absent on Sunday who was trained on Saturday.

Can I count on you? Great! Please come to 46 Hastey on the main campus of the University of Ottawa by (specific time) on Saturday, (date). Do you know where this is? It is directly across from the west entrance of the U. of Ottawa central library. There is a sign outside which says "Psychology--Undergraduate courses". There will be a sign on the door at 46 Hastey giving you directions to the proper room.

If an emergency does come up, though I hope it won't and am planning on you very much for this week end, let me know right away. That way I can try to find a replacement for you. My phone number at home is 737-5083; at work you could reach me at 231-4260. I'm looking forward to meeting you in person on Saturday. See you then.

Appendix 4

INTRODUCTION TO ALL SUBJECTS

Thank you for volunteering to participate in our experiment. As you know, this will be conducted in two parts. The first part, today, will involve you for about two hours time in training. The second part, tomorrow, will take more time - about four hours - and will involve flying to Montreal and back.

The success of this study depends totally on your full co-operation and honesty. The success of this experiment depends on your not discussing any details of whatever goes on here with your friends, fellow classmates or the like. That will spoil the effectiveness of this study. In the same way, I want to assure you that your responses will be kept confidential, your personal identity will not be divulged, and information about you will not be disclosed to anyone. Please be further assured that nothing will be done in the experiment that will harm you in any way or be embarrassing to you in any way.

I would like you to begin by completing some forms for me. The instructions are printed at the top of each of them. Place your name at the top of each one. After I have recorded the responses, I will cover your name with tape to protect your identity.

(Subjects then completed three instruments, in order: Self-Report Anxiety Inventory [SRAI], Flight Apprehension Inventory [FLAPI], and Consent Form.)

Appendix 5

SELF-REPORT ANXIETY INVENTORY (SRAI)

Indicate by circling a number on the scales below.

How You Feel at this Moment:

Very calm and relaxed	0	1	2	3	4	5	6	7	8	9	10	Not at all calm and relaxed
Not at all worried & apprehensive	0	1	2	3	4	5	6	7	8	9	10	Very worried and apprehensive
Not at all anxious & nervous	0	1	2	3	4	5	6	7	8	9	10	Very anxious and nervous
Not at all tense & trembling	0	1	2	3	4	5	6	7	8	9	10	Very tense and trembling

Appendix 6

FLIGHT APPREHENSION INVENTORY (FLAPI)

As honestly and truthfully as possible, please circle HOW YOU USUALLY FEEL while flying in an airplane:

Very calm, relaxed	0	1	2	3	4	5	6	7	8	9	10	Very nervous, tense

Appendix 7

CONSENT FORM

The Ethics Guidelines for human subjects participating in research as promulgated by the Ontario Psychological Association, the Canadian Psychological Association and the American Psychological Association indicate that I have the right:

1. to know what I am participating in;

2. to know what I am to do in the study;

3. to choose to participate -- I must volunteer. I cannot be coerced to participate;

4. of protection from physical and emotional harm as a result of the participation during the course of the experiment;

5. to know that my responses will be kept in the strictest confidence and will be used only for purposes of this research, without personal identification;

6. to cease my participation at any time;

7. to know the results of my participation; to any debriefing that may be appropriate at the termination of the study.

I acknowledge having read the above and am in agreement with the same.

By my signature below, I indicate that I am voluntarily participating in this research which will involve a round trip flight via STOL aircraft from Ottawa to Montreal. Further, I release the University of Ottawa and all members of the staff of the Facultv of Psycholoqy of the University of Ottawa and any of its students who may be involved in this research from all claims arising out of anv injury, whether physical or mental, which mav arise as a consequence of the research in which I am to be a participant and I assume full responsibility for the same.

Witness________________________ Name________________________________

Date___________________________ Date________________________________

Appendix 8

INFORMATION TRAINING PROCEDURE

Most people are somewhat anxious and apprehensive about flying in an airplane. However, that is often because they do not have enough information about what to expect. This is what we will learn about this afternoon.

The purpose of the following experience is to give you as much information as possible to help you deal with a stressful situation. It is your responsibility to acquire as much of that information as you can. How well you learn it today will affect how well you can use it later and how well you will deal with the stress of flying.

Before I describe the training program, let me tell you about what we will do tomorrow. Tomorrow, we will be taking a flight to Montreal and back, and will be monitoring our own stress activity. Before you board the plane, sensors will be attached to your wrists and your left ankle. (At this point, the experimenter held an electrode to his left wrist before passing the electrode to the subjects for them to examine.) When you get on board, these will be plugged into a tape recorder that will record your heart rate. Also, from time to time, you will be asked to report on how you are feeling. Forms will be provided for you. The experimenter will ask you periodically to complete the forms. Do so as honestly and carefully as you can. I will return to tomorrow's flight and the forms later.

The purpose of our training today is to give you as much information as possible about the flight tomorrow in order to help you manage stress. We have only two hours in which to do this learning. It is vitally important that we have your complete mental and physical co-operation for you to acquire as much information as possible.

To begin with, I would like us to think of some situations that make us uptight or nervous. Can we list a few on the board. (Experimenter wrote on blackboard as subjects stated stressful situations.)

Fine. Now, let us look at how we cope with situations generally. What kind of things do you know about the dentist and exams that help you handle those situations? Knowledge about events can help us cope better. This is opposed to not knowing anything when we find ourselves not as able to cope. Let us try to list a few things we know about the events we listed on the board. (Experimenter wrote on blackboard as trainees reported what they knew about the previously listed stressful situations. For example, in relation to taking an exam, such information as the following was shared: persons are sitting, it is generally quiet, test papers are passed around, you need to watch the time you have, you should work on the easiest items first, etc.)

Research has shown that the best way to manage stress is by acquiring as much information as you can about the anticipated situation. We can call this preparatory communication.

This is a proven technique. Pay close attention and actively listen and you will be more effective in managing stress generally. There have been numerous experimental reports, as well as clinical reports, that have shown the effectiveness of preparatory communication in managing stress. This procedure would not be worthwhile if it were only useful as an experiment. It has many applications outside of taking exams, going to a dentist or flying.

Professor Irving Janis at Yale University, through numerous experiments, has shown the effectiveness of acquiring information in order to deal with various types of stresses. By learning as much as you can about the stressful situation, you will find you are better able to anticipate and manage situations where you previously had difficulty.

Professor Janis has taken this approach and developed procedures that are based on hundreds of observations and reports of people who have faced stresses like the loss of homes and family members due to tornadoes or hurricanes, or the fear of facing surgery.

Dr. Janis has shown that people who knew in great detail what to expect before and after surgery were better able to cope with the pain and discomfort they experienced and they made quicker recoveries. Those who were not given detailed information faced their surgery with more anxiety and also took longer to recover from the effects of the operation. Professor Janis and others have concluded that the more information we can acquire about a stressful event, before it happens, the better we are able to cope with it when it actually does occur.

Dr. Janis always helps people reassure themselves about the training and competence of those in control by telling them about the training, experience and ability of doctors, nurses and the like. The procedure we are using today is based on Professor Janis' work.

Let us quickly review. Preparatory communication can give you information about an expected stressful situation that will help you manage it better. Knowing what to expect helps us to manage better. Not knowing what is anticipated is more stressful. If you know all the details of an expected event, why they are occurring, in what order they usually occur and what to anticipate, then you can be more confident and you will not have to ask questions of yourself as to the reasons for these things happening. As well, if you know about the competence of those in control, like the pilots, you can give yourself reassurances that will further help you manage in that stressful situation.

The following is what you can expect to happen tomorrow. Please listen and look carefully and actively as this is important to help you acquire as much information as you can. This will allow you to be well-prepared for our flying tomorrow.

You will come to this place by 9:15 A.M. tomorrow. Because you will be gone until after lunch, it is important for you to eat a good breakfast before you get here. You will be asked to complete two short questionnaires at this time.

At 9:40, we will all take an OC Transpo bus from Nicholas Street to the Holiday Inn downtown. From there, we will board the STOLmobile bus at 10:30. It is a little red bus, like the two pictured here, (Slide 1)[1] that will take us to the STOLport. As you will see, it is painted with the words AIRTRANSIT on each side and on the front. The ride to the STOLport will take ten to fifteen minutes. It is important that you do not talk to each other on this ride as it may ruin the results of this experiment if you do. We will be passing through Ottawa and Vanier on our way. When we come to a set of lights on St. Laurent Blvd., you may notice a green and white sign with an arrow pointing to STOLport and reading in French ADAC port. Once we cross St. Laurent Blvd., the road has a few curves in it and we will drive through what is a flat open treeless area. Once again, we will come to a junction in the road and turn left at the

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[1]A description of each slide appears at the end of the transcript of this training procedure.

sign pointing to the STOLport. After making a left turn, the buildings of the STOLport can be easily seen in the distance directly ahead of us.

As we ride along and the STOLport gets closer, you may see large clouds of smoke and steam rising behind the buildings. This is from the paper mill across the Ottawa River in Quebec.

As we approach the STOLport, you will notice there are four buildings on the site. (Slide 2 - The experimenter pointed out the buildings on the screen as they were described on the tape.) On the farthest right is a rather small low brown building. This is a maintenance garage used to house snow blowers, runway sweepers, plows, etc.

Near the center is the largest building on the site. It is also light brown with a dark brown roof overhang. This building is the maintenance hangar for the aircraft. This is used for the day-to-day upkeep and inspections of the aircraft. Our plane will be kept in there and serviced before we use it tomorrow.

In the center, directly at the end of the road leading to the building complex, you will see the control tower. It looks somewhat like a lighthouse with the top of this light brown structure all enclosed in glass.

The fourth building we will see is a one-story, low building, quite close to the tower. On the top of it, are white letters reading STOLport, ADACport. (Slide 3) This is the passenger terminal and the STOLmobile will stop in front of it. This is where we will get out.

As we enter the passenger terminal, we go through two sets of double doors. (Slide 4) Once inside, on the right, you will notice the ticket counter. The lobby area on the left has a number of red vinyl chairs generally grouped in fours. On the wall to the far left, is a row of vending machines that dispense coffee, tea, soups, sodas, doughnuts, etc. Immediately ahead of you, is a glassed-in area beyond which you will see the plane on which we will be flying. We will learn more about the plane later.

You may see a small number of people around the terminal. At this hour (Slide 5), one of them may be a uniformed RCMP officer. There is one on duty at all times.

Because we will be recording your heart rate and do not want you walking around during the flight, I will ask you to go to use the washroom to empty your bladder. The toilets are located at the far left near the vending machines I mentioned earlier.

After you have used the washroom, I will ask you all to sit in one of the chairs. At this time, the sensors will be attached to your wrists. They are about the size of the end of your finger. The experimenter will take an alcohol swab and use it to clean an area on your wrists. As the alcohol dries, you will feel a cooling sensation. A clear paste will be applied to your wrists. This helps the sensor to record your heart beats. The sensor will then be taped to your wrist with nonsticky tape. A loop will be made with the wire and another piece of tape will attach that to your arm. This will allow you to move your arms around a bit and let you write, etc.

These sensors will then be tested by plugging them into a little black box hooked up to a tape recorder. This will be the same arrangement that you will see in use on the plane.

After all of you have the sensors attached and they are found to be in working order, you will be free to move about the terminal for a few minutes.

Five to ten minutes before we leave, you will hear one of the girls at the check-in counter make this announcement over the public address system: "All passengers leaving on the 11 o'clock flight proceed to preboard screening."

You will go to the area in the center of the terminal that is all enclosed with glass. (Slide 6) From here, you can get a pretty good look at the plane. At the doorway to the area, will be a man with an electronic sensing device. This is a looped rod with a battery-powered handle. It is passed over your body, under your arms along the outside of your body, front, back, etc. Whenever it passes over something metallic, you will hear it make a crackly, staticky sound. This will happen when it passes over keys, change, a watch, belt buckle, metal buttons or the like. While this is really unnecessary for us, it's only a formality, and no one will be stopped. After you are checked, you can take a seat in this enclosed area.

When this process is completed for all of us, I will ask you to complete a questionnaire. This will be the first in a series that you will be completing. We will give you more information about these specific questions near the end of our training today.

After you have completed the questionnaire, we will be ready to board the plane. The experimenter will assign you a seat in the plane. A stewardess, likely the same woman who made the announcement about preboard screening, will lead us all out to the plane. (Slide 7) You may be surprised by its size.

The plane in which we will be flying is a DeHavilland Twin Otter. It was chosen for use in this STOL project because of its previously demonstrated reliability, quietness and international acceptance. Currently, more than 350 Twin Otters are regularly operating in upwards of 45 different countries.

When you get out there, you may see a long, heavy, black cable leading to the plane, at the right of the door. This is for auxiliary electrical power when the plane is on the ground. You will go up a narrow set of metal stairs. Be sure to duck your head and keep it ducked until you sit in your assigned seat. (Slide 8) Immediately to your left as you enter, is a place to hang your coats. To your right as you enter and to the very back of the cabin, is a lavatory. The interior of the cabin is arranged like this. The seats and carpet are a turquoise blue fabric. The seat size and spacing are the same that you would experience in the largest airplanes among the world airlines. You will note that the seat is nonreclinable but that its fixed position is at a more comfortable angle than the upright position of most airline reclinable seats.

Once you are settled in your seat, the stewardess will make sure to check that you are buckled in. The experimenter will again plug the sensors into the black box and test to see that the recorder is working. After this, you may want to familiarize yourself.

If you look above you, you will see a light and an air outlet over your seat. In the pocket on the seat ahead of you will be a clipboard with a packet of questionnaires that you will be completing. They are closed with seals and you will be asked to break the particular numbered seal before you complete the questionnaire. You are to keep the clipboard on your lap throughout the flight.

If you look to the side, you will likely be able to look out a window and see the ground. If you look all the way to the front, you will see the cockpit (Slide 9) with a large number of switches, levers and instruments. The door will always be open. (Given to condition of cockpit, door open throughout the flight.) While flying, you won't be able to see this. (Given to condition of cockpit, door being closed during flight.) Just outside the cockpit on the right front wall of the cabin, you will see the lighted signs reading "No smoking" and "Fasten your seat belts".

(Slide 10) You will see two men seated in the cockpit. These are the crew. The crew of two pilots flying our Twin Otter consists of the captain (in the left seat) who is the pilot in command, and the first officer (in the right seat). The names of the pilots flying your airplane will be posted on the left hand front wall of the cabin, right across from the "No smoking" sign.

These men possess the Canadian Airline Transport License. This certifies that they have successfully met the stiffest qualifying standards in this country. Once licensed, these men undergo a proficiency check at least every three months with a total of six checks per year. Because Airtransit is a subsidiary of Air Canada, all pilots and first officers must meet the standards for commercial pilots flying anywhere in the world. All the crew members have been flying this type of aircraft since the beginning of the trial flights and the beginning of actual regular STOL service between Ottawa and Montreal. Further, all pilots are former military pilots with an average of 20 to 25 years of flight experience under all types of conditions. Their experience has included flying the Governor-General, ministers of Parliament, etc. You may be assured that your crew tomorrow will be of the highest caliber, having met the most stringent standards of competence, ability and experience that Canada requires for airline pilots.

There will be no cabin attendants aboard this flight. This is standard procedure. With such a short flight, they do not serve any food or beverages and, with a maximum of only eleven passengers, the pilots are quite capable of providing any assistance required in the cabin.

About now, you will probably hear the door to the cabin shut with a dull clunk. At this time, you will hear me give this instruction: "Please take the clipboard from the pocket ahead of you. Break seal number one with the eraser end of your pencil and complete questionnaire number 1." Keep the clipboard on your lap throughout the flight. After you finish this, you may possibly see or hear the right engine being started. The plane may vibrate a bit as this is happening. The first officer will then make the following announcement over the intercom: "Welcome aboard Airtransit's STOL service to Montreal. Please fasten your seat belt and refrain from smoking. You may smoke when the "No smoking" sign has been switched off after take-off." These are standard announcements. The left engine will also be starting at about this time. Shortly after this, you may see the pilot with his right hand over his shoulder on some controls. The first officer may also have his hand over his shoulder and controls. (The latter two sentences were omitted in the training group flown with the cockpit door closed.)

The plane will begin to taxi. We will make a right turn, go for a short distance, make a left turn and then turn right onto the runway. The pilot again has his right hand over his shoulder at points (this sentence omitted for closed cockpit). All along, you may be surprised at the sound the engines make inside the plane. When we reach the beginning of the runway, the plane sort of swings around to the right while standing in place. We will then come to a brief complete stop.

You will hear the noise of the engines get louder as the engines rev-up for take-off. Very quickly, we will be taxiing down the runway. There are some bumps as we go along. The sensation is somewhat like a quick acceleration with a very powerful car as you feel yourself pressed against the back of the seat. There is a sort of surge forward as we get off the ground.

The take-off run of the plane is very short. After lift-off, it climbs at a steeper angle than what you may have experienced with other conventional aircraft. Even when the seat belt sign goes off, Airtransit recommends that you keep your seat belts loosely fastened throughout the flight.

On the left (Slide 11), as we taxi and climb, you will see a part of Ottawa's Rockliffe Park area. On the right, will be the Ottawa River and the Province of Quebec.

You may hear some beeping sounds from the cockpit. These come from a small computer on board.

(Slide 12) We bank to the right and continue to climb. You may not even be aware that we are turning and banking until you notice blue sky out of one window and the ground out of the opposite one. There may be some bumping sensations as we continue to gain altitude. You may also feel some popping in your ears as we gain further altitude and your ears adjust to the changes in air pressure. In a matter of a few minutes, we will be at cruising altitude.

(Slide 13) At that point, you will hear the E on the intercom tell you to "break seal number 2 and complete questionnaire number 2 at this time, please". Please keep the clipboard on your lap throughout the flight.

Throughout the flight, you will frequently hear a beep-beep sound from the cockpit. It is a signal which announces to the pilots that the airplane is approaching the next way point of the computer-programmed flight path. This is a feature of the Area Navigation equipment on board: most sophisticated in use for air navigation. Airtransit is the first airline to use it in Canada. It is extremely accurate and virtually maps out a three-dimensional highway in space which the pilot can easily follow on his instruments. Area Navigation permits less frequent verbal communication with air traffic controllers who can still monitor the progress of the flight by radar. This Airtransit Twin Otter is also equipped with weather radar.

After a time, you may have had a chance to look around you. You will see that we are not really flying that high off the ground. (Slide 14) We will cruise between a minimum of 3,000 feet and a maximum of 5,000 feet. You may see the Gatineau Hills of Quebec, some of the farms and small towns and snow-covered fields of Ontario. After about ten minutes, you will hear the experimenter give you instructions to "break seal number 3 and complete questionnaire number 3".

You may be getting accustomed to the flight and not feel at all as if you are moving, although you may feel an occasional bump like you would experience riding in a car. Someone described it sort of like taking a tame ride at a carnival midway. After about another ten minutes, the experimenter will once again give the instructions, "break seal number 4 and complete questionnaire number 4".

About ten minutes later, the experimenter will aaain come over the intercom with the instructions. "please break seal number 5 and comolete questionnaire number 5".

(Slide 15) As we get closer to Montreal, we will have a change in altitude either descending or ascending, depending on what elevation we have been flying at. (Slide 16) You may or may not be aware of this, though you may feel a change in pressure in your ears.

(Slide 17) Not too much later, we will begin our descent to land. This will be preceded by the first officer turning on the "Fasten your seat belts" sign and the "No smoking" sign, and making this standard announcement over the intercom: "We will be landing shortly. Please ensure that your seat belt is fastened and refrain from smoking." Once again, you will see the crew with their hands above their shoulders adjusting controls as the plane descends. (This last sentence was omitted for the flight condition with the cockpit door closed.)

(Slide 18) You will feel the nose of the plane go down, the sound of the engines will change and you will feel a deceleration, somewhat like when you apply the brakes after a fast ride on the highway. (Slide 19) If you look out of the plane, you may see the St. Lawrence River in the foreground with the runway in the distance. Seeing the runway before landing, you may think it looks very small.

As the airplane approaches (Slide 20), the angle of descent is steeper than that of a conventional airplane. That is why you may feel a slight angle forward in your seat. The instrument landing guidance system which has been adapted to the STOL operation, known as MLS (micro-wave landing system), permits steeper approaches. MLS is more accurate than conventional landing guidance systems and is not subject to interference such as reflection of its beamed signals from nearby tall structures.

During descent, you may experience some mild "blocking" sensation in your ears. This is caused by the changes in air pressure. The sensation can generally be cleared by swallowing.

While the plane descends slowly, the entire landing is over very quickly. (Slide 21) Before you know it, we will be touching down on the runway. As soon as we do so, the engines are reversed and the brakes applied so we will come to a stop very quickly!

(Slide 22) After landing, the first officer will announce: "We hope you have enjoyed your flight and thank you for flying Airtransit." The experimenter will give you the instructions: "Please break seal number 6 and complete questionnaire number 6." After you have completed the questionnaire, he will then begin with those seated at the back, turn off the tape recorder and unplug the sensors from the black box and you will be able to leave the plane. (Slide 23) Do not forget to pick up your coats. We will be in the terminal at Montreal for about half an hour. Please do not take any coffee or tea at this time, although soda or juice is okay. We will be on the ground long enough to refuel the aircraft and to check our eauipment before we leave for our return trip to Ottawa. Please do not talk to each other at the STOLport nor at any time during the flight.

You will find the interior of the STOLport at Montreal basically the same as that in Ottawa. These are simple in design and conceived for fast and efficient processing of the travelling public. Most of the frills found in conventional airports are absent, since the Terminal is geared to quick and efficient service more useful to commuters which feature minimal waiting time.

Before we get ready for our return flight, once again I will instruct you to use the lavatory because I do not want you walking around on the plane while we try to record your heart beats.

Before we get on board the plane, once again I will ask you to sit in one of the chairs for a moment while I check to see that the sensors are still attached correctly.

Five to ten minutes before we are to leave, we will again hear the announcement over the public address system about going to the preboard screening area. We will go through that process again. After all of us have completed that procedure, the experimenter will give you a questionnaire to complete. Following this, we will board the plane again. After the sensors are connected to the black box and tested and your seat belts are fastened, the door will be closed and you will again be asked to take your clipboard and break seal number 1 and complete questionnaire number 1.

At various points during the flight, you will be asked to break seal numbers 2, 3, 4 and 5 and complete the appropriate questionnaires under them.

(Slide 24) Landing at Ottawa is a bit different from landing in Montreal. Likely, we will not be circling the city as we did at Montreal. (Slide 25) Rather, you will hear the usual announcement from the first officer: "We will be landing shortly. Please ensure that your seat belt is fastened and refrain from smoking." The "No smoking" sign and "Fasten your seat belts" sign will also be lit. (Slide 26) We simply come in over the East end of Ottawa with houses on our left and the Ottawa River on our right.

After we are on the ground, you will be asked to break the seal to number 6 and complete questionnaire number 6 at that time.

Again, the experimenter will unplug the sensors from the black box and you will be free to leave the airplane. When we get back to the terminal, the experimenter will remove the sensors from your wrists and ankle, and you may want to go to the washroom to wash off the paste residue.

In a few minutes, all of us will reboard the STOL-mobile and be taken back to the main campus at the University of Ottawa. We will meet at 46 Hastey for a period for coffee and doughnuts and a chance to get your views on your experience. At this time, we will conduct a brief postexperimental interview.

In order to ensure that we learn as much as we can about the events we can expect tomorrow, I am going to show the slides and go through the tape once again. Listen and watch as actively and carefully as possible as this will help you acquire some more information, in case you may have missed something the first time we went through this procedure.

Description of Slides Shown in Information Training Procedure

Slide 1	STOLmobile Buses Parked at STOLport Passenger Terminal.
Slide 2	Buildings on the Site of the Ottawa STOLport.
Slide 3	Entrance to Passenger Terminal at Ottawa STOLport.
Slide 4	Ticket Counter in Passenger Terminal at Ottawa STOLport.
Slide 5	Interior View of Passenger Terminal at Ottawa STOLport.
Slide 6	Exterior View of DeHavilland Twin Otter (STOLcraft).
Slide 7	Passengers Boarding STOL at Ottawa STOLport.
Slide 8	Architect's Rendering of the Cabin Interior of Twin Otter (STOL).
Slide 9	Close-Up View of Cockpit of Twin Otter.
Slide 10	Cockpit of Twin Otter as Viewed by Passengers.
Slide 11	Aerial View of Ottawa STOLport immediately Following Take-Off.
Slide 12	Aerial View of Ottawa During Ascent Following Take-Off.
Slide 13	Aerial View of Ottawa at Cruising Altitude.
Slide 14	Aerial View of Ottawa at Cruising Altitude.
Slide 15	Aerial View of Montreal at Cruising Altitude.

Slide 16	Aerial View of Montreal at Cruising Altitude.
Slide 17	Aerial View of Montreal at Onset of Descent for Landing.
Slide 18	Twin Otter (STOL) Descending to Land at Montreal.
Slide 19	Aerial View of Runway at Montreal STOLport.
Slide 20	Twin Otter (STOL) Immediately Prior to Landing.
Slide 21	Twin Otter (STOL) Landing at Montreal.
Slide 22	Buildings on the Site of the Montreal STOLport.
Slide 23	Interior View of Passenger Terminal at Montreal STOLport.
Slide 24	Aerial View of Ottawa STOLport on Approach for Landing.
Slide 25	Twin Otter (STOL) Descending to Land at Ottawa.
Slide 26	Aerial View of Runway at Ottawa STOLport.

Appendix 9

SELF-TALK TRAINING PROCEDURE

Most people are somewhat anxious and apprehensive about flying in an airplane. However, it is possible for people to control their emotions if they know how to go about it. This is what we will learn this afternoon.

The purpose of the following experience is to teach you a coping strategy to use in a stressful situation. It is your responsibility to learn that coping strategy as well as you can. How well you master it today will affect how well you can use it later and how well you will cope with the stress of flying.

Before I describe the training program, let me tell you about what we will do tomorrow. Tomorrow, we will all be taking a flight to Montreal and back and will be monitoring our own stress activity. Before you board the plane, sensors will be attached to your wrists and your left ankle. (At this point, the experimenter held an electrode to his left wrist before passing the electrode to the subjects for them to examine.) When you get on board, these will be plugged into a tape recorder that will record your heart rate. From time to time, you will be asked to report on how you are feeling. Forms will be provided for you. The experimenter will ask you periodically to complete the forms. Do so as carefully and honestly as you can. I shall return to tomorrow's flight and the forms later.

The purpose of our training today is to teach you how to cope with stress. We have only two hours in which all of us can practise. It is vitally important that we have your complete mental and physical co-operation for you to learn this coping strategy.

To begin with, I would like us together to think of some situations that make us uptight or nervous. Can we list a few on the board? (Experimenter wrote on blackboard as subjects stated stressful situations.)

Fine. Now let us look at how we cope with those situations generally. What kind of negative thoughts run through your mind when you are facing that situation? Let us see if we can list some of them. (Experimenter wrote negative thoughts suggested by subjects for previously listed stressful situations.)

All of us have probably faced one or more of these situations. Now let us think, what kind of reassurances do you give yourself? Let us try to list them. (Experimenter wrote on blackboard positive or reassuring thoughts or statements in contrast to the above-listed negative thoughts.)

To help you understand more how to control your anxiety and apprehension, let us look at what happens to all of us when we meet a stressful situation. We experience two things. Things happen physically, and we think. Physically, our palms may get sweaty, our heart may beat faster, our body may feel tense, and we may notice that we breathe faster and we may feel dryness in our mouth.

Secondly, we also start thinking. We may think negative thoughts, or how we can avoid the situation, or how we can cope with it. We may feel helpless, or have the desire to run, or our thoughts may become jumbled and we may feel panicky.

It has been found that taking a slow, deep breath can be helpful in dealing with some of the physical effects. Watch me. I shall take a slow, deep breath. As I pay attention to the air coming in and slowly going out, I will feel relaxation come over me.

Research has shown that the best way to control your thoughts and feelings is through what you tell yourself. We can call these self-statements, or self-talk. What we think influences what we feel. What we say to ourselves, our negative self-talk, can have an effect on how we feel. The trick is to learn to control our self-talk. If we can control our self-talk, we can control how we feel. By substituting positive self-talk for the negative thoughts, we can feel positively about situations we encounter and can cope with them more adequately.

This is a <u>proven</u> technique. Pay close attention to this procedure and actively practise it and you will be more effective in coping with stress in your everyday life. There have been numerous experimental reports, as well as clinical reports, that have shown the effectiveness of realistic, coping self-statements, or self-talk, in dealing with stress. This procedure would not be worthwhile if it were only useful as an experiment. It has many applications in everyday life.

Professor Donald Meichenbaum at the University of Waterloo, through numerous experiments, has shown the effectiveness of these self-statements, or self-talk, in dealing with various types of stresses. Some of these were fear of public speaking, fear of exams, and the like. By learning and using this procedure, you too will find that you are better able to cope in situations where you previously had difficulty.

This procedure is based on the theories and practices of many different scientists and therapists. It is commonly known as a semantic approach. One of the main sources of this procedure is from the work of Dr. Albert Ellis, the founder of Rational Emotive Therapy. Dr. Ellis stresses the role of negative and unrealistic self-statements in causing and/or maintaining anxiety. Through his procedure, people learn to be more realistic in their self-talk and more anxiety-free in their everyday life. Dr. Ellis has reported many successes in the professional literature and has been very influential in the field of therapy in recent years.

Professor Meichenbaum has taken the semantic approach and has developed procedures that are based on accepted learning theory approaches and the findings of experimental psychology. Dr. Meichenbaum's approach has the advantage of being very amenable to use in groups such as ours. His procedure consists of determining the self-statements that an individual uses for coping in certain situations. Dr. Meichenbaum then demonstrates to the individuals how those and similar self-statements can be useful in certain other situations where an individual has had difficulty in the past. The procedure we are using today is based on Professor Meichenbaum's work.

In this part of the experiment, then, we will concentrate on learning a set of positive coping self-statements. These, you can use when you are confronted with a stressful situation. Use them to replace the negative statements you make to yourself. I shall give you an example in a minute.

In order to overcome a panicky feeling or jumbled thoughts, it has been shown that you can cope better with a stressful situation if you break it down into four phases. Phase 1 - preparing for the stressor; Phase 2 - confronting or handling a stressor; Phase 3 - possibly being overwhelmed by a stressor; Phase 4 - Rewarding yourself for having coped. (Experimenter wrote each phase on blackboard.)

Let us quickly review. Positive self-statements can control your emotions when they are used in place of negative or bad self-statements. If you break down a stressful situation into four phases, you can cope better with it. Look at the board. The four phases again are: 1 - preparing for a stressor; 2 - confronting or handling a stressor; 3 - possibly being overwhelmed by a stressor; 4 - rewarding yourself for having coped.

Fine. Now let us take one of the situations we mentioned at the beginning that made some of us uptight. Let us consider taking an exam. When I am handed the test and first look at it, I might make some negative self-statements like this: "I didn't study that part well;" or "I can't get all this question;" or "I'll never be able to finish in the time I have;" or "How can they be finished already?" Sound familiar? Now I can replace all of those jumbled thoughts by thinking: Let's see; break this into four phases. I'll use the negative self-talk as a signal to use positive coping self-statements."

For the first phase, preparing for a stressor, I can say: "What is it I have to do? What does the question really ask? Then, for the second phase, confronting and handling the stressor, I can say: "I'll take my time. Just think it through and answer as clearly and carefully as I can. No need to get panicky. I can handle this." For the third phase, feelings of possibly being overwhelmed, I can say: "Remember, use positive self-statements. This tenseness can be used as a signal to cope. Keep on the task. Don't let your mind wander. That guy who just handed in his paper must not know much. They'll score this on a curve." Finally, for Phase 4, rewarding myself for coping, I can say: "Great! I handled that really well! It's almost over; just one more question. It's working. It isn't that bad after all. I can go on to the next question and handle that okay too."

Now, I am going to give you a prepared list of self-statements that I would like you to learn to use. Read over the list, notice how it is designed, taking into account the four phases. I would like you to stop and think for a time. Think of a stressful situation, possibly one of those we listed on the board. Got one? Now, think of how you would use coping self-statements. I would like you to choose at least two self-statements for each phase. You may use some of the ones on the list, or you may choose statements that are uniquely your own. When you have decided on them, I would like you to write them down on the sheet of paper I shall now provide. (Subjects completed list of self-statements on blank form provided.)

Fine. Now I would like to have you take time to rehearse and learn the self-statements well enough so that you can give them from memory in a few minutes. Tell the experimenter when you think you have them memorized well and feel able to use them in a stressful situation. (Subjects were given approximately five minutes for memory work.)

Good. Now I would like you to recall those statements and write them down on the paper I'm providing. (Subjects wrote their list of coping self-statements which they had just learned.)

Very good. Now we will practise using your positive coping self-statements in their proper sequence in an imagined situation. Let us imagine you are afraid of horses and you are to go horseback riding. If I had that kind of fear, here is what I would do. I shall model for you and you can practise your self-statements to yourself as we go along. Sit back, close your eyes if it will help you visualize and imagine. We are at the farm and I am walking towards the horse which has its bridle and reins on and is already saddled. I think: "Break it into four phases." So, in preparing for the stressor, for the first phase, I can say: "That looks like a tame, gentle horse; no need to get nervous; the horse isn't going to bite or kick me. Worry won't help anything. Maybe I can just get acquainted a bit before I get on." Okay, now practise what you would say. (Pause) For the second phase, imagine that you are now beside the horse with the reins in your right hand and you are gently rubbing the horse's nose with your left hand. I can say: "Relax. I'm in control. One step at a time." Okay, now practise what you would say. (Pause) For the third phase, I might even say, as I begin to worry that the horse might bite: "This tension and nervousness can be used to cope. Or, use positive self-statements; they will help me stay in control. Relax. He's a gentle horse." Okay. Practise what you would say. (Pause) Finally, as you are all ready to get into the saddle, you could say: "I knew I could do it. I handled this really well. I can relax and enjoy this ride. Then, as I ride, I continue going through the statements again whenever I feel some tension."

Okay. Now practise what you would say. Talk to yourself. You know you won't get hurt; you just want to control your unrealistic reactions. (Pause)

Good. Now this time we shall continue with the horseback ride, only I shall not give you any statements as I want you to practise using your own. Imagine along with me; close your eyes. The scene is that you are standing beside the horse and about to get into the saddle. As you step towards the horse, it moves its legs around a bit and sort of shies away from you. Now imagine yourself preparing for the stressor and making positive self-statements. Practise your own. (Pause - approximately fifteen seconds.)

Good. Now you have gotten on the horse and it is slowly walking away with you in the saddle. Imagine yourself confronting and handling the stressor and making positive self-statements. Practise your own. (Pause - approximately fifteen seconds.)

Fine. Now imagine you are still on the horse and you want it to go slowly, but it seems to want to go faster and as it trots you bounce up and down in the saddle. Now imagine yourself possibly being overwhelmed and making positive self-statements. Practise your own. (Pause - approximately fifteen seconds.)

Good. Now you pulled back on the reins and the horse is walking along slowly. You are sitting in the saddle feeling quite relaxed. Imagine yourself rewarding yourself for having coped so well. Practise your own positive self-statements. (Pause - approximately fifteen seconds.)

Alright. Suppose that you are somewhat anxious and apprehensive about flying and are going to take a trip in an airplane tomorrow. We will be flying tomorrow. What positive coping self-statements can you come up with? Write them on the sheet I am now providing. Have at least two for each phase.

(Subjects completed list of coping self-statements. This was followed by an exercise where each individual shared with the group their self-talk for each phase. Where necessary, guidelines and reminders were given by the experimenter that seeking external reassurance in the plane, pilot, weather, etc. would not be as effective as giving oneself reassurances. Subjects whose self-statements were based on the external environment were asked and helped to formulate coping self-statements which were more reflective of attending to the subject's own internal state.)

Tomorrow, when we go for our flight, you may be distracted by many things and may not think of using your coping self-statements. It is highly important for you to think of using positive self-talk. Using it will help you to cope with the apprehension and nervousness you may have about the flight. It is very important for the success of this experiment that you use positive self-statements throughout the flight. Make sure you use them tomorrow. Using self-talk will not prevent you from enjoying the flight; in fact, if you are less anxious because you used your positive coping self-statements, you will have more time to enjoy the flight.

In order for today's training to be most effective, I expect that you will be practising using your positive coping self-statements between now and tomorrow when we are actually flying. (Subjects took their list of self-statements with them to be returned the following morning.)

Appendix 10

SAMPLE LIST OF SELF-STATEMENTS

Phase 1- Preparing for the stressor.

1. I have a strategy to deal with this.
2. No negative self-talk, just positive self-statements.
3. Don't worry, worry won't help anything.
4. No need to get nervous, I can use positive self-talk.

Phase 2- Confronting and handling the stressor.

1. This tension can be a signal to practise my positive self-talk.
2. I can handle this. I'm in control.
3. I expected some fear, but I'm in control.
4. This flight isn't really all that bad, I can cope.
5. Take a deep breath.
6. I'm O.K.
7. Just talk positively.
8. I won't let this get to me.

Phase 3- Coping with feelings of being overwhelmed.

1. This tenseness is what the trainer said I might feel.
2. Remember, I have a strategy, it'll help me stay in control.
3. Don't try to eliminate the fear totally, just keep it manageable.
4. No matter how anxious I get, I can handle it.
5. I'm in control.

Phase 4- Rewarding self-statements.

1. I knew I could do it, I handled it well.
2. I controlled my thoughts and the self-talk worked.
3. I can relax and enjoy this flight.
4. I did really well, next time I feel tenseness I'll do even better.

Appendix 11

PSEUDO-TREATMENT CONTROL TRAINING PROCEDURE

Most people are somewhat anxious and apprehensive about flying in an airplane. However, that is often because they do not know the history of transportation, in general and the history of aviation, in particular. This is what we will learn this afternoon.

The purpose of the following experience is to acquaint you with many aspects of the development of transportation in Canada, including the history of powered flight. It is your responsibility to acquaint yourself with this as much as you can. How much you acquire today will affect how well you will deal with the stress of flying tomorrow.

Before I describe the training program, let me tell you about what we will do tomorrow. Tomorrow, we will all be taking a flight to Montreal and back and we will be monitoring our own stress activity. Before you board the plane, sensors will be attached to your wrists and your left ankle. (At this point, the experimenter held an electrode to his left wrist before passing the electrode to the subjects for them to examine.) When you get on board, these will be plugged into a tape recorder that will record your heart rate. From time to time, you will be asked to report on how you are feeling. Forms will be provided for you. The experimenter will ask you periodically to complete the forms. Do so as carefully and honestly as you can. I'll return to tomorrow's flight and the forms later.

The purpose of our training today is to acquaint you as much as possible with the history and development of aviation in Canada in order to help you manage the stress of flying. Further, the history and development of other modes of transportation is usually helpful to you in learning how to cope with stress. We have only two hours in which to do this learning. It is vitally important that we have your complete mental and physical co-operation for you to acquaint yourself as much as possible with this historical process.

To begin with, I would like us to think of some situations that make us uptight or nervous. Can we list a few on the board. (Experimenter wrote on blackboard as subjects stated stressful situations.)

Fine. Now let us share some of the things we think about or feel when we are in those situations. (Experimenter wrote on blackboard as trainees reported negative or positive thoughts and feelings related to previously listed stressful situations.)

Maybe we can talk about our apprehensions about flying. What are some of the feelings and fears we experience? Can we share them a bit? (Subjects shared with experimenter and each other their apprehensions of flying, without discussion or attempt at allaying their fears or anxiety.)

Research has shown that a way to manage the stress of flying is by acquainting yourself with the mode of transportation causing stress and by learning of the history and development of transportation, in general and of flying in particular. We can call this Icarian communication. This procedure is based on the theories and practices of many different scientists and theoreticians. Dr. John Garnichts of the Pennsylvania State Institute of Psychological Technology, through numerous experiments, has shown the effectiveness of this procedure in dealing with various types of stresses. By being exposed to, and acquainting yourself with, this procedure, you will find that you are better able to cope in similar situations where you previously had difficulty. This is a proven technique. Pay close attention and actively listen and you will be more effective in managing stress generally. There have been numerous experimental reports, as well as clinical reports, that have shown the effectiveness of Icarian communication in managing stress. This procedure would not be worthwhile if it were only useful as an experiment. It has many applications in everyday life outside of flying, taking exams, or going to a dentist.

The procedure we are using today is based on Dr. Garnicht's work. You will be shown films; each of them will be followed by a questionnaire and a brief discussion period with the experimenter. The discussion will center on the content of the film, especially on what you liked least and liked most about the film. Please listen and look carefully and actively as this is important to help you acquaint yourself with the material being presented. Participate in the discussions. All this will then help you to be well prepared for your flying tomorrow. (Three films were shown in the numerical order listed in the following Appendix. After each film, subjects rated their reactions to the film which they had just viewed.)

Appendix 12

DESCRIPTION OF FILMS IN ORDER OF SHOWING

1. "In the Beginning, a Wilderness of Air"

   Time: 28 minutes 45 seconds

   Reviews some of man's earliest attempts at powered flight, including the first successful flight of the Silver Dart piloted by J.A.D. McCurdy; the first trans-Canada flight; the first trans-Atlantic crossing by Britain's giant dirigible, the R-100; the beginning of commercial aviation (National Film Board Catalogue, 1975, p. 46).

2. "Pathways in the Sky"

   Time: 17 minutes 13 seconds

   Nothing in the 20th century amazes more than the strides made in aviation. Here is a picture that captures the romance of past and present from primitive one-seater to supersonic jet. Aircraft are seen in domestic service: crop dusting, water bombing, air-lifting. The need for safeguards and air traffic control, as carried out by the Civil Aviation Branch, is made obvious. Air-minded viewers will especially enjoy the proximity this film affords to aircraft of all kinds (National Film Board Catalogue, 1975, p. 46).

3. "The Romance of Transportation in Canada"

   Time: 10 minutes 48 seconds

Light-hearted whimsy about a down-to-earth subject - how this country's vast distances and great obstacles were brought under control. The whole story of transportation is told with tongue-in-cheek seriousness from the intrepid trail blazers of long ago to the aircraft of today and tomorrow (National Film Board Catalogue, 1975, p. 56).

Appendix 13

SRAI ADMINISTERED FOLLOWING EACH FILM

Indicate by circling a number on the scale below how you felt while watching the film you just saw.

Very calm and relaxed	0	1	2	3	4	5	6	7	8	9	10	Not at all calm and relaxed
Not at all worried & apprehensive	0	1	2	3	4	5	6	7	8	9	10	Very worried and apprehensive
Not at all anxious & nervous	0	1	2	3	4	5	6	7	8	9	10	Very anxious and nervous
Not at all tense & trembling	0	1	2	3	4	5	6	7	8	9	10	Very tense and trembling

Appendix 14

FINAL INSTRUCTIONS TO ALL SUBJECTS

The final part of our training today involves helping you to fill out the forms you will be asked to complete at various times tomorrow. During each flight, you will be given the questionnaire seven times: once at the STOLport; once after we have boarded the plane, but before take-off; four times during the flight; and once after we have landed. When you are asked to complete the scales, do not spend too much time on each item. In order to help you reply quickly, we shall practise with a few scales this afternoon. You will be asked to rate yourself on a scale from 0 to 10. At each end of the scale will be a set of words describing that line. You will be asked to rate how you feel along that line. I shall give an example on the board.

The scale is from 0 to 10. I am to rate on that line how I feel between, let us say, these possibilities. (The experimenter wrote a scale from 0 to 10 on the blackboard with the polarities of "very tired and sleepy" at 0, and "not at all tired and sleepy" at 10.) Let me remind you, feel free to circle any one number on the scale that best corresponds to how you feel. Notice that at the 5 position, this rating is mid-way between the two extremes.

It is important to get an accurate report of how you feel, so I want you to know what to expect and to be familiar with the words you will be seeing tomorrow. Here are the groups of words you will see tomorrow. (The experimenter distributed copies of the Self-Report Anxiety Inventory [SRAI].)

Fine. Now that you have seen them for a bit, and have practised with the scales, I would like you to complete the questionnaire you have before you at this time. Do so as honestly and as carefully as possible. (Subjects completed the SRAI at this point.)

I want to thank you for taking your time to participate in our project today. For the next part of the study which takes place tomorrow, I want to remind you that we will meet here tomorrow morning at 9:15. It is crucial for this experiment that all of you show up and that you be here on time. Furthermore, I want all of you to eat a good breakfast as we will be gone for at least four hours over the noon hour and middle of the day.

We will be going to the STOLport by STOLmobile and OC Transpo Bus. I want all of you to co-operate with us and help us as best you can. So I ask that you do not talk to each other on the bus ride to the STOLport. Furthermore, I again ask your co-operation in not discussing the details of your experience today and tomorrow with anyone else as it may have bad effects on what we hope to learn. In the same way, I assure you that your responses will be kept confidential and not disclosed to anyone.

Appendix 15

FLIGHT ANTICIPATION SCALE

Indicate by circling a number on the scales below, How You Have Been Feeling Since Yesterday Afternoon in Anticipation of the Flight Today:

Very calm and relaxed	0	1	2	3	4	5	6	7	8	9	10	Not at all calm and relaxed
Not at all worried & apprehensive	0	1	2	3	4	5	6	7	8	9	10	Very worried and apprehensive
Not at all anxious & nervous	0	1	2	3	4	5	6	7	8	9	10	Very anxious and nervous
Not at all tense & trembling	0	1	2	3	4	5	6	7	8	9	10	Very tense and trembling

Appendix 16

APPARATUS AND PROCEDURE FOR HEART RATE RECORDING

Several pieces of portable equipment were utilized for heart rate monitoring. A low-leakage, battery-powered Heuristics ohmmeter was used to check resistance levels of electrodes. A Nihon Kohden Handy Monitor Twin portable electrophysiological oscilloscope was used to assess the ECG wave. In order to simultaneously record the HR of 10 subjects while airborne, it was necessary to manufacture some equipment locally. The Experimental Department of the Faculty of Psychology at the University of Ottawa designed an ECG to Rectangular Pulse Converter (with electrophysiological amplifier). This converter was 5 x 10 x 16 cm and could easily fit under the passenger's seat. This converter had, as its input, a standard ECG. The ECG was amplified and fed into a Schmitt trigger which converted the Q.R.S. wave into a rectangular pulse. This pulse was then recorded on 60-minute BASF cassette tapes by a Bell & Howell Educator Series battery-powered tape recorder.

A number of prototypes of the converter were tested in the aircraft. Tests were conducted on the ground and in flight. It was determined that the converter did not interfere with any of the electronic navigational equipment of the aircraft. However, one frequency of the radio transmissions from the aircraft to the control tower was received by the converter. It was decided that this "noise" could be used as an event marker across all recordings as the transmissions on this frequency occurred only while taxiing and immediately prior to clearance for take-off.

Prior to boarding, the experimenter applied silver-chloride electrodes to both wrists and the left ankle of subjects. These electrodes had been immersed in a solution of physiological saline for a minimal period of 72 hours to insure depolarization. Beckman electrode paste was applied to act as an interface between each electrode and the skin. Nonstick "micropore" tape was used to secure electrodes. An assistant from the Experimental Department of the Faculty of Psychology at Ottawa University tested the resistance of the electrodes with an ohmmeter. He also adjusted the converter output using an oscilloscope to monitor the ECG wave.

Appendix 17

AIRTRANSIT CREW ANNOUNCEMENTS

Prior to take-off:

Welcome aboard Airtransit's STOL service to Montreal/ Ottawa. Please fasten your seat belt and refrain from smoking. You may smoke when the 'No Smoking' sign has been switched off after take-off.

Prior to landing:

We will be landing shortly. Please ensure that your seat belt is fastened and refrain from smoking.

After landing:

We hope you have enjoyed your flight and thank you for flying Airtransit.

Appendix 18

SRAI ADMINISTERED AT REV-UP

Indicate by circling a number on the scales below,
How You Feel at this Moment:

Very calm and relaxed	0	1	2	3	4	5	6	7	8	9	10	Not at all calm and relaxed
Not at all worried & apprehensive	0	1	2	3	4	5	6	7	8	9	10	Very worried and apprehensive
Not at all anxious & nervous	0	1	2	3	4	5	6	7	8	9	10	Very anxious and nervous
Not at all tense & trembling	0	1	2	3	4	5	6	7	8	9	10	Very tense and trembling

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How Afraid Are You Now?

Not at all scared & afraid	0	1	2	3	4	5	6	7	8	9	10	Very scared and afraid

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How Did You Find the Last Ten Minutes?

Very exciting and thrilling	0	1	2	3	4	5	6	7	8	9	10	Not at all exciting and thrilling
Very enjoyable	0	1	2	3	4	5	6	7	8	9	10	Not at all enjoyable

Appendix 19

SRAI ADMINISTERED AT TAKE-OFF

Indicate by circling a number on the scales below,
How You Felt During the Take-Off:

Very calm and relaxed	0	1	2	3	4	5	6	7	8	9	10	Not at all calm and relaxed
Not at all worried & apprehensive	0	1	2	3	4	5	6	7	8	9	10	Very worried and apprehensive
Not at all anxious & nervous	0	1	2	3	4	5	6	7	8	9	10	Very anxious and nervous
Not at all tense & trembling	0	1	2	3	4	5	6	7	8	9	10	Very tense and trembling

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How Afraid Were You?

Not at all scared & afraid	0	1	2	3	4	5	6	7	8	9	10	Very scared and afraid

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How Did You Find the Last Ten Minutes?

Very exciting and thrilling	0	1	2	3	4	5	6	7	8	9	10	Not at all exciting and thrilling
Very enjoyable	0	1	2	3	4	5	6	7	8	9	10	Not at all enjoyable

Appendix 20

SRAI ADMINISTERED DURING CRUISING PERIODS

Indicate by circling a number on the scales below,
How You Felt During the Last Ten Minutes:

Very calm and relaxed	0	1	2	3	4	5	6	7	8	9	10	Not at all calm and relaxed
Not at all worried & apprehensive	0	1	2	3	4	5	6	7	8	9	10	Very worried and apprehensive
Not at all anxious & nervous	0	1	2	3	4	5	6	7	8	9	10	Very anxious and nervous
Not at all tense & trembling	0	1	2	3	4	5	6	7	8	9	10	Very tense and trembling

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How Afraid Were You in the Last Ten Minutes?

Not at all scared & afraid	0	1	2	3	4	5	6	7	8	9	10	Very scared and afraid

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How Did You Find the Last Ten Minutes?

Very exciting and thrilling	0	1	2	3	4	5	6	7	8	9	10	Not at all exciting and thrilling
Very enjoyable	0	1	2	3	4	5	6	7	8	9	10	Not at all enjoyable

Appendix 21

SRAI ADMINISTERED AT LANDING

Indicate by circling a number on the scales below, How You Felt During the Landing (from the start of the descent to touching down on the runway):

Very calm and relaxed	0	1	2	3	4	5	6	7	8	9	10	Not at all calm and relaxed
Not at all worried & apprehensive	0	1	2	3	4	5	6	7	8	9	10	Very worried and apprehensive
Not at all anxious & nervous	0	1	2	3	4	5	6	7	8	9	10	Very anxious and nervous
Not at all tense & trembling	0	1	2	3	4	5	6	7	8	9	10	Very tense and trembling

\- - - - - - - - - - - -

How Afraid Were You?

Not at all scared & afraid	0	1	2	3	4	5	6	7	8	9	10	Very scared and afraid

\- - - - - - - - - - - -

How Did You Find the Last Ten Minutes?

Very exciting and thrilling	0	1	2	3	4	5	6	7	8	9	10	Not at all exciting and thrilling
Very enjoyable	0	1	2	3	4	5	6	7	8	9	10	Not at all enjoyable

POST-EXPERIMENTAL QUESTIONNAIRE

1. a) What kind of thoughts went through your mind during the flight experience (on the ground and in the air)? What kind of self-statements were you making (positive thoughts, if any)? List them below:

   b) Estimate by circling the appropriate number below what percent of the time, throughout the flight experience, you were saying things to yourself to help you cope with the stress of flying.

   0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

   c) Rate how effective you found the technique of using positive self-statements in coping with the stress of flying:

Not at all helpful & useful	0	1	2	3	4	5	6	7	8	9	10	Very helpful & useful

2. a) Last night or this morning, did you find yourself worrying or anticipating the flight you were going to take today?

   Yes___ No___

   b) Estimate by circling the appropriate number below what percent of the time last night or this morning you spent worrying or anticipating the flight you were going to take today.

   0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

   c) By circling the appropriate number below, rate how effective you found the technique of providing information about what to anticipate in helping you cope with the stress of flying.

Not at all helpful & useful	0	1	2	3	4	5	6	7	8	9	10	Very helpful & useful

3. a) Do you wish you had acquired more information and known better what to anticipate today?

   Yes___ No___

   b) If Yes, what further information would have been helpful?

Appendix 23

QUESTIONS FOR POST-EXPERIMENTAL INQUIRY

1. If you had to go to Montreal in a hurry, would you elect to go by Airtransit (STOL)?

2. If you wanted to go to Montreal for pleasure and were not rushed, which mode of transport would you prefer:

   Rank order: -Bus
   -Private car
   -Air Canada
   -Airtransit (STOL)
   -Train

3. What do you like most about flying in the STOL? What did you like least about the experience?

4. If there were things you would want changed or improved, what would these be?

5. Would you recommend to your friends the STOL service?

6. Did you enjoy the flight? Why? (Not?)

7. If a person were afraid of flying in larger aircrafts (i.e., jets, DC7, etc.), do you think the STOL experience might help them overcome some of this fear?

8. How did you feel about having the cockpit door open/closed during the flight?

9. Do you wish the pilot could have communicated more to the passengers on the flight?

10. If you had music (plug-in) on the aircraft, would you have used it under normal circumstances?

11. If you had some work to do, do you think you could get work done on the plane? What kind of work?

12. How did you feel about being able to see the plane outside the windows while you were waiting at the STOLPORT?

13. How did you feel about the noise on the plane? Too loud? Not bad?

14. By the way, what thoughts went through your mind when we had that missed approach here in Ottawa and had to go around to land again? Do you remember what you were saying to yourself?

Appendix 24

FLIGHT CREW TURBULENCE RATING SCALES

Rate how much turbulence was encountered in this flight:

none										extreme amount
0	1	2	3	4	5	6	7	8	9	10

How much turbulence was encountered in this flight?

1	2	3	4	5	6	7
none	very little	a little	some	much	very much	extreme amount

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Appendix 25

FOLLOW-UP LETTER

Dear

I am writing to you to follow up on our study in which you participated last March and April. Before I complete my report, I would like you to take the time to complete one more questionnaire for me.

Please return it to me as quickly as possible in the enclosed, stamped, self-addressed envelope.

I do hope you had a good summer.

Sincerely yours,

Julius Roehl

P.S. We will send you a copy of the results of the study shortly after we have received your replies.

Appendix 26

FOLLOW-UP QUESTIONNAIRE

1. As honestly and truthfully as possible, please circle HOW YOU FEEL, now, if you were to fly:

Very calm, relaxed	0	1	2	3	4	5	6	7	8	9	10	Very nervous, tense

2. Have you flown in an airplane since participation in our study?

   Yes ____ No ____

3. If yes, please circle HOW YOU FELT while flying:

Very calm, relaxed	0	1	2	3	4	5	6	7	8	9	10	Very nervous, tense

4. If yes, please circle how much the training you received helped you cope with flying this time:

Not at all helpful	0	1	2	3	4	5	6	7	8	9	10	Very helpful

5. Please circle HOW YOU FEEL about flying generally as a result of your experience in our study:

Much less afraid	0	1	2	3	4	5	6	7	8	9	10	Much more afraid

6. Is there anything about your participation in the experiment which you feel has affected your general well-being (positively or negatively), or your general feelings about flying?

Appendix 27

TABLES FOR ANALYSES OF DATA REPORTED

Table 3

Summary of One-Way Analysis of Variance on Self-Report Anxiety Inventory(SRAI) and Flight Apprehension Inventory(FLAPI) at Pre-Training

	Source	*df*	*MS*	*F*
Self-Report Anxiety Inventory(SRAI) at pre-training	Between	3	75.67	1.33
	Within	52	56.84	
	Total	55		
Flight Apprehension Inventory(FLAPI) at pre-training	Between	3	2.88	.91
	Within	52	3.16	
	Total	55		

Table 4

One-Way Analysis of Variance on SRAI Scores at Post-Training

	Source	*df*	*MS*	*F*
SRAI Immediately following training	Between	3	273.06	8.83*
	Within	52	30.93	
	Total	55		

*p < .001

Table 5

Means and Standard Deviations of SRAI Scores at Pre- and Post-Training

	Pre-training		Post-training	
	M	*SD*	*M*	*SD*
Information	11.64	7.67	6.43[a]	4.18
Self-Talk	14.29	6.93	14.36	6.42
Combined	17.21	7.81	12.29	7.26
Control	13.43	7.71	5.29	3.52
Total	14.14	7.61	9.59	6.64

[a]Tukey post hoc analysis showed Information and Control group subjects differed significantly from Combined and Self-Talk groups, $p < .05$.

Table 6

Duncan's Multiple Range Comparisons between Group SRAI Scores at Preflight and Preboarding

Preflight (Differences between means)	2	3	4	Preboarding (Differences between means)	2	3	4
(1) Information (M = 8.86)	6.21*	1.86	1.07	(1) Information (M = 10.50)	4.86*	1.71	1.29
(2) Self-Talk (M = 15.07)		4.36*	5.14*	(2) Self-Talk (M = 15.36)		6.57*	3.57*
(3) Combined (M = 10.71)			.79	(3) Combined (M = 8.79)			3.00
(4) Control (M = 9.93)				(4) Control (M = 11.79)			

*p < .05

Table 7

One-Way Analysis of Variance on Flight Anticipation Scale Scores (Pre-Flight)

	Source	*df*	*MS*	*F*
Flight Anticipation Scale scores (reported amount of "work of worrying" at pre-flight)	Between	3	181.26	6.96*
	Within	52	26.03	
	Total	55		

Mean Flight Anticipation Scale scores by groups

	M	*SD*
Information	8.50	4.86
Self-Talk	15.50[a]	5.00
Combined	8.14	5.33
Control	8.29	5.20

[a]Tukey post hoc analysis found Self-Talk subjects differed significantly from the other three groups, $p < .05$.

*$p < .001$

Table 8

Two-Way Analysis of Variance (Flight Crew X Flights) on Flight Crew Turbulence Ratings

	Source	df	MS	F
Flight crew ratings of turbulence for all flights	Flight crew(A)	1	.52	1.11
	Flights (B)	5	8.55	18.23*
	A X B	5	.46	.98
	Within	36	.47	

*$p < .001$

Table 9

Analysis of Variance (Groups X Door X Events) on SRAI Scores for Trial 1

	Source	*df*	*MS*	*F*
Self-Report of Anxiety (SRAI) scores for Trial 1	Groups (A)	3	107.15	.40
	Door (B)	1	576.19	2.17
	Events (C)	5	1292.55	35.96*
	A X B	3	661.10	2.49
	A X C	15	31.54	.88
	B X C	5	12.33	.34
	A X B X C	15	19.67	.55
	Within	48	265.61	
	Total	240	35.95	

*$p < .001$

Table 10

Summary of One-Way Analysis of Variance on SRAI Scores at Rev-Up and Take-Off (Trial 1)

	Source	df	MS	F
SRAI scores at Rev-Up (Trial 1)	Between	3	86.92	1.25
	Within	52	69.30	
	Total	55		
SRAI scores at Take-Off (Trial 1)	Between	3	51.90	.49
	Within	52	106.92	
	Total	55		

Table 11

Two-Way Analysis of Variance (Groups X Door) on SRAI Scores at Take-Off (Trial 1)

	Source	df	MS	F
Self-Report of Anxiety (SRAI) scores at take-off (Trial 1)	Groups (A)	3	51.91	.50
	Door (B)	1	108.64	1.05
	A X B	3	168.45	1.64
	Within	48	103.04	

Table 12

Analysis of Variance (Groups X Door X Cruising Periods) on SRAI Scores for Cruising Periods (Trial 1)

	Source	*df*	*MS*	*F*
SRAI scores for three 10-minute Cruising Periods (Trial 1)	Groups (A)	3	75.80	.56
	Door (B)	1	418.01	3.08
	Cruising (C)	2	135.50	8.31*
	A X B	3	204.24	1.50
	A X C	6	24.08	1.48
	B X C	2	13.24	.81
	A X B X C	6	17.40	1.07
	Within	48	135.89	
	Total	96	16.32	

*$p < .001$

Table 13

Summary of Two-Way Analysis of Variance (Groups X Door) on SRAI Scores for Cruising Periods (Trial 1)

	Source	*df*	*MS*	*F*
SRAI at 10 minutes Cruising	Groups (A)	3	35.49	.60
	Door (B)	1	111.45	1.89
	A X B	3	89.35	1.51
	Within	48	59.10	
SRAI at 20 minutes Cruising	Groups (A)	3	51.21	.93
	Door (B)	1	58.02	1.05
	A X B	3	65.16	1.18
	Within	48	55.29	
SRAI at 30 minutes Cruising	Groups (A)	3	36.78	.69
	Door (B)	1	252.88	4.73*
	A X B	3	84.78	1.59
	Within	48	53.49	

*$p < .03$

Table 14

Two-Way Analysis of Variance (Groups X Door) on SRAI Scores at Landing (Trial 1)

	Source	df	MS	F
SRAI scores at Landing (Trial 1)	Between	3	2.05	.02
	Within	52	113.07	
	Total	55		

Table 15

Analysis of Variance (Groups X Seat X Door) on SRAI Scores at 30-Minutes Cruising (Trial 1)

	Source	*df*	*MS*	*F*
	Groups (A)	3	37.15	.74
	Seat (B)	1	1.29	.03
	Door (C)	1	252.88	5.03*
SRAI scores at 30 minutes	A X B	3	126.09	2.51
Cruising (Trial 1)	A X C	3	61.20	1.22
	B X C	1	57.74	1.15
	A X B X C	3	42.93	.85
	Within	40	50.31	
	Total	55	57.91	

*$p < .03$

Table 16

One-Way Analysis of Variance on SRAI Scores at Montreal STOLport

	Source	*df*	*MS*	*F*
SRAI scores prior to reboarding at Montreal STOLport	Between	3	15.86	.54
	Within	42	29.60	
	Total	45		

Note. Not all subjects were included because one flight was unable to land in Montreal.

Table 17

Analysis of Variance (Groups X Door X Events) on SRAI Scores for Trial 2

	Source	df	MS	F
Self-Report of Anxiety (SRAI) scores for Trial 2	Groups (A)	3	193.39	.78
	Door (B)	1	1364.07	5.48*
	Events (C)	5	1540.41	47.69**
	A X B	3	446.11	1.79
	A X C	15	35.38	1.10
	B X C	5	48.87	1.51
	A X B X C	15	30.62	.95
	Within	48	249.07	
	Total	240	32.30	

*p < .03
**p < .001

Table 18

Summary of One-Way Analysis of Variance on SRAI Scores at Rev-Up and Take-Off (Trial 2)

	Source	*df*	*MS*	*F*
SRAI scores at Rev-Up[a] (Trial 2)	Between	3	13.33	.39
	Within	42	34.04	
	Total	45		
SRAI scores at Take-Off (Trial 2)	Between	3	39.87	.63
	Within	52	63.47	
	Total	55		

[a]Not all subjects were included because one flight was unable to land in Montreal.

Table 19

Analysis of Variance (Groups X Door) on SRAI Scores at Take-Off (Trial 2)

	Source	df	MS	F
	Groups (A)	3	39.88	.67
SRAI scores at Take-Off (Trial 2)	Door (B)	1	30.02	.51
	A X B	3	138.54	2.33
	Within	48	59.47	

Table 20

Analysis of Variance (Groups X Door X Cruising Periods) on SRAI Scores for Cruising Periods (Trial 2)

	Source	*df*	*MS*	*F*
SRAI scores for three 10-minute Cruising Periods (Trial 2)	Groups (A)	3	105.45	.99
	Door (B)	1	947.63	8.90*
	Cruising (C)	2	67.04	11.46**
	A X B	3	186.48	1.75
	A X C	6	7.27	1.24
	B X C	2	5.59	.96
	A X B X C	6	5.71	.98
	Within	48	106.53	
	Total	96	5.85	

*$p < .004$
**$p < .0001$

Table 21

Summary of Two-Way Analysis of Variance (Groups X Door) on SRAI Scores for Cruising Periods (Trial 2)

	Source	df	MS	F
	Groups (A)	3	50.79	1.27
SRAI scores at 10 minutes	Door (B)	1	412.57	10.32***
Cruising	A X B	3	83.19	2.08
	Within	48	39.98	
	Groups (A)	3	47.35	1.14
SRAI scores at 20 minutes	Door (B)	1	244.45	5.90*
Cruising	A X B	3	71.07	1.72
	Within	48		
	Groups (A)	3	21.86	.59
SRAI scores at 30 minutes	Door (B)	1	301.79	8.20**
Cruising	A X B	3	43.64	1.86
	Within	48		

*$p < .02$
**$p < .006$
***$p < .003$

Table 22

Summary of Two-Way Analysis of Variance (Groups X Door) on SRAI Scores at Unexpected Event and Final Landing (Trial 2)

	Source	df	MS	F
SRAI scores at Unexpected Event (Trial 2)	Groups (A)	3	156.41	1.20
	Door (B)	1	553.14	4.25*
	A X B	3	126.05	.97
	Within	48	130.27	
SRAI scores at Final Landing (Trial 2)	Groups (A)	3	54.02	.53
	Door (B)	1	66.45	.65
	A X B	3	136.73	1.33
	Within	48		

*$p < .04$

Table 23

Summary of One-Way Analysis of Variance on SRAI Scores at Unexpected Event and Final Landing for Door-Open and Door-Closed (Trial 2)

		Source	df	MS	F
SRAI scores at Unexpected Event	Door-open	Between	3	203.18	1.47
		Within	24	138.48	
		Total	27		
	Door-closed	Between	3	79.27	.65
		Within	24	122.06	
		Total	27		
SRAI scores at Final Landing	Door-open	Between	3	150.24	1.51
		Within	24	99.67	
		Total	27		
	Door-closed	Between	3	40.51	.38
		Within	24	105.56	
		Total	27		

Table 24

t Tests on SRAI Scores at Unexpected Event (Trial 2) for Door Condition

Groups Compared[a]	SRAI Scores-Unexpected Event *M*	*SD*	*t*[b]
Open			
Information	23.29	14.63	
Self-Talk	14.29	9.38	1.37
Information	23.29	14.63	
Combined	18.14	15.26	.64
Information	23.29	14.63	
Control	26.43	4.39	-.54
Self-Talk	14.29	9.38	
Combined	18.14	15.26	-.57
Self-Talk	14.29	9.38	
Control	26.43	4.39	-3.10*
Combined	18.14	15.26	
Control	26.43	4.39	-1.38
Closed			
Information	13.14	9.16	
Self-Talk	10.86	8.13	.49
Information	13.14	9.16	
Combined	18.86	15.54	-.84
Information	13.14	9.16	
Control	14.14	9.84	-.20
Self-Talk	10.86	8.13	
Combined	18.86	15.54	-1.21
Self-Talk	10.86	8.13	
Control	14.14	9.84	-.68
Combined	18.86	15.54	
Control	14.14	9.84	.68

[a] $n = 7$ for each group

[b] $df = 12$

*$p < .009$

Table 25

t Test of Means for Correlated Samples on SRAI Scores from Cruising to Unexpected Event and from Unexpected Event to Final Landing for Door Condition

Group[a]	Cruising *M*	Event *M*	*t*[b]	Event *M*	Landing *M*	*t*[b]
Open						
Information	4.29	23.29	-3.39**	23.29	16.00	1.93
Self-Talk	6.57	14.29	-2.33	14.29	12.29	.93
Combined	5.14	18.14	-2.24	18.14	11.14	1.84
Control	11.00	26.43	-4.99****	26.43	21.43	2.53*
Closed						
Information	2.71	13.14	-3.58***	13.14	15.86	-.74
Self-Talk	2.57	10.86	-2.54*	10.86	12.86	-4.58****
Combined	1.86	18.86	-3.02**	18.86	13.43	1.97
Control	1.29	14.14	-3.28**	14.14	10.00	2.48*

[a] n = 7 for each group
[b] df = 6
*$p < .05$
**$p < .02$
***$p < .01$
****$p < .005$

Table 26

$\underline{X}^2$ Analysis on Subjects Who Decreased or Increased in SRAI Scores from Cruising to Unexpected Event (Trial 2)

Group	Decrease	No change or increase	$\underline{X}^2$
All subjects			
Information	0	14	
Self-Talk	1	13	
Combined	0	14	
Control	0	14	3.06
Open			
Information	0	7	
Self-Talk	1	6	
Combined	0	7	
Control	0	7	6.15
Closed			
Information	0	7	
Self-Talk	0	7	
Combined	0	7	
Control	0	7	1.12

$\underline{df} = 3$

Table 27

$\underline{X}^2$ Analysis on Subjects Who Decreased or Increased in SRAI Scores from Unexpected Event to Final Landing (Trial 2)

Group	Decrease	No change or increase	$\underline{X}^2$
All subjects			
Information	7	7	
Self-Talk	3	11	
Combined	11	3	
Control	11	3	18.89**
Open			
Information	4	3	
Self-Talk	3	4	
Combined	6	1	
Control	6	1	11.09
Closed			
Information	3	4	
Self-Talk	0	7	
Combined	5	2	
Control	5	2	15.43*

$\underline{df} = 3$

*$\underline{p} < .02$

**$\underline{p} < .005$

Table 28

Fisher Exact Tests on Subjects Who Decreased or Increased in SRAI Scores from Unexpected Event to Final Landing (Trial 2)

Group	Decrease		No change or increase		
	No. of subjects	No. of Self-Talk Ss	No. of subjects	No. of Self-Talk Ss	p
Open					
Information	4	3	3	4	n.s.
Self-Talk	3	3	4	4	n.s.
Combined	6	3	1	4	n.s.
Control	6	3	1	4	n.s.
Closed					
Information	3	0	4	7	n.s.
Self-Talk	0	0	7	7	n.s.
Combined	5	0	2	7	.05
Control	5	0	2	7	.05

Table 29

Summary of Analysis of Variance (Groups X Seats X Door) on SRAI Scores for Cruising Periods (Trial 2)

	Source	df	MS	F
	Groups (A)	3	52.77	1.27
	Seats (B)	1	6.39	.15
	Door (C)	1	412.57	9.89**
SRAI scores at 10 minutes	A X B	3	63.10	1.51
Cruising (Trial 2)	A X C	3	86.39	2.07
	B X C	1	1.85	.04
	A X B X C	3	15.89	.38
	Within	40	41.72	
	Total	55	49.70	
	Groups (A)	3	49.61	1.31
	Seats (B)	1	13.86	.37
	Door (C)	1	244.45	6.45*
SRAI scores at 20 minutes	A X B	3	68.84	1.82
Cruising (Trial 2)	A X C	3	87.17	2.30
	B X C	1	41.65	1.10
	A X B X C	3	66.56	1.76
	Within	40	37.91	
	Total	55	47.07	
	Groups (A)	3	23.40	.70
	Seats (B)	1	11.49	.34
	Door (C)	1	301.79	8.97***
SRAI scores at 30 minutes	A X B	3	52.07	1.55
Cruising (Trial 2)	A X C	3	52.47	1.56
	B X C	1	3.72	.11
	A X B X C	3	80.72	2.40
	Within	40	33.65	
	Total	55	41.20	

*p < .01
**p < .003
***p < .005

Table 30

Summary of Analysis of Variance (Groups X Seats X Door) on SRAI Scores for Unexpected Event and Final Landing (Trial 2)

	Source	*df*	*MS*	*F*
	Groups (A)	3	165.95	1.26
	Seats (B)	1	270.32	2.05
	Door (C)	1	553.14	4.20*
SRAI scores at Unexpected Event (Trial 2)	A X B	3	147.33	1.12
	A X C	3	163.57	1.24
	B X C	1	39.50	.30
	A X B X C	3	58.94	.45
	Within	40	131.77	
	Total	55	139.15	
	Groups (A)	3	48.04	.56
	Seats (B)	1	92.96	1.09
	Door (C)	1	66.45	.78
SRAI scores at final Landing (Trial 2)	A X B	3	374.37	4.39**
	A X C	3	166.84	1.96
	B X C	1	12.32	.15
	A X B X C	3	84.23	.99
	Within	40	85.26	
	Total	55	101.17	

*$p < .04$
**$p < .009$

Table 31

$\underline{X}^2$ Analysis on Number of Subjects Stating Need for More Information prior to the Flight

Group	Need for more information Yes	No	$\underline{X}^2$
Information	2	12	
Combined	2	12	
Control	7	7	6.16*

$\underline{df} = 2$

$*\underline{p} < .05$

Table 32

Fisher Exact Tests on Subjects Expressing Satisfaction with Information Acquired Prior to the Flight

	Satisfaction with information		
Group	No. of subjects	No. of controls	*p*
Information	12	7	.05
Combined	12	7	.05
Control	7	7	n.s.

Table 33

Summary of One-Way Analysis of Variance on Rated Effectiveness of Information (Post-Experimental Questionnaire)

	Source	df	MS	F
Door-open	Between	2	61.75	12.12*
Rated effectiveness of	Within	18	5.09	
information provided	Total	20		
Door-closed	Between	2	19.62	1.98
Rated effectiveness of	Within	18	9.92	
information provided	Total	20		

Mean rated effectiveness of acquired information (door-open)

	M	SD
Information	7.71	1.49
Combined	8.71	1.58
Control	3.14[a]	2.90

[a]Tukey post hoc analysis found Control group subjects differed significantly from Information and Combined group subjects, $p < .05$.

*$p < .001$

Table 34

t Tests on Percentage of Time Spent Emitting Self-Statements

Groups Compared[a]	% of Time - Self-statements *M*	*SD*	*t*
Open			
Self-Talk	3.71	2.56	
Combined	4.86	3.81	-.66
Closed			
Self-Talk	3.86	2.41	
Combined	2.43	2.07	1.19
Self-Talk (open)	3.71	2.56	
Self-Talk (closed)	3.86	2.41	.11
Combined (open)	4.86	3.81	
Combined (closed	2.43	2.07	1.48

[a]*n* = 7 for each group

df = 12

Table 35

t Tests on Rated Effectiveness of Self-Statements

Groups Compared[a]	Effectiveness of self-statements *M*	*SD*	*t*[b]
Open			
Self-Talk	7.29	2.50	
Combined	7.14	2.19	.11
Self-Talk	7.29	2.50	
Control	4.00	2.71	2.36*
Combined	7.14	2.19	
Control	4.00	2.71	2.39**
Closed			
Self-Talk	7.14	1.77	
Combined	4.71	3.73	1.56
Self-Talk	7.14	1.77	
Control	6.43	2.23	.66
Combined	4.71	3.73	
Control	6.43	2.23	-1.04

[a]$n = 7$ for each group
[b]$df = 12$

*$p < .04$
**$p < .03$

Table 36

χ^2 Analysis on Preference for Cockpit Door Condition (Open vs. Closed) (Post-Experimental Inquiry)

Stated preference	Condition flown under Open	Closed	χ^2
Same door condition	27	12	
Other door condition	1	16	19.01*

df = 1
*$p < .001$

Table 37

Fisher Exact Tests on Cockpit Door Preference (Post-Experimental Inquiry)

Group	Door-open Preference for door-closed	Door-closed Preference for door-open	*p*
Information	0	4	.03
Self-Talk	0	4	.03
Combined	0	4	.03
Control	1	4	n.s.

Table 38

Frequency of Expressed Desire for More Communication from the Pilot (Post-Experimental Inquiry)

Group	More communication from pilot	
	No. of subjects	
	Yes	No
Open		
Information	5	2
Self-Talk	2	5
Combined	4	3
Control	4	3
Closed		
Information	5	2
Self-Talk	5	2
Combined	4	3
Control	4	3

Note. Fisher Exact Tests found no differences between groups within or across door conditions.

Table 39

Subjects' Responses, by Category, to Unexpected Event Reported at Post-Experimental Inquiry

Group	"Trick"	Very upsetting	Coping	Past-Experience
Open				
Information	2	3	2	0
Self-Talk	3	3	1	0
Combined	0	4	2	1
Control	0	4	1	2
Total	5	14	6	3
Closed				
Information	4	1	1	1
Self-Talk	4	1	2	0
Combined	0	3	3	1
Control	3	2	1	1
Total	11	7	7	3

Table 40

Fisher Exact Tests on Subject's Responses, by Category, to Unexpected Event (Post-Experimental) Inquiry)

Response category	No. of subjects by door condition Open	Closed	*p*
"Trick"	5	11	.03
Very upsetting	14	7	.05
Coping	6	7	n.s.
Past experience	3	3	n.s.

Table 41

t Tests on SRAI Scores at 30-Minute Cruising, Unexpected Event, and Final Landing for Subjects Who Considered Unexpected Event a "Trick"

Group	Door	*n*	At 30-min. Cruising *M*	*SD*	*t*	Unexpected Event *M*	*SD*	*t*	Landing *M*	*SD*	*t*
Trick	Open	5	12.00	10.65		26.40	6.73		18.80	11.03	
Trick	Closed	11	2.36	2.34	2.96**[a]	14.55	9.85	2.42*[a]	15.46	10.86	.57[a]
Trick	Open	5	12.00	10.65		26.40	6.73		18.80	11.03	
Non-trick	Open	23	5.61	7.49	1.61[b]	19.26	2.65	4.03***[b]	14.44	2.12	1.86[b]
Trick	Closed	11	2.36	2.34		14.55	9.85		15.46	10.86	
Non-trick	Closed	17	1.94	1.78	.54[b]	14.06	11.71	.11[b]	11.47	9.25	1.04[b]

[a] *df* = 14
[b] *df* = 26
$*p < .05$
$**p < .02$
$***p < .001$

Table 42

Analysis of Variance (Groups X Door) on Flight Apprehension Scores at Follow-Up

	Source	*df*	*MS*	*F*
	Groups (A)	3	4.65	1.10
	Door (B)	1	.01	.01
FLAPI scores at follow-up	A X B	3	5.21	1.23
	Within	45	4.23	
	Total	52	4.23	

Table 43

Summary of One-Way Analysis of Variance on Flight Apprehension Scores at Follow-Up for Door Condition

	Source	*df*	*MS*	*F*
Open	Between	3	9.37	2.39
Flight apprehension at	Within	24	3.92	
follow-up	Total	27		
Closed	Between	3	.49	.11
Flight apprehension at	Within	21	4.60	
follow-up	Total	24		

Mean flight apprehension at follow-up (door-open)

	M	*SD*
Information	2.57	1.72
Self-Talk	3.00	1.41
Combined	2.29[a]	2.29
Control	4.86	2.34

[a]Duncan's test found Combined group subjects differed significantly from Control group subjects, $p < .05$.

Table 44

Analysis of Variance (Groups X Seats) on Flight Apprehension Scores at Follow-Up

	Source	df	MS	F
FLAPI scores at follow-up	Groups (A)	3	4.46	1.14
	Seats (B)	1	2.66	.68
	A X B	3	9.05	2.31
	Within	45	3.92	
	Total	52	4.23	

Table 45

Summary of One-Way Analysis of Variance on FLAPI Scores at Follow-Up for Seating

	Source	df	MS	F
Front seat	Between	3	2.51	.57
FLAPI scores at	Within	20	4.42	
follow-up	Total	23		
Rear seat	Between	3	10.99	3.12*
FLAPI scores at	Within	25	3.52	
follow-up	Total	28		

Mean FLAPI scores at follow-up for rear seat

	M	SD
Information	4.20	2.77
Self-Talk	2.88	1.73
Combined	2.13[a]	.83
Control	4.75	2.12

[a]Duncan's test found Combined group differed significantly from Control group subjects, $p < .05$.

*$p < .04$

Table 46

Summary of One-Way Analysis of Variance on Ratings of Experimental "After Effects" (Follow-Up)

	Source	df	MS	F
All subjects				
Ratings of "after effects" from experiment at follow-up	Between	3	14.28	4.57**
	Within	49	3.13	
	Total	52		
Open	Between	3	5.38	1.43
Ratings of "after effects" at follow-up	Within	24	3.77	
	Total	27		
Closed	Between	3	9.76	3.43*
Ratings of "after effects" at follow-up	Within	21	2.84	
	Total	24		

Mean ratings of experimental "after effects" for all subjects

	M	SD
Information	3.54	1.90
Self-Talk	2.00[a]	1.18
Combined	2.00[a]	2.08
Control	4.00	1.83

Mean ratings of "after effects" (door-open)

	M	SD
Information	4.00	1.79
Self-Talk	1.86[a]	1.07
Combined	2.00[a]	2.00
Control	4.17	1.83

[a]Duncan's test showed that Self-Talk and Combined group subjects differed significantly from Information and Control, *p* .05

*p < .04
**p < .007

Table 47

Analysis of Variance (Groups X Seats) on Ratings of Experimental "After Effects" (Follow-Up)

	Source	df	MS	F
	Groups (A)	3	13.43	4.36**
Ratings of "after effects"	Seats (B)	1	12.73	4.13*
from experiment at	A X B	3	.63	.20
follow-up	Within	45	3.08	
	Total	52	3.77	

*p < .05
**p < .009

Table 48

Summary of One-Way Analysis of Variance on Experimental "After Effects" at Follow-Up for Seating

	Source	df	MS	F
Front seat				
Ratings of "after effects" from experiment at follow-up	Between	3	4.59	1.24
	Within	20	3.71	
	Total	23		
Rear seat				
Ratings of "after effects" from experiment at follow-up	Between	3	9.47	3.67*
	Within	25	2.58	
	Total	28		

Mean ratings of "after effects" (rear seat)

	M	SD
Information	3.20	1.79
Self-Talk	1.63[a]	1.30
Combined	1.38[a]	1.30
Control	3.63	2.00

[a]Duncan's test showed Self-Talk and Combined group subjects differed significantly from Information and Control group subjects, $p < .05$.

*$p < .03$

Table 49

t Tests for Means of Correlated Samples on Flight Apprehension Scores from Pre-Training to 4½-Month Follow-Up for Door Condition

Group	Pre-training FLAPI		Follow-up FLAPI		
	M	*SD*	*M*	*SD*	*t*
Open					
Information	6.43	2.64	2.57	1.72	3.58[a]**
Self-Talk	6.14	1.35	3.00	1.41	4.46[a]***
Combined	6.86	1.46	2.29	2.29	4.70[a]***
Control	6.14	.69	4.86	2.34	1.65[a]
Closed					
Information	5.17	1.72	3.50	2.59	1.69[b]
Self-Talk	6.14	2.55	2.86	1.86	6.30[a]****
Combined	6.50	1.05	3.33	2.07	3.12[b]*
Control	4.83	1.84	3.17	2.04	1.63[b]

[a]*df* = 6

[b]*df* = 5

*$p < .03$
**$p < .01$
***$p < .005$
****$p < .001$

Table 50

Analysis of Variance (Groups X Door) on Decrease in Flight Apprehension Scores from Pre-Training to Follow-Up

	Source	*df*	*MS*	*F*
Decrease in FLAPI scores (pre-training to follow-up)	Groups (A)	3	14.05	2.66
	Door (B)	1	7.41	1.40
	A X B	3	5.01	.95
	Within	45	5.28	
	Total	52	5.81	

Mean decrease in FLAPI scores (pre-training to follow-up

	M	*SD*
Information	2.85	2.79
Self-Talk	3.21	1.58
Combined	3.92[a]	2.53
Control	1.46	2.18

[a]Duncan's test showed Combined group subjects decreased significantly more than Control group subjects, $p < .05$.

Table 51

Summary of One-Way Analysis of Variance on Decrease in Flight Apprehension Scores from Pre-Training to Follow-Up for Door Condition

	Source	df	MS	F
Open				
Decrease in FLAPI scores	Between	3	13.95	2.48
from pre-training to	Within	24	5.62	
follow-up	Total	27		
Closed				
Decrease in FLAPI scores	Between	3	5.10	1.04
from pre-training to	Within	21	4.90	
follow-up	Total	24		

Mean decreases in FLAPI scores (pre-training to follow-up) for door-open

	M	SD
Information	3.86	2.85
Self-Talk	3.14	1.86
Combined	4.57[a]	2.57
Control	1.29	2.06

[a]Duncan's test indicated Combined group subjects differed significantly from Control group in decrement of flight apprehension, $p < .05$.

Table 52

Summary of t Tests on Flight Apprehension Change Scores (Pre-Training to Follow-Up) and Flight Apprehension at Follow-Up Comparing Door-Open vs. Door-Closed Subjects

	Subjects who flew door-open			Subjects who flew door-closed			
	n	M	SD	n	M	SD	t
Mean decrease in flight apprehension (pre-training to follow-up)	(28)	3.21	2.56	(25)	2.48	2.22	1.11
Flight apprehension at follow-up	(28)	3.18	2.13	(25)	3.20	2.02	-.04

df = 51

Appendix 28

MEASUREMENTS AND ANALYSES OF TURBULENCE RATINGS

The Air Data Acquisition System (ADAS) aboard the aircraft yielded instrument-rated samples of turbulence (Vertical Deviation) in two formats: (a) deflections on graphs which plotted changes in the altitude of the aircraft, and (b) printouts of means and standard deviations (in feet) of changes in altitude. Measures of instrument-rated turbulence were analyzed only for the 30-minute cruising periods of each Trial. No computer records were available for the entire Flight 3 and Trial 2 of Flight 4.

Two methods were employed to compute turbulence on the basis of Vertical Deviation. The first method was concerned with calculating Vertical Deviation (VD) means at 32-second intervals. These were averaged over the period of time which coincided with the 10-minute interval between completion of SRAI questionnaires by subjects while cruising. Thus, an average VD mean for 10-minute segments was obtained. As summarized in Table 53 when mean VD turbulence was correlated with mean composite SRAI scores, no significant differences were found on Trial 1. On Trial 2, at ten minutes cruising (Cruise 4), VD turbulence and mean composite self-report anxiety scores were significantly negatively correlated, $r(36) = -.28$, $p < .05$, indicating that as turbulence increased, anxiety scores decreased. Table 54 summarizes results comparing subjective reports of anxiety for the period of minimum and maximum VD turbulence. In the three instances where significant differences are indicated, either within flights or across flights, the differences

Table 53

Pearson Correlation Coefficients on SRAI Scores with Average Vertical Deviation (VD) Means

SRAI Scores	Average VD Means 10 min.	20 min.	30 min.	Trial Total
Trial 1[a]				
10 min. cruising	-.02			-.07
20 min. cruising		-.04		.03
30 min. cruising			.21	-.01
Total cruising				-.04
Trial 2[b]				
10 min. cruising	-.28*			-.19
20 min. cruising		-.16		-.15
30 min. cruising			-.04	-.23
Total cruising				-.20

[a] *df* = 48
[b] *df* = 38
*$p < .05$
All tests two-tailed.

Table 54

t Tests on SRAI Scores for Periods of Minimum and Maximum Turbulence from Average Vertical Deviation Means

Flight	Trial	Cruising Period	SRAI Scores M	SRAI Scores SD	df	t
1	2	30 min.	7.67	9.38	8	-.79
	1	20 min.	9.22	11.12		
2	2	20 min.	4.10	3.45	9	2.27*
	2	30 min.	2.20	2.53		
4	1	20 min.	11.50	9.11	9	-1.68
	1	10 min.	15.30	7.57		
5	2	10 min.	4.10	1.60	9	4.13**
	2	30 min.	2.90	1.29		
6	2	10 min.	4.22	2.82	8	1.84
	2	20 min.	2.78	2.28		
Door Open						
6	2	10 min.	4.22	2.82	16	-1.10
1	1	20 min.	7.78	9.26		
Door Closed						
5	2	10 min.	4.10	1.60	9	4.13**
5	2	30 min.	2.90	1.29		

$*p < .05$
$**p < .003$

are in the opposite direction than might be expected if one assumed that turbulence produces greater arousal. Under maximum turbulence conditions, subjects rated themselves less anxious, while under minimum turbulence subjects rated themselves more anxious. It would appear that the effects of habituation are stronger than the influence of turbulence.

The second method utilized to compute instrument-rated turbulence (i.e., Vertical Deviation) was concerned with standard deviations for each 32-second interval. Standard deviations were averaged over the period of time which coincided with each 10-minute interval between completion of SRAI questionnaires by subjects while cruising. Thus, an average of VD standard deviations for 10-minute segments was obtained. Standard deviation was used on the presumption that changes in flight conditions would elicit more anxiety than a constant amount of turbulence. Subjects would attend more to aircraft conditions if these changes were sudden and erratic. No significant correlations were found between averaged standard deviation VD turbulence and mean composite SRAI anxiety scores on either Trial 1 or Trial 2. These data are summarized in Table 55. A comparison of SRAI scores for the periods of minimum and maximum VD turbulence, within flights, is summarized in Table 56. In two instances, Flight 2 and Flight 6, where significant differences are shown, the differences are in the opposite direction from what might be expected if it were assumed that turbulence produces greater anxiety. Once again during periods of maximum turbulence, within these flights, subjects reported less anxiety, while during periods of minimum turbulence, subjects reported more anxiety. The significant

Table 55

Pearson Correlation Coefficients on SRAI Scores with Average Vertical Deviation (VD) Standard Deviations

SRAI Scores	Average VD S.D. 10 min.	20 min.	30 min.	Trial Total
Trial 1[a]				
10 min. cruising	.04			.04
20 min. cruising		.09		.03
30 min. cruising			.19	.16
Total cruising				.09
Trial 2[b]				
10 min. cruising	.10			.06
20 min. cruising		-.07		-.02
30 min. cruising			.04	.04
Total cruising				.03

[a] *df* = 48
[b] *df* = 38
All tests two tailed.

Table 56

t Tests on SRAI Scores for Periods of Minimum and Maximum Turbulence from Average Vertical Deviation Standard Deviations

Flight	Trial	Cruising Period	SRAI Scores *M*	SRAI Scores *SD*	*df*	*t*
1	1	20 min.	9.22	11.12	8	-1.84
	1	10 min.	10.56	10.51		
2	1	20 min.	7.90	5.69	9	2.82**
	2	20 min.	4.10	3.45		
4	1	20 min.	11.50	9.11	9	-1.68
	1	10 min.	15.30	7.57		
5	2	30 min.	2.90	1.29	9	-5.80***
	1	30 min.	7.00	3.05		
6	1	30 min.	5.67	3.50	8	2.39*
	2	10 min.	4.22	2.82		
Door Open						
1	1	20 min.	9.22	11.12	8	-1.84
1	1	10 min.	10.56	10.51		
Door Closed						
5	2	30 min.	2.90	1.29	18	-1.03
2	2	20 min.	4.10	3.45		

*$p < .04$

**$p < .02$

***$p < .01$

difference for Flight 5, where in the period of minimum turbulence (Trial 1, third cruising period) subjects reported less anxiety, and while during the period of maximum turbulence (Trial 2, third cruising period) they reported more anxiety, may be spurious as all subjects, in all flights, responded with less anxiety at the third cruising period of Trial 2 than the third cruising period of Trial 1.

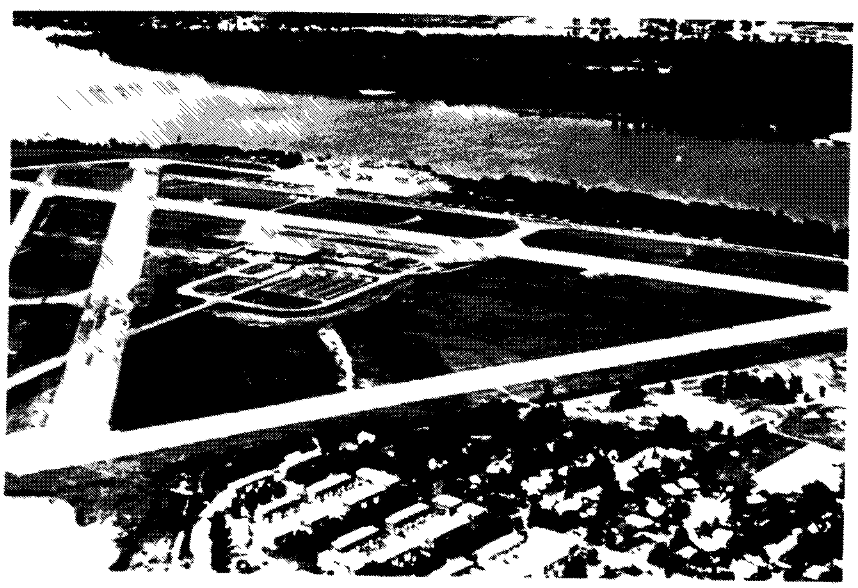
Pearson Correlations of Flight crew assessed turbulence with averaged VD mean and averaged VD standard deviation (instrument) ratings of turbulence were calculated and no significant relationships were found. This lack of significant relationship implies no psychological effect on flight crew, and possibly on subjects, as a result of changes in the amount of turbulence encountered while in flight.

Again, habituation or decrement in subjective report of anxiety scores across 10-minute time blocks, especially on the return flights, is confounded with any anxiety effect that the VD turbulence could have produced. It would seem that habituation is a more potent factor in affecting changes in SRAI scores than turbulence. If turbulence did produce variable effects on subjects, (1) it is not possible to isolate these effects from powerful habituation factors and/or (2) the turbulence effects on SRAI scores are not manifested in the subjects' overall assessment of arousal over 10-minute blocks.

APPENDIX 29

PHOTOGRAPHS OF SLIDES PRESENTED TO INFORMATION GROUP SUBJECTS

1. STOLmobile Buses Parked at STOLport Passenger Terminal.

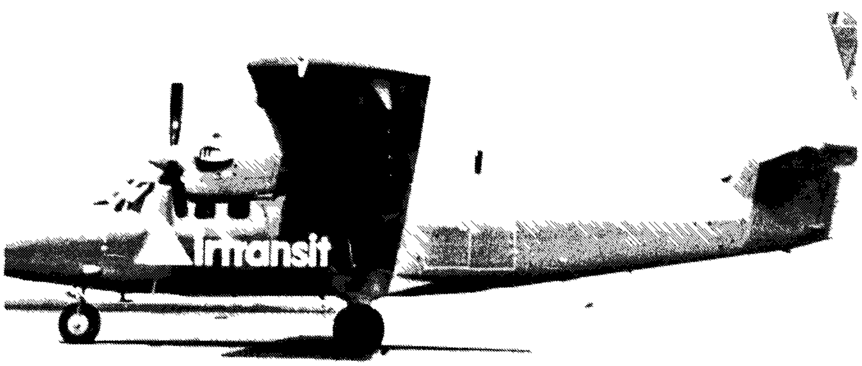


2. Buildings on the Site of the Ottawa STOLport.

3. Entrance to Passenger Terminal at Ottawa STOLport

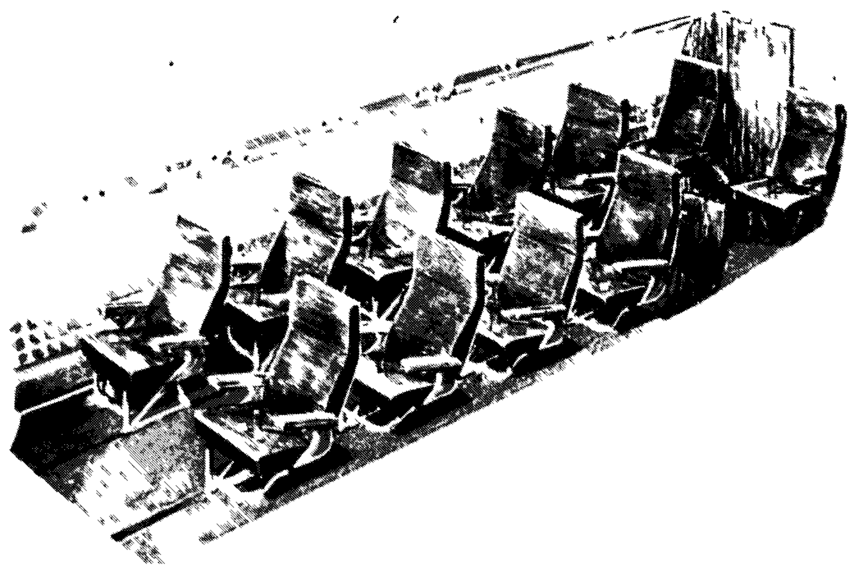
4. Ticket Counter in Passenger Terminal at Ottawa STOLport.

5. Interior View of Passenger Terminal at Ottawa STOLport.

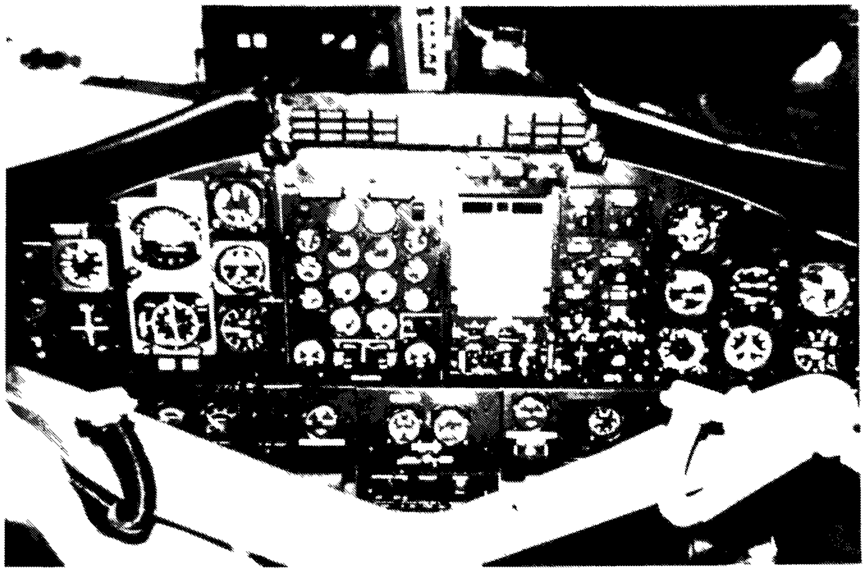


6. Exterior View of DeHavilland Twin Otter (STOL-craft).

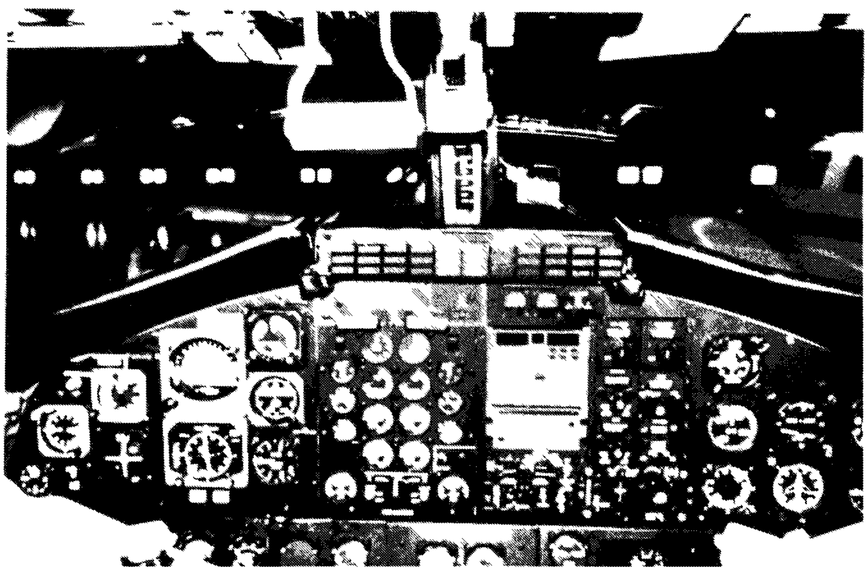
7. Passengers Boarding STOL at Ottawa STOLport.



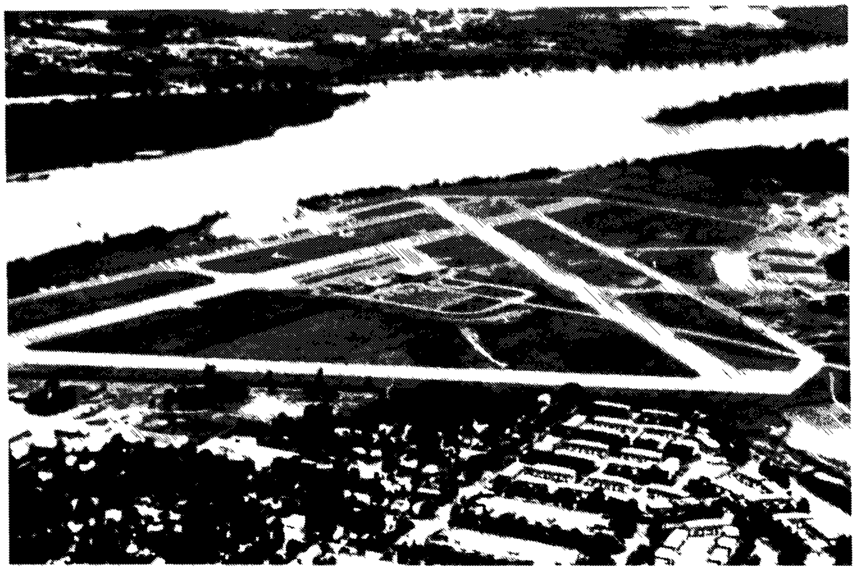
8. Architect's Rendering of the Cabin Interior of Twin Otter (STOL).



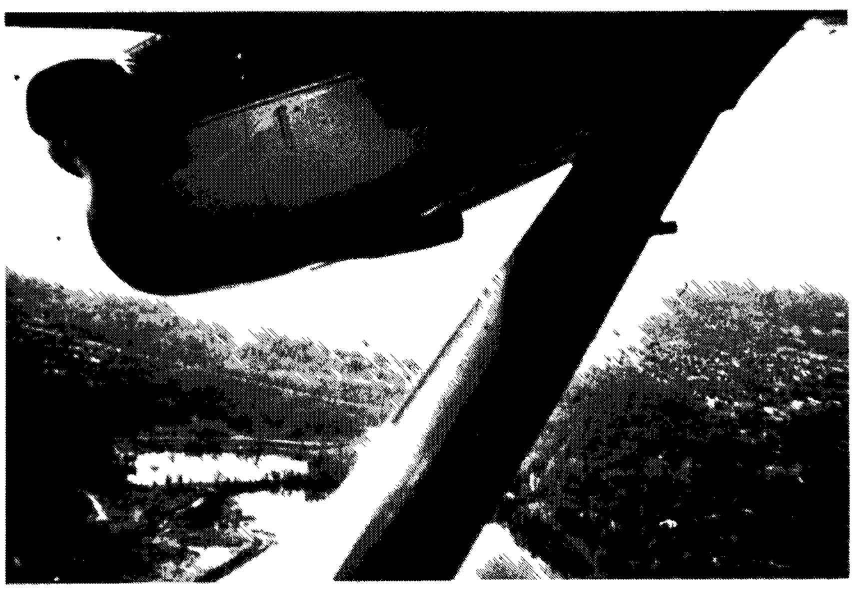
9. Close-Up View of Cockpit of Twin Otter.



10. Cockpit of Twin Otter as Viewed by Passengers.

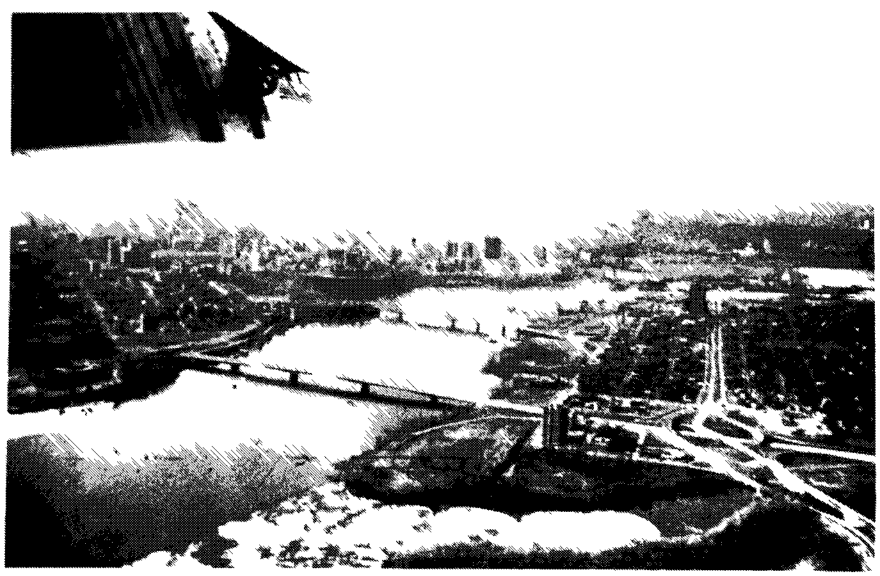


11. Aerial View of Ottawa STOLport immediately Following Take-Off.

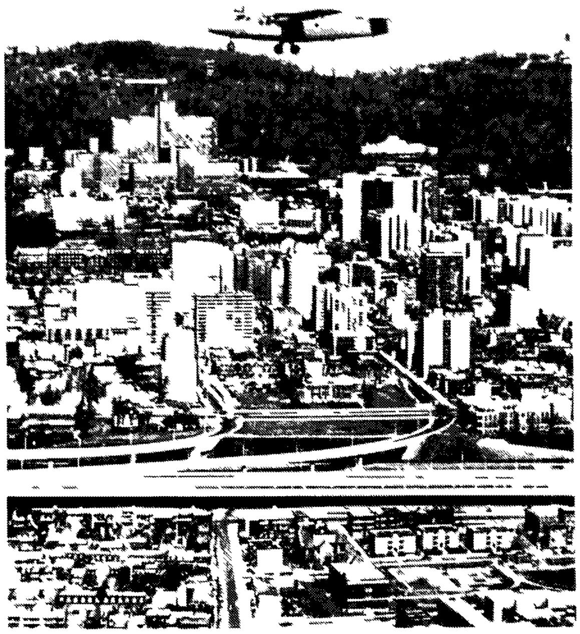


12. Aerial View of Ottawa During Ascent Following Take-Off.

13 Aerial View of Ottawa at Cruising Altitude.



14 Aerial View of Ottawa at Cruising Altitude

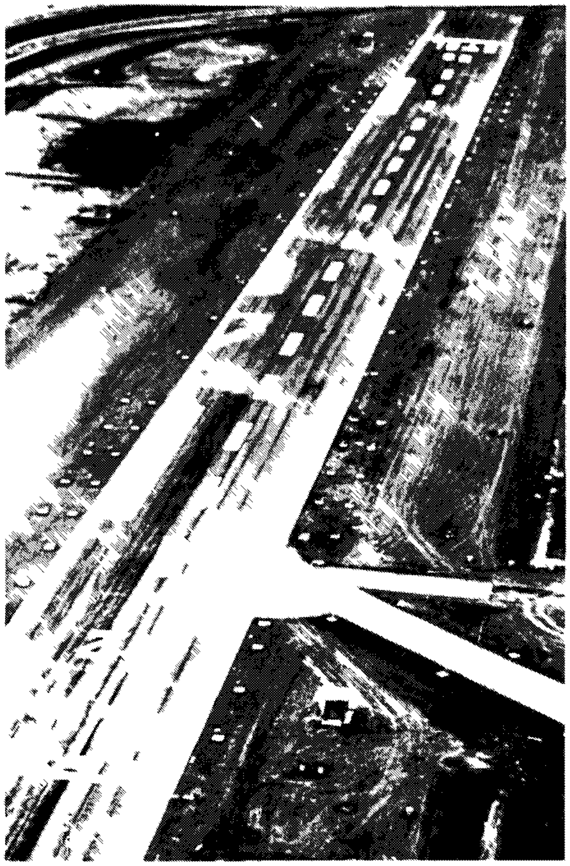


15. Aerial View of Montreal at Cruising Altitude.

16. Aerial View of Montreal at Cruising Altitude.

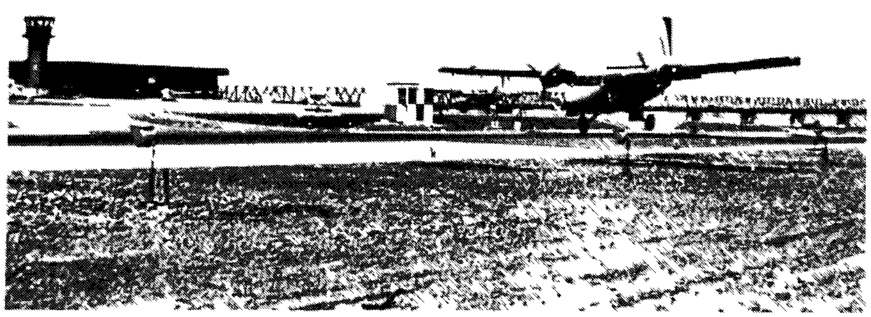
17. Aerial View of Montreal at Onset of Descent for Landing.

18. Twin Otter (STOL) Descending to Land at Montreal



19. Aerial View of Runway at Montreal STOLport.

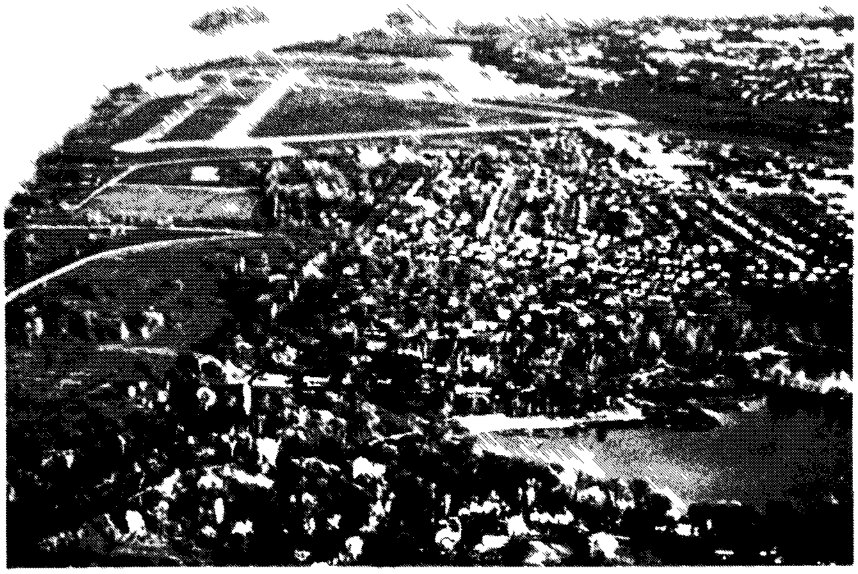
20. Twin Otter (STOL) Immediately Prior to Landing.



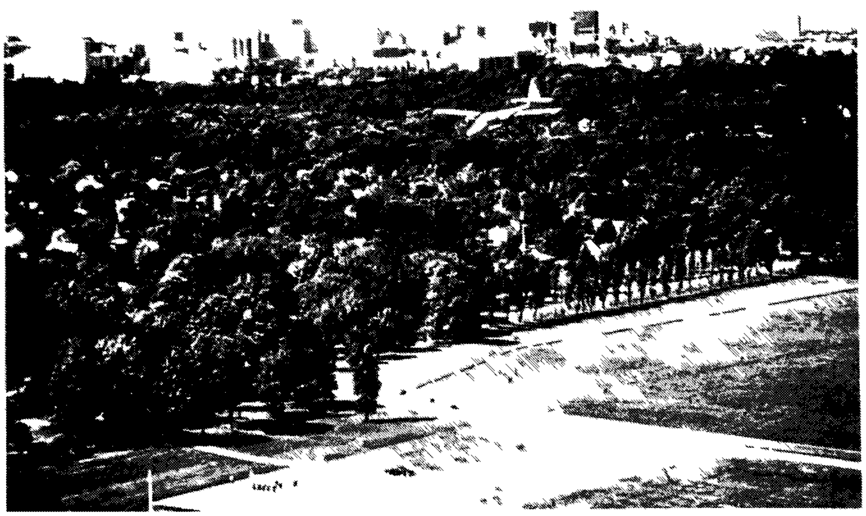
21. Twin Otter (STOL) Landing at Montreal.

22. Buildings on the Site of the Montreal STOLport.

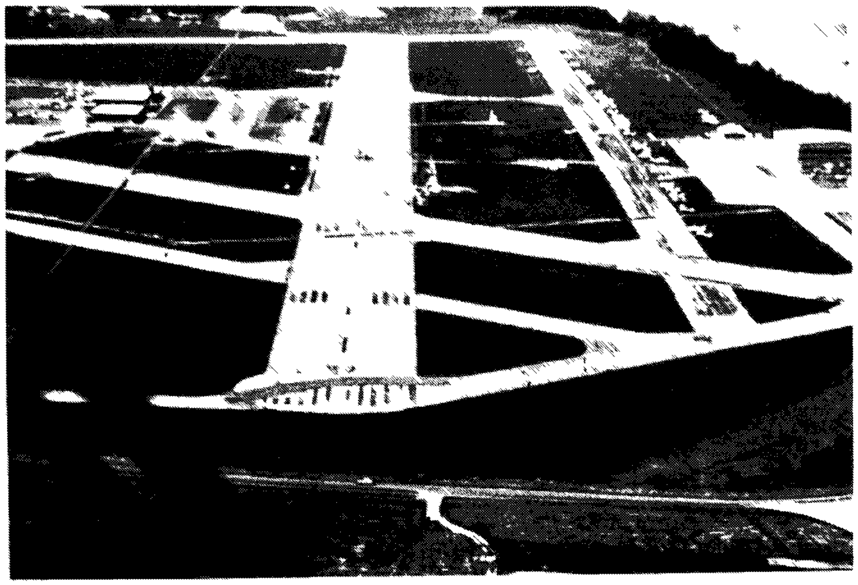
23. Interior View of Passenger Terminal at Montreal STOLport.



24. Aerial View of Ottawa STOLport on Approach for Landing.



25 Twin Otter (STOL) Descending to Land at Ottawa



26. Aerial View of Runway at Ottawa STOLport