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ACHIEVEMENT MOTIVATION MEASURED THROUGH ACADEMIC  
PERFORMANCE IN OFFICER TRAINING SCHOOL (OTS)  
CANDIDATES

by

LYNN JARED STONE, B.S., M.S., M.A.

DISSERTATION

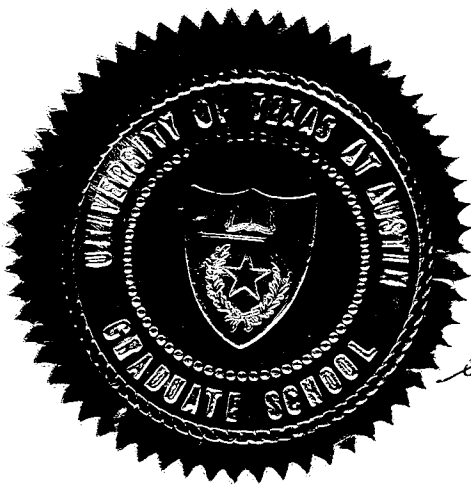
Presented to the Faculty of the Graduate School of  
The University of Texas at Austin  
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for the Degree of  
DOCTOR OF PHILOSOPHY

THE UNIVERSITY OF TEXAS AT AUSTIN

December 1994

ACHIEVEMENT MOTIVATION MEASURED THROUGH ACADEMIC  
PERFORMANCE IN OFFICER TRAINING SCHOOL (OTS)  
CANDIDATES

APPROVED BY  
DISSERTATION COMMITTEE:



Gary D. Borich  
Gary D. Borich, Supervisor

Victor H. Appel  
Victor H. Appel

Robert L. Helmreich  
Robert L. Helmreich

Richard Mowsésian  
Richard Mowsésian

Mark D. Shermis  
Mark D. Shermis

Dedicated to my daughter-

Tori

-with the hope and prayer for God's richest blessings  
and protection for her always

## ACKNOWLEDGEMENTS

I present this dissertation first, as a testimony to the grace of God, second, an affirmation of my faith in God, and finally, in acknowledgement of God's omnipotence.

Since the beginning of my tenure in this doctoral program, my daughter and I have been overwhelmed with an endless succession of horrendous difficulties and incredible injustices. They continue even to this day. I expect that they will continue for years to come yet.

I am convinced that all who believe in God are faced with many and sometimes frequent tests. Every hardship and test is relative. Further, I believe that at some point in their lives, they are faced with what is likely their ultimate test of faith. In this respect, I do not believe that my daughter and I are unique.

I am reminded of, and often reflect on a number of things which I believe are appropriate for and applicable to our particular circumstances. The first is the story of Jonah and the whale, and how God prepared the whale to receive and deliver Jonah in safety. The second is the parable of the disciple who committed Christ to payment of taxes without Christ's knowledge. Christ's response was to send the disciple out to catch a fish. The fish which the disciple caught had in its mouth the coin to pay the taxes

which were owed. Third, I am reminded of the writing entitled Footprints In the Sand, where the single set of footprints were God's, and not the person's, as He carried them through all sorts of difficult times. Finally, I am reminded of the Prayer of Serenity, where the prayer is for serenity to accept things one cannot change, courage to change the things one can, and the wisdom to know the difference between the two. The message here for us is clearly that: (1) God takes care of us; and (2) God will provide.

Throughout my pursuit of a doctoral degree, there have been a number of people who have been absolutely critical in my overcoming some major obstacles. I am confident they are virtually ignorant, (with few exceptions), of my own unrelated circumstances, yet they were there when it counted the most, as if out of thin air. I will not attempt to tie them individually to some gracious act for which they are responsible in my behalf, but will simply say that I believe it all was the work of God, and they, and their actions, were part of God's grandest plan. I believe God accounts for us all in all circumstances in His master plan.

And, so, I wish to simply list these individuals and say, from the depths of my soul: thank you!

- . Dr. Gary Borich
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- . Dr. Janet Spence
- . Dr. Judy Turner (and her staff)
- . Col Charles Walters (and his staff)
- . The US Air Force

It is my sincerest prayer that: (1) this dissertation serves a purpose other than just being a dissertation, and that some of it can be applied in a practical way, and is therefore a return on an investment on many people's parts; (2) this is just a beginning for me in psychometric endeavors; (3) I have in my life, and continue, to give something back, and make a real contribution to causes higher than my own. If I do, then I am confident that these are the dividends on the tremendous investments that my parents have made, and continue to make in me, and is a reflection of the values they have worked so hard to instill in me.



ACHIEVEMENT MOTIVATION MEASURED THROUGH ACADEMIC  
PERFORMANCE IN OFFICER TRAINING SCHOOL (OTS)  
CANDIDATES

Publication No. \_\_\_\_\_

Lynn Jared Stone, PhD

The University of Texas at Austin, 1994

Supervisor: Gary D. Borich

Previous research supports the multidimensionality of achievement motivation. There is very strong theoretical support for the dimensions of aptitude/ability, self-attribution, motivation, and demographics in predicting academic achievement. The United States has a vested interest in the successful completion of candidates in their Officer Training School (OTS) program. The ability to accurately predict which candidates will be successful in OTS prior to the beginning of training would afford maximum utility with fiscal, personnel, and real property resources. This study sought the development of a more accurate prediction model for successful completion of one of several aspects of OTS, i.e. academic achievement, by using an achievement motivation approach.

A total of 259 candidates were selected for this

study. From these, 146 were predicted to be in either the upper 30% or lower 30% of the sample using cumulative written test (CWT) scores as the criterion. Predictions were based on twelve measures which defined the four dimensions of academic achievement.

Results indicated that: (1) the two groups differ significantly statistically; (2) the relative predictive powers of the variables are uncertain; (3) several variables make the greatest unique contributions to prediction; and (4) the model predicting academic performance in OTS failed to predict correctly at a rate greater than or equal to 87.5%, i.e. the overall rate of successful completion of OTS among all OTS candidates.

This study concluded that: academic predictors predict better than motivation predictors to an academic criterion.

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## CHAPTER 1

### Introduction

✓ Officer Training School (OTS) is one of several commissioning sources into the United States Air Force (USAF) officer corp. These sources (and their respective percentages) are OTS (25%), Reserve Officer Training Corp (42%), Air Force Academy (15%), and other (18%). OTS is a 14-week course that has the mission to lead, train, motivate, evaluate, and commission as second lieutenants candidates who attain Air Force officership standards in response to USAF and USAF Reserve requirements. OTS objectives include, among other things, providing an adequate number of newly commissioned officers to meet Air Force manpower requirements, and identifying and eliminating trainees who do not meet the prescribed standards for commissioned Air Force Officers.

### Problem Statement

In general terms, the problem which exists with accessions into the OTS candidate selection process is the ratio between "identified and eliminated trainees", and the "adequate number" of initially selected candidates to become newly commissioned officers.



First Problem Restatement. A restatement of the problem might be: the need for a more predictive OTS selection protocol, battery, or profile. A more predictive protocol would result in greater cost efficiency. The cost to train one candidate through full term is approximately \$18,000. The typical attrition rate among candidates is 12.5%. From fiscal year 1993 through fiscal year 1999 approximately 7325 candidates are programmed for accession into OTS. At the typical drop out rate 915 candidates would attrit, resulting in a loss of up to \$16,470,000 in tax payer/government funds. A more predictive protocol would also result in less deterioration in projected personnel end strengths. Since 1960, personnel strengths have decreased from 814,000 to 444,000 in 1993, with a projected 1995 end strength of 400,000. Officers make up approximately 19 per cent of Air Force personnel resources. Given the small proportion of active duty officers, the absolute number of attritions in OTS has a significantly greater impact on the final officer corp strength.

Second Problem Restatement. A second restatement of the problem might be: the need for decreased false positives in selection of OTS candidates. False positives are defined as those candidates who are predicted to

succeed in the OTS program, based on a number of objective parameters, and subsequently fail. There are generally five reasons for failure in OTS. They include: (1) self-initiated elimination, (2) lack of aptitude (as determined by a flight commander's ratings), (3) military training deficiency (i.e. poor academic test scores), (4) medical disqualification, and (5) other (i.e. disciplinary: cheating, prejudicial conduct, etc.). Among the candidates examined in this study, the respective rates of failure among all failures were 45.83%, 25.00%, 20.83%, 8.00%, and 0.00%.

Third Problem Restatement. A third restatement of the problem might be: a need for greater predictive validity between the selection criteria (i.e. the independent variables), and the success criteria (the dependent variables). A narrowed focus of this problem might be greater predictive validity between cognitive/academic predictors and academic success criteria. This third restatement of the problem is the frame of reference that this study will take.

### Current Selection Criteria/Protocol

OTS source selection accessions are both from active duty and civilian pools. Civilian accessions are via Air Force recruiters. Active duty accessions are via education services officers. Both types of accessions are processed through Headquarters US Air Force Recruiting Service, where preselections occur. Final selection is made by an OTS selection board which is periodically convened.

Selection Board. The selection board is charged with providing a numerical assessment of potential for entry into OTS and subsequent commissioning. Normally the selection board is composed of colonel and colonel-select board members. Board members usually make up five panels. The panel members are rated (aviators), technicians, and nontechnicians. The composition of the selection board is determined by AF Military Personnel Center (AFMPC) requirements, the number of applications received, and program openings and closures.

Record Scoring. All records are scored using the "whole person concept", i.e. for relatively consistent strengths across a number of measures versus wide variance across these same measures. The whole person concept is a

multidimensional model which provides a quasi-collective definition of the best candidate. Factors to be considered in assessing the "whole person" are: college grade point average (GPA); interviews; AF Officer Qualifying Test (AFOQT) scores; law violations; work experience; warrior qualities; awards and recognitions; academic discipline; leadership potential; letters of recommendation; and skills, hobbies, and outside activities. The validation criteria for this model is presumed to be successful officers, i.e. colonels and colonel-selects who constitute the selection board. They are in effect an "expert" panel of judges. All records are scored independently by each panel member. Most records are scored by a single panel. Records receiving a split score (i.e. more than a one-point scoring difference among panel members) are returned for re-scoring. Each panel typically scores 70 -90 records.

Subscores. Each record is scored in 1/10th point increments from 0 to 10. Three subscores combine to make up the possible 10-point maximum score. The three subscores are: (1) education/aptitude (0 - 3 points), (2) experience (0 -3 points), and (3) potential/adaptability (0 - 4 points). Academic discipline, AFOQT scores, impact of work experience, and GPA are scored under "education/aptitude"

for both civilians and active duty candidates. Employment while in school, employment since graduation, salary/level of responsibility, honors/recognition, outside activities (athletics, community service, skills/hobbies) are scored under "experience" for civilian candidates. Military experience/performance (Airman Performance Report history, promotion phases, awards and decorations, letters of recommendation), demonstrated leadership experience, and outside interests (community/base involvement, skills/hobbies/athletics) are scored under experience for active duty candidates. Education and experience factors, affiliation with the military, evaluation of the interviewing officer, motivation, goals, letters of recommendation, and law violations/waivers are scored under "potential/adaptability" for civilian candidates. Time in service, squadron commander interview, and communications skills are scored under "potential/adaptability" for active duty candidates.

Three instruments (AF Form 56, AF Form 1145, Air Education and Training Command Form 1422) are used to collect these measures on candidates. Scores of nine to 10 are rated as "outstanding"; greater than five but less than nine are rated "average"; zero to five are rated "not recommended".

### Typical Fiscal Year (FY) 93 OTS Selection Profile

Tables 1 and 2 reflect typical profiles for candidates selected for FY93.

#### Table 1: Selection Profile For All Candidates

Average GPA:	3.2
--------------	-----

Average AFOQT Subcores:

Pilot-	69
--------	----

Navigator-	73
------------	----

Academic Aptitude-	73
--------------------	----

Verbal-	72
---------	----

Quantitative-	70
---------------	----

Average Age (years):	26.4
----------------------	------

Sex:

Male (%) -	88.1
------------	------

Female (%) -	11.9
--------------	------

Minorities:

Black (%) -	6.8
-------------	-----

Hispanic (%) -	1.0
----------------	-----

Table 2: Selection Profile For Active Duty Candidates Only

Average GPA: 3.3

Average AFOQT Scores:

Pilot- 68

Navigator- 68

Academic Aptitude- 66

Verbal- 67

Quantitative- 61

Average Age (years): 28.5

Sex:

Male (%) - 97.7

Female (%) - 2.3

Minorities:

Black (%) - 7.8

Hispanic (%) - 1.0

Average Grade (rank): E-5

Average Time In Service  
(years): 7.8

Current Success Criteria/Protocol

As with candidate selection, success in OTS is measured using a multidimensional model. This model uses four types of parameters. They are: (1) academics,

(2) leadership, (3) physical fitness, and (4) discipline.

Academics. Six scores are used to compute an academic rating. They are consolidated written tests (CWT), communications skills (CS), professional knowledge (PK), defense studies (DS), a letter, and a briefing. Five CWTs are administered during the program. A composite score is computed. Single CS, MK, DS, letter, and briefing scores are computed. The letter and briefing scores are nominal scores. The briefing score is critical, i.e. a failing briefing score results in overall failure in academics.

Leadership. Three scores are used to compute a leadership rating. They are Officer Training Evaluation Reports (OTER), leadership academic course (including a Vigilant Warrior Exercise rating), and flight commander evaluations. Two OTERs are given, one at the six-week point and the second at the end of the course. Performance in the leadership course is evaluated with a written examination. Periodic flight commander evaluations are performed. They are subjective evaluations. OTERs and flight commander evaluations are nominal ratings. A failing score in any of these three measures results in an assessment of "lack of aptitude". Aptitude, and



subsequently leadership, are critical, i.e. failure in leadership results in overall failure in the OTS program.

Physical Fitness. Physical fitness is measured through a series of seven physical fitness tests and a timed 1.5-mile run. The physical fitness ratings are nominal.

Discipline. Discipline is measured by a school regulations written examination and the lack of infractions which would result in some type of sanction (e.g. loss of weekly privileges), up to and including elimination from the program.

Distinguished Graduate (DG). DG is an end of program rating reserved for up to the top 10% of the graduating class. DG status is determined by a composite of all measures throughout the entire program.

## CHAPTER 2

### Literature Review

Both the OTS selection and success criteria are multidimensional. Given the third problem restatement, i.e. a need for greater predictive validity, it is important to review the two sets. Table 3 presents that information.

Table 3: OTS Selection/Success Criteria

Selection Criteria

- (1) Education/Aptitude
- (2) Experience
- (3) Potential/Adaptability

Success Criteria

- (1) Academics
- (2) Leadership
- (3) Physical fitness
- (4) Discipline

The two sets of criteria differ in dimensionality (three versus four) and in definition, although there does appear to be some overlap. A prima facie examination of the measures which define the respective dimensions of

these criteria illustrates this point. Tables 4 and 5 present this information.

Table 4: Measures Defining OTS Selection Criteria

Dimensions

(1) Education/Aptitude

- . GPA
- . AFOQT
- . Work experience
- . Academic discipline

(2) Experience

- . Work experience
- . Awards and recognitions
- . Leadership potential
- . Letters of recommendation
- . Skills, hobbies, outside activities

(3) Potential/Adaptability

- . Interviews
- . Law violations
- . Warrior qualities
- . Letters of recommendation

Note: The same measure may be used to define a different dimension, depending on whether the candidate is civilian or active duty source selected.

Table 5: Measures Defining OTS Success Criteria Dimensions

(1) Academics

- . Cumulative written tests
- . Communications skills
- . Professional knowledge
- . Defense studies
- . Letter
- . Briefing

(2) Leadership

- . Officer Training Evaluation Report
- . Leadership Academic Course
- . Flight commander evaluations

(3) Physical fitness

- . Physical fitness tests

(4) Discipline

- . School Regulations Examination
- . Infractions

While the selection and success measures vary, it appears that they might all be placed in four common dimensions. Those dimensions/measures: (1) Aptitude/Ability, (cognitive and physical); (2) Self-attributions (self -awareness/-perception); (3) Motivation; (4) Demographics; are presented in Tables 6 and 7.

Table 6: Reclassified OTS Selection Measures

(1) Aptitude/Ability

- . GPA
- . AFOQT
- . Academic discipline

(2) Self-attributions

- . Awards and recognitions
- . Leadership potential
- . Letters of recommendation

(3) Motivation

- . Law violations
- . Work experience
- . Skills, hobbies, outside activities

(4) Demographics

- . Interviews
- . Warrior qualities

Table 7: Reclassified OTS Success Measures

(1) Aptitude/Ability

- . CWT
- . Communications skills
- . Professional knowledge
- . Defense studies
- . Letter
- . Briefing
- . Leadership Academic Course
- . Physical fitness tests
- . School Regulations Examination

(2) Self-attributions

- . OTER
- . Flight commander evaluations

(3) Motivation

- . Infractions

Of the five reasons for attrition in the OTS program, self-initiated eliminations (SIE) alone accounts for almost half (45.83%) the losses. SIEs, as the name implies, are directly under the control of the candidates themselves. They alone decide, for what ever reason(s), to discontinue working to achieve the goal of successful completion of OTS.

For that reason, the following review of literature examines research conducted in the areas of aptitude/ability, self-attributions, and motivation as they relate to achievement.

### Aptitude/Ability

The collective findings of several researchers suggest a definite link between aptitude/ability (specifically cognitive ability) and motive. McClelland et al. (1976., p.30) reported that affective arousal is the basis for motive, and that affect is the innate result of discrepancies between expectations and perceptions. Miller (1944) and Clark (1952) reported that achievement motivation is the outcome of an approach-avoidance gradient, and that fear of failure and success strivings are the two necessary aspects of achievement. The gradient between the former and the latter determines the level of motivation. Both these findings suggest a strong dependency on cognitive state, or level of cognitive development.

Jennings et al. (1984) reported that environmental mastery is the impetus for cognitive development. From infancy to early childhood, mastery motivation and cognition operate on a continuum, even though they are

undifferentiated in infancy. Perhaps they are the same trait at different developmental stages. This relationship, however, was not observed as being the same in both boys and girls.

The question of how early motivation is acquired is still a puzzling one. Some have postulated that need for approval is an answer to this question. Contrary to what was widely held as true, Harter (1975), stated that need for approval is not so prevalent in younger children as had been previously thought. She reported that mastery motivation is present in younger children, as well as in older children. Mastery, beginning in early childhood through later childhood, is defined more in cognitive dimensions than need for approval as children get older. For example, older children display a greater desire to solve cognitively challenging problems for the inherent gratification of finding a solution.

If a cognitive developmental continuum does exist, something must account for individual differences. Harmon et al. (1984) confronted this issue and contended that no such continuum exists, but instead a transformation occurs during the second half of a child's first year. This transformation is a shift from exploratory behaviors to mastery behaviors. The shift occurs under normal



circumstances. Abnormal circumstances, e.g. premature birth, child abuse, have been demonstrated to interfere with this shift (Harmon et al., 1984). Premature infants have exhibited slower task solving skills and fewer instances of task appropriate behaviors. They have also exhibited less positive solutions than have full term babies.

One potential remediation for retarded cognitive development is diversity in cognitively-oriented social stimulation. Gaiter et al. (1982) suggested that diversity in stimulating activities presented by primary caretakers might facilitate cognitive competence (and presumably compensate for retarded cognitive development). This has been demonstrated with language deficiencies.

From the Gaiter et al. (1982) and earlier studies, it may be concluded that mastery motivation (i.e. desire to acquire a specific behavior) is the impetus for continued cognitive development. It could be hypothesized that mastery motivation and cognition are on the same continuum which is sometimes disrupted by retarding forces, e.g. premature birth, abuse. These retarding forces are environmental in nature.

Environmental Factors. Often cues and factors associated with achievement are present in the external environment. Shalley and Oldham (1985) studied the effects of goal difficulty when evaluation was anticipated. They postulated that difficult tasks generally were attractive and that intrinsic motivation would diminish in anticipation of evaluation. Some of the findings in this study distort the relationship between intrinsic motivation and performance. In particular, while it was found that individuals assigned difficult goals performed significantly better than did those assigned easy goals, the former exhibited less intrinsic motivation. This finding seems inconsistent with others.

In a related study, Deci et al. (1981) examined the relationship between teacher characteristics, and intrinsic motivation and self-esteem in fourth- and sixth- graders. Teacher attitudes, (i.e. control-oriented versus autonomy-oriented) were demonstrated to affect both self-esteem and intrinsic motivation. However, the effects of teacher motivation lasted only through the first six weeks of school; subsequently, students were unaffected by teacher orientation. Overall, self-worth and cognitive competence were most affected by teacher orientation. The students perceptions of both the classroom environment and the

teachers, mediated the effects of teacher orientation on the students' self-esteem and motivation.

Green and Foster (1986) took the question of teacher orientation and classroom environment one step further and asked if these effects varied with gender. One significant difference existed between boys and girls with respect to classroom curiosity. Girls were more curious (and perhaps more ambitious) in the classroom.

Collectively, these results suggest that task difficulty is related to intrinsic motivation in a complex manner. Autonomy-oriented teachers and positive classroom environments increase intrinsic motivation and self-esteem. Gender differences do occur in classroom academics. Teacher orientation is causal only for an initial period of time.

Gender. Gender differences in classroom performance curiosity raises the question of other differential performances with regard to level and type of motivation. When gender typing as an experimental activity is controlled for and verbal praise is used, intrinsic motivation increases for both boys and girls, and has a slightly greater effect on girls in some female-labeled tasks (Blanck, 1984).

McClelland et al. (1976) concluded that women's achievement is more tied to social acceptability, and men's to leadership capacity and intelligence. However, gender differences are less apparent in many achievement situations.

Social Class. Socio-economic status (SES), environmentally and demographically, has been demonstrated to be related to achievement motivation. Douvan (1956), in her research, examined this relationship. The then current theory maintained that middle-class children exhibited greater achievement need than did lower SES children. It was presumed that early achievement was stressed with middle-class children. Achievement need was said to generalize to more situations in middle-class children. Lower SES children were said to demonstrate a greater change in achievement need after conditions in which material reward was absent. Other significant findings indicated that under material reward conditions, achievement motivation for both groups was virtually the same; material reward was equally salient in both groups. These findings have significant implications for academic (cognitive) remediation.

Katz, in writings submitted at the 1967 Nebraska

Symposium on Motivation, concluded that: the child's capacity for sustained academic effort depends heavily on an internalized mechanism of affect-mediated self-evaluation. This is consistent with McClellan's theory presented above. Katz also maintains that by assessing the self-regulating process, and relating its characteristics to the classroom performance, and home and school background variables, it would be possible to test a broad range of hypotheses regarding motivational difficulties which may be experienced by disadvantaged students.

#### Self-attributions

It is apparent from the previous findings that environmental consequences have some effect on self-concept and self-evaluation (self-esteem). Another example of the same type of environmental consequence is prior success/failure. According to Feather and Saville (1967), prior failure has a greater impact than does prior success on subsequent performance. Also, they concluded that expectations for success increased and decreased after success and failure respectively; motivation changes in a similar manner.

Extreme effects resulting in dysfunction/pathology were investigated by Zukerman et al. (1980). They

investigated the effects of fear of success in choice and task outcomes, intrinsic motivation, causal attribution, and subsequent choice of behavior. One finding was that low fear of success subjects, those with prior success (e.g. prior service candidates), perceived their performance as higher than high fear of success subjects under both success and failure conditions, even though their performance was actually less.

If these findings are correct, it could be concluded that failure can be a self perpetuating phenomenon. This conclusion perhaps underlies the phenomenon of learned helplessness, or more importantly, is the basis for lack of self-competence.

Competence. Competence in self-evaluation, has been demonstrated to be a consequence of prior success/failure. The role of competence in motivation and subsequent performance is an important issue.

Sansone (1986) concluded that competence in self-evaluation is consequential only if competence is the primary goal of the task. Achievement-oriented individuals are also more sensitive to cues from different types of feedback regarding personal assessment and achievement, and lesser achieving individuals are less sensitive to

these same cues. It may be true that in general, high achievers are more sensitive to all other classes of cues associated with achievement, while low achievers may not be.

Self-esteem. Self-evaluation and self-esteem are synonymous in this discussion. Self-esteem is equated to "wanting to do it oneself" by Geppert and Kuster (1983). Wanting to do it oneself is presumed requisite for achievement in young children. Geppert and Kuster (1983) found a correlation between wanting to do it oneself and self-concept in children as young as 16 months old. They suggested that wanting to do it oneself may be based on the self-efficacy experience, which presumes mastery opportunity. Wanting to do it oneself culminates in the desire to achieve (Geppert and Kuster, 1983). Desire to achieve is the intrinsic by-product of mastery achievement. Other factors, e.g. age, and family, have been commonly accepted as important in self-concept formation. Jensen (1983), however, would disagree with this. While she concedes that variations in self concept may exist, her data demonstrated that only a negligible relationship between young children's global self-concept, and gender or family structure exists.

The fact that her instrument was an instrument of global self-concept and not domain specific self-concept could explain Jensen's findings.

Muller et al. (1977) investigated the idea of domain specific self-concept. They found that at least in the academic domains, self-concept was significantly correlated with success. Muller et al. (1982) also investigated the effects of academic self-concept and self-esteem, when self-concept was inconsistent with subject domain, and the effects on achievement. Their results were inconsistent with previous findings, at least in the domains of reading, language, and mathematics content areas. The latter findings may have occurred because the two experimental groups were not matched in intelligence. Had intelligence been controlled for, domain-specific self-concept might have been found to be correlated with achievement.

Gose et al. (1980) investigated this hypothesis. They found that when coupled with academic self-concept, intelligence was more predictive of academic success. In spite of Jensen's (1983) findings, findings by others provide obvious support for family and significant others as significant variables in assessing self-concept/self-esteem and subsequently achievement motivation. Filsinger and Andersen (1982) found that when social class of one's



best friend was discrepant with own social class, one's self-esteem changed so that it was consistent with the social class of the best friend. The friend's status was shown to be predictive of self-esteem. It has been widely accepted that self-esteem changes with age. McCarthy and Hoge (1982) found that under normal circumstances self-esteem increases with age.

Other research (Muller et al., 1977) has demonstrated a relationship between self-concept and academic achievement but has failed to clearly demonstrate a similar relationship between achievement and self-esteem. Bachman and O'Malley (1977) investigated this question. Specifically, they investigated the relationship between self-esteem and educational attainment, and occupational status. First, they concluded that self-esteem during high school had a direct impact on self-esteem five years later. Second, they concluded that having a high status job directly contributed to higher self-esteem. An important unanswered question is whether present self-esteem contributes to present occupational status.

In summary, a desire to do it oneself in young children gives rise to self-concept, which can further be influenced by significant others. Differentiated self-concept, identified with a specific domain, is predictive

of achievement in that domain (e.g. academic achievement). Self-concept, coupled with intelligence, is more predictive of achievement. Self-esteem, which can be strongly influenced by status of best friend, may be related to occupational attainment.

### Motivation

Intrinsic motivation is an internal source of motivation. To this extent, it has been hypothesized to be related to other internal phenomena. Deci (1975) states that intrinsic motivation is the result of external informative and controlling cues, which presumably are internalized.

Koestner et al. (1987) found that intrinsic motivation is enhanced with task involvement, as opposed to ego-involvement. Ability praise (praise based on ability), rather than effort praise or no praise, enhances intrinsic motivation. The interaction of praise and involvement also enhances intrinsic motivation, (Koestner et al., 1987). These findings are consistent with Deci's theory, and support the efficacy of external cues in the manifestation of intrinsic motivation.

One external factor which is known to decrease intrinsic motivation is tangible reward. The relationship

between intrinsic motivation and reward is thought to be governed by the overjustification effect, i.e. reward made contingent on task engagement results in a decrease in subsequent interest on that task upon task completion. Tangible rewards, generally, diminish the effects of intrinsic motivation. Also, Anderson et al. (1976) reported that subjects ignored by the experimenter showed a decrement in intrinsic motivation. This finding appears theoretically significant, since it suggests that individuals are capable of acting as a source of external mediating cues which cause the same negative effects as do tangible rewards and effort praise.

Cognitive-motivational theory is typically used to explain the negative effect of tangible rewards on intrinsic motivation. However, McCullers et al. (1987) questioned this explanation but provided no experimental data to refute it.

Given the previous findings, it appears that class, type, and/or quality of reinforcer makes a difference in performance.

Type of Reward/Reinforcer. While the primary research question for Masters et al. (1977) dealt with achievement standards, their findings with regard to evaluative rewards

were noteworthy. They found that achievement standards, and not contingency reinforcement (tangible or evaluative rewards), were the primary determinants of children's learning. However, self-dispensed evaluation did promote mastery, so much so, that by the end of the experiment all effects due to experimental manipulation were non-existent. Self-evaluation was not previously demonstrated to be an effective reinforcer.

Verbal reinforcement (i.e. praise) has also traditionally been accepted as a reinforcer in middle-class but not in lower-class students. In her study, McGrade (1966) demonstrated that lower class students generally were not unresponsive to verbal reinforcement. This finding lends support to the possibility of finer within class distinctions with regard to effective reinforcers than had been previously made. Blair (1972) investigated possible within class differences with regard to class of effective reinforcers. He found that middle-class boys did not all have the same responsiveness to a single class of reinforcers when their achievement levels differed. He concluded that more complex tasks than those traditionally used in achievement studies were necessary to measure these finer, within class distinctions.

Spence (1970), in a separate study involving a test of

the notion of social class specific reinforcers, looked at the role of tangible reinforcers. She concluded that in lower-class children tangible rewards may well function as distracters, rather than as appropriate reinforcers as was previously thought. The same distraction also occurs in middle-class children.

The overjustification effect, which appeared to be a paradoxical effect of rewards, was investigated by Boggiana et al. (1982). They concluded that continued interest is a function of two conditions, i.e. the challenge of the task and the absence of extrinsic reasons for task performance (material reward).

In summary, type and amount of reinforcement may affect motivation and subsequent performance. Self-evaluation is a class of reinforcement not traditionally considered as such. Verbal reinforcement has been shown not to be class specific. Tangible reinforcement may act as a task distracter. Exclusion of extrinsic reinforcers increases the likelihood of subsequent task interest.

Task interest and subsequent performance has been demonstrated to vary over time (Helmreich et al., 1986). This phenomenon is accounted for in the "honeymoon effect".

Honeymoon Effect. After a period of time at a new job, the novelty and challenge of the task(s) begin to wear off. In effect, the individual begins to acquiesce to local expectations and their level of performance decreases over time relative to the initial performance level. Helmreich et al. (1986) observed that while personality predictors correlated poorly with performance during the honeymoon period, they correlated significantly after this initial phase of performance. These personality predictors included, among others, work, mastery and competitiveness motivations, as defined by the Work and Family Orientation Questionnaire (WOFO).

Implicit in Helmreich's et al. findings, level of motivation may be a function of the instrument or protocol used to index that phenomenon.

Measurement of Motivation. According to Clarke (1973), the choice of instrument used to measure motivation can make a major difference in predicting scores on the job. After examining the results of various instruments for measuring motivation, he argued that these instruments were, in fact, measuring different aspects of motivation. The implication is that motivation is not a unidimensional

construct, or that there are various types of achievement motivation.

Helmreich and Spence (1978) did, in fact, discuss four types of achievement motivation (work, mastery, competitiveness, and personal unconcern). The WOFO measures these four types of motivation.

### Demographics

Zuckerman et al. (1980) reported that low fear of success subjects (i.e. those with prior success) perceive their performances as higher than high fear of success subjects (i.e. those with prior failure). Within the group of subjects in this study (OTS candidates) active duty candidates (i.e. those with prior enlisted service) are classed as low fear of success individuals. Although Zuckerman et al. (1980) maintain that failure appears to be the more salient predictor, within the group of OTS candidates, low fear of success subjects are not able to be identified based on failure prior to and outside the OTS program. Given this, it is plausible that prior success is a reasonable demographic predictor for success in the OTS program. Prior success is implicit among active duty (prior service) candidates. Rated status (i.e. programmed flyers) and active versus reserve duty status may likewise

be reasonable demographic predictors within candidates.

### Integration of Findings

The findings with regard to intrinsic motivation seem to indicate that intrinsic motivation is an internal phenomenon that can be mediated by external factors, e.g. praise, tangible reward. Therefore, intrinsic motivation may be the energy or catalyst which drives a mediating variable which, in turn, results in achievement. Some of the previously cited research indicates that level of cognitive development may be this mediating variable. This research postulates that in order for achievement to occur, some level of cognitive capacity must be present; the level necessary for achievement depends on the task. Ultimately, intrinsic motivation is the catalyst which drives the cognitive capacity.

This research also attempts to account for individual differences vis-a-vis academic success versus failure. Individual differences are defined by different levels of achievement on the same task by different individuals, and different levels of achievement by the same individual on different tasks. Some of the constructs reviewed here may account for individual or "self" differences.

Past failure and fear of success have been found to be



more predictive than has been past success. This research postulates that past failure acts as feedback, providing some measure of self-competence for the individual. Findings indicate that competence is only important if competence is the goal. But, this research postulates that task specific competence is necessary for achievement in all situations.

In summary, it is proposed that:

- (1) cognitive aptitude, motivational, and self-attributional measures are significant predictors of achievement motivation,
- (2) demographic characteristics based on prior performance of candidates such as prior service (i.e. prior service or no prior service), flight rating (i.e. rated or non-rated), and duty status (i.e. active or reserve) may be important predictors.

#### Research Model

The research model for this study is four dimensional (aptitude/ability, self-attribution, motivation, demographics), incorporating twelve parameters. The twelve parameters are defined by three previously developed and validated instruments, and data from US Air Force archives.

Aptitude/ability is measured by the Air Force Officer Qualifying Test (AFOQT). The two parameters derived from the AFOQT are: AFOQT verbal score (AFOQTVER), and AFOQT quantitative score (AFOQTQUA). Self-attribution is measured by the Myers-Briggs Type Indicator. The four bi-polar parameters derived from the Myers-Briggs (MB) are: introversion-extroversion (SA1), thinking-feeling (SA2), sensing-intuitive (SA3), and judging-perceiving (SA4). Motivation is measured by the Work and Family Orientation Questionnaire (WOFO). The three parameters derived from the WOFO are: WOFO work + mastery (WOFOW-M), WOFO competitiveness (WOFOCOMP), and WOFO personal unconcern (WOFOPERS). The three demographic parameters prior service (PRIORSER), rated status (RATESTAT), and duty status (DUTYSTAT), were extracted from Air Force archives. In general, this twelve-parameter model serves to predict academic success in OTS. Academic success is a cognitive outcome. It is noteworthy that a cognitive dimension (aptitude/ability) is used in part to predict to a cognitive outcome (academic success).

Implicit in this model is the notion that, in addition to a cognitive predictor dimension, three other types of dimensions predict to the cognitive outcome. This is consistent with multidimensional theory and findings

presented previously.

Certain ones of the twelve are expected to be more predictive of the outcome. They are: AFOQTVER, WOFOW-M, PRIORSERV, and AFOQTQUA. AFOQTVER is the single best measure of overall cognitive ability used in this study. WOFOW-M (a measure of motivation) is the catalyst which operates on cognitive ability (AFOQTVER) resulting in achievement. PRIORSERV is a measure of prior success. AFOQTQUA is a second order measure of cognitive ability, second order in the sense that it is less global in nature than AFOQTVER in an OTS context.

All four Myers-Briggs measures represent the individual's perception of self, vis-a-vis external cues/feedback. All but introversion-extroversion (SA1) are thought to be significant predictors, specific to the outcome in the OTS context. The remaining three self-attributions are believed to reflect some degree of intelligence.

The five remaining model predictors are thought to be predictive, but not to a large degree. WOFOCOMP and WOFOPEERS are believed to be opposite poles along the same dimension in the present context. They are both elements of individual achievement and group academic conformity in OTS. There is little evidence to support whether

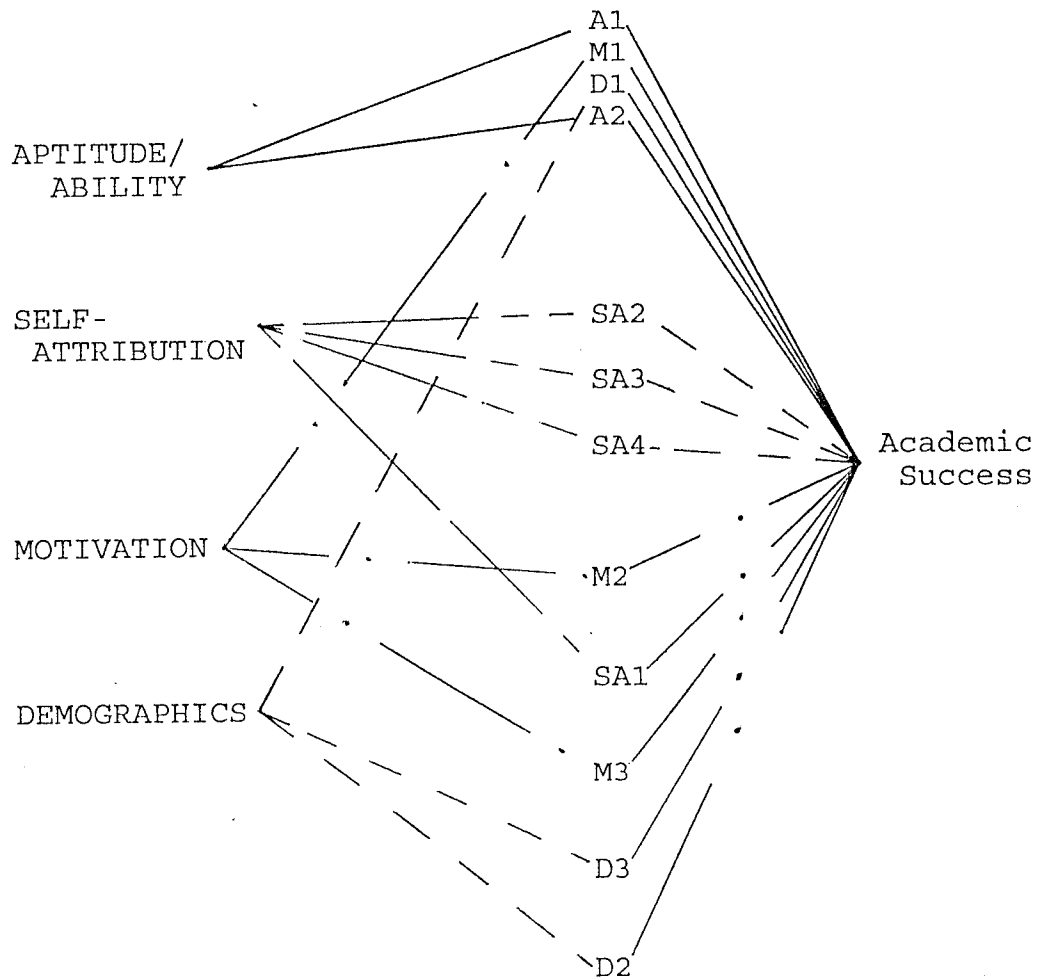
introversion or extroversion is predictive of the research outcome using paper and pencil measures. Consequently, there is no reason to believe MB Intro- extrovert will be predictive of academic success. However, if this particular predictor is more global in nature, and tends to measure trait versus state (i.e. test performance), then perhaps it should be included in the model. There is little reason to believe RATESTAT will add a major contribution to the model since it simply designates a later career field in the Air Force, and some additional training (aviation training) while in OTS. However, some, but not all OTS candidates do have previous aviation experience. To date, there is little evidence to suggest that active duty versus reserve members are more or less academically inclined. All OTS candidates are required to hold at least an undergraduate degree.

The research model for this study is defined in equation 2.1.

$$\begin{aligned} 2.1 \text{ Academic Success} = Z = & b1A1 + b2M1 + b3D1 + b4A2 + \\ & b5SA2 + b6SA3 + b7SA4 + b8M2 + b9SA1 + b10M3 + b11D3 \\ & + b12D2, \end{aligned}$$

where  $b_1$  through  $b_{12}$  are associated beta weights. Figure 1 is a graphic illustration of the research model and defines the remaining terms of the model. Academic success is relative success, i.e. relative to all candidates in the sample.

FIGURE 1  
Research Model



Legend: A1 - AFOQTVER	M1 - WOFOW-M
A2 - AFOQTQUA	M2 - WOFOCOMP
SA1 - MB Intro- extrovert	M3 - WOFOPERS
SA2 - MB Thinking-Feeling	D1 - PRIORSER
SA3 - MB Sensing-Intuitive	D2 - RATESTAT
SA4 - MB Judging-Perceiving	D3 - DUTYSTAT

## CHAPTER 3

### Research Hypotheses

This study seeks to assess relative levels of motivation among OTS candidates. Specifically, achievement motivation will be measured. The model previously presented will experimentally define achievement motivation. Since motivation is not directly observable, it is inferred from scores on a number of specified measures. Outcome is the a priori index of overall achievement motivation. The specific outcome variable is the composite cumulative mean score over five consolidated written tests (CWT) administered during OTS.

The objectives of this research are the development of a prediction equation that will predict academic performance in OTS, and to be able to discriminate between the best and worst academic performers prior to entry into the program. Specifically, this equation is designed to discriminate between those candidates scoring in the top 30% on cumulative mean CWT score, and those scoring in the bottom 30% on cumulative mean CWT score. With this equation candidates could be in part selected based on their projected academic performance during the program. The implication of this model is that ultimately, performance in all individual aspects of the program may be accurately

predicted, as well as overall success/failure in the program as a whole. The consequence of a more predictive equation would be a more efficient selection equation, and ultimately substantial savings of fiscal, personnel, and other resources.

In that regard, there are four hypotheses associated with this study.

#### Hypothesis One

There is a statistically significant difference between OTS candidates in the upper 30% of the group and those in the lower 30%, using the predictor variables in the discriminant function model equation presented previously, and with CWT as the outcome variable.

The most obvious support for this hypothesis is that two of twelve predictors are cognitive, which are predicting to a cognitive outcome. Also, three cognitive measures (GPA, AFOQT scores, and academic discipline) are used in the selection process of candidates. It is widely accepted that predictors measuring a given trait predict reasonably well to criteria in the same or similar domains, if the measure used is appropriate for that subject pool.

The collective findings of Jennings et al. (1984),



Harmon et al (1984), and Gaiter et al. (1982) suggest that mastery and cognitive ability go hand in hand. The obvious conclusion is that those individuals who excel most in academic mastery are the same as those who are more cognitively developed, and vice versa. Katz (1967) contends that affect-mediated self-evaluation is the impetus for sustained academic effort. High tests scores potentially serve as the external feedback which is the basis for internalized self-evaluation, and thus the self-fulfilling prophecy, (i.e. continued high academic performance).

#### Hypothesis Two

The relative predictive powers of the independent variables are: AFOQTVER, WOFOW-M, PRIORSER, AFOQTQUA, MB Thinking-Feeling, MB Sensing-Intuitive, MB Judging-Perceiving, WOFOCOMP, MB Intro- extrovert, WOFOBERS, DUTYSTAT, RATESTAT.

The first four predictors are hypothesized to be the most powerful, and statistically significant of the twelve. Cognitive predictors predict best to cognitive criteria. AFOQTVER is the more global of the two cognitive predictors. WOFOW-M is the most global of all the

motivational predictors (i.e. the catalyst necessary to drive cognitive ability) available. Past experience (in the form of PRIORSER) has been demonstrated to be a strong and reliable predictor (Feather and Saville, 1967). Successful past experience (i.e. prior service) is likely to engender competence in self-evaluation. Since competence in the military is definitely a goal, according to Sansone (1986), competence is definitely consequential. AFOQTQUA is the other of the two cognitive predictors.

In general, (three of four predictors), the self-attributional predictors are thought to be the next most predictive group of independent variables. They represent measures of internalized feedback and self-efficacy experiences, which, according to Geppert and Kuster (1983) presume mastery (i.e. achievement). Mastery implies low fear of success which, according to Zuckerman et al. (1980), supports greater self-perceived performance. MB thinking-feeling is associated with cognitive aspects. MB sensing-intuitive and MB judging-perceiving represent perceptual aspects.

The remaining five predictors, while thought to be predictive, are not expected to be statistically significant. WOFOCOMP is a measure of individual motivation. Group pressure and conformity are potent

influences in OTS, possibly even in the academic domain. Varied degrees of both introversion and extroversion are instrumental in OTS, again, possibly even in the academic domain. WOFOPEERS, a measure of consensual behavior and conformity, is and isn't appropriate, depending on the circumstance. RATESTAT and DUTYSTAT are not based necessarily on prior achievement, and therefore are not thought to be significantly predictive.

#### Hypothesis Three

AFOQTVER, WOFOW-M, PRIORSER, and AFOQTQUA used as predictors, will make the greatest unique contributions to the discriminant function.

The support for the reasonableness of this hypothesis is the same as presented under Hypothesis Two above.

#### Hypothesis Four

Using the twelve predictor variables, 90.0% of the sample of candidates can be correctly classified at the .05 alpha level of significance.

Presently, 87.5% of the selected candidates are "true" positive selections, versus 12.5% false positives. While

these rates apply to the over-all success rate in the completion of the program, academic success rates are presumed to be equal or approximately equal to these rates. The present selection model uses three dimensions (education/aptitude, experience, and potential/adaptability). The research model uses four dimensions (aptitude/ability, self-attribution, motivation, and demographics). Three of the dimensions from either model can be roughly equated; education/aptitude to aptitude/ability; experience to self-attribution; potential/adaptability to motivation. The modest increase in predictive accuracy (i.e. 87.5% to 90.0%) is expected, given the nature of the added fourth dimension in the research model. The findings of Feather and Saville (1967) support this prediction.

## CHAPTER 4

### Methodology

#### Subjects

From three consecutive OTS classes (91-03, 91-04, and 91-05), 146 of the 259 candidates participated in this study. Eighty-five potential subjects were lost due to incomplete data sets. Training for the three classes (each 14 weeks) overlapped several weeks, beginning October 4, 1990, and ending June 6, 1991 with the graduation of the third class. The 259 candidates in all classes fell into three graduation categories: distinguished graduates (DG), graduates, and failures. Table 8 presents this distribution. Of the 146 candidates participating

Table 8: Graduation Categories For All Candidates

<u>Class</u>	<u>DG</u> (n/%)	<u>Graduate</u> (n/%)	<u>Failure</u> (n/%)	<u>Total</u> (n/%)
91-03	6/26.1	68/32.1	8/33.3	82/31.7
91-04	9/39.1	66/31.1	7/29.2	82/31.7
91-05	8/34.8	78/36.8	9/37.5	95/36.6
Total	23/ 8.9	212/81.8	24/ 9.3	259/100.0

n - number

% - percentage of total group, e.g. % of all DGs

in the study, 15 (10.3%) were DGs, 124 (84.9%) were graduates, and 7 (4.8%) were failures. The typical candidate participating in the study is represented in Table 9.

Table 9: Typical Profile For All Research Candidates

(N = 146)

	<u>Number</u>	<u>Percentage</u>
PRIORSER (yes/no)	58 / 88	39.7 / 60.3
DUTYSTAT (active/reserve)	129 / 17	88.4 / 11.6
RATESTAT (yes/no)	57 / 89	39.0 / 61.0
SEX (female/male)	22 / 124	15.1 / 84.9
GRADSTAT (DG/grad/fail)	15 / 124 / 7	10.3 / 84.9 / 4.8
REASONON (SIE/LOA/MTD)	1 / 6 / 2	11.1 / 66.7 / 22.2

N - number  
 DG - distinguished graduate  
 grad - graduate  
 fail - failure  
 REASONON -reason for failure  
 SIE - self-initiated elimination  
 LOA - lack of aptitude  
 MTD - military training deficiency

### Research Design

All candidates were given a series of paper and pencil measures, as a class, in an auditorium setting. The session for each class lasted approximately two hours. The session dates for classes 91-03, 91-04, and 91-05 were December 7, 1990, January 11, 1991, and March 22, 1991 respectively. Sessions were conducted in the afternoon. The series of measures included: the Work and Family Orientation Questionnaire (WOFO), the Myers-Briggs Type Indicator, the Leadership Effectiveness Assessment Profile (LEAP), and the Self-Awareness Questionnaire. Only Part I of the WOFO was administered. The LEAP was a personality personnel selection prototype in the validation phase. The Self-Awareness Questionnaire was an inventory in the pilot development phase. One class was not administered this inventory due to time constraints. Candidates who were not available for the scheduled sessions were administered some of the measures individually at a later time by OTS staff members. AFOQT, PRIORSTAT, RATESTAT, and DUTYSTAT data were retrieved from Air Force archives.

### Research Measures

The data used in this study were collected primarily using three measures: the Air Force Officer Qualifying Test

(AFOQT), the Myers-Briggs Type Indicator (MB), and the Work and Family Orientation Questionnaire (WOFO), Part I.

Air Force Officer Qualifying Test. The AFOQT is a test used by the USAF to measure aptitudes in selecting candidates for officer commissioning programs and specific officer training programs. The AFOQT has 16 subtests. Subtest scores are combined to yield five composite scores. These five composite scores are: pilot score, navigator-technical score, academic aptitude score, verbal score, and quantitative score.

Essential piloting knowledge and abilities are measured by the pilot test. Essential navigational knowledge and abilities are measured by the navigational-technical test. Academic aptitude test score is a composite of verbal and quantitative test scores. The verbal test measures verbal ability and knowledge. The quantitative test measures quantitative knowledge. Psychometric data on the AFOQT are not readily available. The composition of the AFOQT is represented in Table 1 (Appendix A).



Myers-Briggs Type Indicator. The MB (Form G) is a 126-item abbreviated version self-report which measures the preferences of individuals for perception and judgement. It yields four separate scores: judgment versus perception, sensing versus intuition, thinking versus feeling, and introversion versus extroversion. It is based on the theory of personality types developed by Carl G. Jung (1923).

Although the MB is the most popularly used personality assessment measure in recent literature, there is a distinct lack of in-depth item-level psychometric analysis. External criterion validity is established using Jungian theory as the external criteria.

Work and Family Orientation Questionnaire. The WOFO is a 32-item, five-point Likert scale, which measures achievement motivation and attitudes towards family and career. Part I of the WOFO contains 23 items which measures four types of motivation: (1) work motivation (i.e. desire to work hard), (2) mastery motivation (i.e. desire for intellectual challenge), (3) competitiveness motivation (i.e. desire to be successful in competitiveness), and (4) personal unconcern (i.e. attitude about negative interpersonal consequences of achievement

which is conceptually related to the notion of fear of success). The items contained in Part I of the WOFO are presented in Table 2 (Appendix A).

The five response options for each item are scored 0-4, with four indicating the highest achievement response. The remaining alternatives are scored in order 3, 2, 1, and 0. Scores for each scale are determined by summing the items scores, with high scores indicating higher levels of the attribute.

Reliability estimates for the four scales, expressed in alpha coefficients, range from .50 on the Personal Unconcern Scale for both males and females to .76 and .72, respectively, for males and females on the Competitiveness Scale. Alpha coefficients are considered satisfactory indices of internal consistency reliabilities for scales of this length as supported in research by Helmreich and Spence (1978).

Helmreich and Spence (1978) report that evidence for the validity of the measure is provided by comparison of scores for selected populations, including students, Ph.D. scientists, and varsity athletes, and by prediction of scientific attainment, college grades, and income.

Items are bipolar, with no true zero point.

## Analysis

Sample Division. All candidates were randomly divided into two groups: (1) an analysis sample, and (2) a holdout sample. Assignment within each achievement category (i.e. upper 30% and lower 30% based on CWT) within both analysis and holdout samples was random.

Statistical Analysis. The statistical analysis was a discriminant function analysis. Discriminant function analysis is appropriate when: (1) the dependent variable is categorical, (2) the independent variables are continuous and/or dichotomous, and (3) the purpose of the study is to develop an equation that can accurately classify or predict group membership of the observations.

The assumptions made in this analysis were that:

(1) the two groups of candidates were mutually exclusive, (2) the sample came from a population with a joint multivariate normal distribution on the discriminant variables, (3) the sample was random, and (4) both variance-covariance matrices were approximately equal.

Discriminant function analysis is characterized by three stages: (1) derivation, (2) validation, and (3) interpretation.

Derivation. In this stage variables were selected, the sample was randomly divided into calibration and holdout groups, the discriminant function was derived, and the function was tested for statistical significance.

Details of the sample division were presented above. Specifically, the sample was divided in the manner stated so that the discriminant function could be validated using the split sample or cross validation approach.

The full discriminant function model is presented in equation 2.1.

In the stepwise method each predictor is allowed to enter the equation one at a time, beginning with the predictor which accounts for the most variance in the criterion. The stepwise method was used to determine the contribution of each predictor while statistically holding the effect of all the other predictors constant. The order in which the predictors entered the equation was an indication of their relative importance.

Validation. In this stage a classification matrix (hit rate chart) was developed since chi square was statistically significant. Cutting scores were then determined, a chance model developed, and the classification matrix hit rate subsequently compared to the

chance model. The classification matrix was developed to determine the discriminating power of the function.

The classification matrix was developed using the discriminant function beta weights computed on the analysis sample; these weights were used to predict the criterion in the hold out sample. The predicted classifications within the holdout sample were compared to the actual classifications in the hold out sample to determine the cross-validation hit rate of the discriminant function. Two critical Z-cutting scores ( $Z_c$ ) were used to classify members of the hold out sample. Candidates whose discriminant z-score were greater than the higher  $Z_c$  (92.8) were classified as being in the top 30% of all candidates; those whose z-scores were less than the lower  $Z_c$  (88.6) were classified as being in the lower 30% of all candidates.

Since the two groups were slightly unequal (45 versus 44), a proportional chance criterion was used in developing the chance model which was equal to :  $(p \times p) + [(1 - p)(1 - p)]$ , where  $p$  is the proportion of candidates in the upper 30% of the group, and  $(1 - p)$  is the proportion of candidates in the bottom 30% of the group.

The classification accuracy given by the classification matrix was compared to the chance

classification. The classification accuracy is defined as significant if the discriminant classification shows a significant improvement over chance.

Interpretation. In this stage discriminant weights and discriminant loadings were examined.

The loadings measure the simple linear correlation between the specified predictor variables and the discriminant function. Univariate F-tests were computed to report the significance of the contribution of individual predictors to the criterion.

In this study,  $b_1$  -  $b_{12}$  were the discriminant beta weights associated with the individual predictors. The absolute values of the weights were indices of the relative predictive power of the independent variables in the discriminant function, given that all predictors are in the model. The larger the absolute value of the weight, the greater the predictive power, given no multicollinearity.

Since weights are subject to instability due to variations in the specific sample selected, sample size, sample ratios, order of predictors in the function, number of predictors, etc., discriminant loadings were used to interpret discriminant function analysis results. Since discriminant loadings are a measure of the common variance

of the predictor variables and the discriminant function, the relative contributions of the discriminant variables were also examined in this way.

Tests of Hypotheses. Chi square was a test of Hypothesis One. It is an unbiased statistic which tests the hypothesis of equality of sample means, i.e. centroids or mean values for the discriminant scores of the two groups.

The relative magnitudes of the beta weights were a test of Hypothesis Two, to the extent they are uncorrelated.

Wilks' Lambdas (U-statistics) was used to test Hypothesis Three. Univariate F-tests were computed to test the significance of the contribution of individual predictors to the criterion.

The computation of cutting scores, the development of a chance model, and the subsequent comparison of the classification matrix hit rate with the chance model, comprised the test for Hypothesis Four.

## CHAPTER 5

### Results

#### Analysis

The statistical analyses for this study were performed using SPSS-PC (version 4.0) for Macintosh.

The descriptive results of measures assessing the four predictor dimensions and the criterion in this study for all 146 candidates are presented in Tables 10 - 12. These results include the individual variables in the AFOQT, the Myers-Briggs Type Indicator, and the WOFO. Demographic data are included in Table 8 above. Descriptive results on the parametric predictors for the upper 30% and lower 30% of all candidates differ from those of the entire sample. They are presented in Table 13.



Table 10: Descriptive Statistics (WOFO/AFOQT/CWT) (N=146)

<u>Variable</u>	<u>Mean</u>	<u>SD</u>	<u>Median</u>	<u>Mode</u>	<u>Max</u>	<u>Min</u>
WOFOW-M	44.34	5.11	45.00	43.00	55.00	27.00
WOFOCOMP	14.42	3.49	15.00	17.00	20.00	3.00
WOFOBERS	5.77	2.86	6.00	4.00	12.00	1.00
AFOQTVER	73.82	19.26	77.00	86.00	99.00	13.00
AFOQTQUA	67.01	20.13	69.00	75.00	99.00	17.00
CWT	90.63	3.76	90.80	89.40	99.20	80.00

N - number  
SD - standard deviation  
MAX - maximum score  
MIN - maximum score

Table 11: Descriptive Bi-Polar Myers-Briggs Statistics  
(N=146)

<u>Variable</u>	<u>Frequency</u>	<u>Percent</u>
I/E	64/82	43.8/56.2
T/F	118/28	80.8/19.2
S/N	77/69	52.7/47.3
J/P	104/42	71.2/28.8

N - number  
I/E - introversion/extroversion  
T/F - thinking/feeling  
S/N - sensing/intuitive  
J/P - judging/perceiving

Table 12: Descriptive Statistics / Myers-Briggs Categories  
(N=146)

<u>Category</u>	<u>Frequency</u>	<u>Percent</u>
ISTJ	29	19.9
ISFJ	5	3.4
INFJ	2	1.4
INTJ	9	6.2
ISTP	7	4.8
ISFP	1	.7
INFP	1	.7
INTP	10	6.8
ESTP	3	2.1
ESFP	2	1.4
ENFP	7	4.8
ENTP	11	7.5
ESTJ	26	17.8
ESFJ	4	2.7
ENFJ	6	4.1
ENTJ	23	15.8

No. - number  
 I - Introvert  
 E - extrovert  
 S - sensing  
 N - intuitive  
 T - thinking  
 F - feeling  
 J - judging  
 P - perceiving

Table 13: Descriptive Statistics: Upper 30% & Lower 30%

(N=89)

<u>Variable</u>	<u>Mean</u> (Up/Low)	<u>Std Dev</u> (Up/Low)
WOFOW-M	43.24/44.61	5.60/5.10
WOFOCOMP	14.51/14.57	3.17/4.16
WOFOPEERS	6.22/5.86	3.03/2.66
AFOQTVER	82.53/67.84	15.69/20.03
AFOQTQUA	74.20/59.27	18.03/18.53

N - number

Std Dev - standard deviation

Up - upper 30%

Low - lower 30%

Results supporting each of the four hypotheses are presented below.

Hypothesis One. This hypothesis states: there is a statistically significant difference between OTS candidates in the upper 30% of the group and those in the lower 30%, using the predictor variables in the discriminant function model equation, and with CWT as the outcome variable.

Chi square is a test of this hypothesis. It is a statistic which tests the equality of sample centroids,

i.e. the mean values of the discriminant scores of the two groups. These results are presented in Table 14.

Table 14: Chi Square / Group Centroids

<u>Group</u>	<u>Centroid</u>		
Lower 30% (n=44)	0.72545		
Upper 30% (n=45)	-0.70933		
<u>Chi Square</u>	<u>DF</u>	<u>Significance</u>	
35.526	6	0.0000	

Hypothesis Two. This hypothesis states: the relative predictive powers of the independent variables are: AFOQTVER, WOFOV-M, PRIORSER, AFOQTQUA, MB Thinking-Feeling, MB Sensing-Intuitive, MB Judging-Perceiving, WOFOCOMP, MB Intro- extrovert, WOFOBERS, DUTYSTAT, and RATESTAT.

The relative magnitudes of the beta weights (standardized canonical discriminant function coefficients) are a test of this hypothesis. These results are presented in Table 15.

Table 15: Beta Weights

<u>Variable</u>	<u>Weight</u>
PRIORSERV	0.561
T-F	0.488
AFOQTVER	-0.473
AFOQTQUA	-0.442
RATESTAT	0.395
I-E	0.243

T-F - thinking-feeling

I-E - introvert-extrovert

Note: None of the remaining 12 variables entered the stepwise discriminant function equation.

Hypothesis Three. This hypothesis states: AFOQTVER, WOFOW-M, PRIORSER, and AFOQTQUA will make the greatest unique contributions to the discriminant function. Wilks' Lambda (U-statistic) and univariate F-tests are a test of this hypothesis. These results are presented in Table 16.

Table 16: Wilks' Lambda (U-statistics) and Univariate

F-tests

<u>Variable</u>	<u>Wilks' Lambda</u>	<u>F</u>	<u>Significance</u>
AFOQTVER	0.8540	14.88	0.0002
AFOQTQUA	0.8543	14.84	0.0002
T-F	0.8977	9.92	0.0022
PRIORSER	0.9278	6.77	0.0109
I-E	0.9630	3.35	0.0707
DUTYSTAT	0.9742	2.31	0.1325
WOFOW-M	0.9836	1.45	0.2315
WOFOBERS	0.9960	.352	0.5545
J-P	0.9967	.288	0.5927
S-N	0.9968	.280	0.5983
RATESTAT	0.9970	.266	0.6071
WOFOCOMP	0.9836	.532E-02	0.9420

Hypothesis Four. This hypothesis states: using the twelve predictor, variables, 90% of the sample candidates can be correctly classified at the .05 alpha level of significance. The computation of cut scores, the development of a chance model, and the subsequent comparison of the classification matrix hit rate with the chance model were a test of hypothesis number four.

The cut score for the lower 30% of the group is: less

than/or equal to 88.6. The cut score for the upper 30% of the group is: greater than/or equal to 92.8.

In this study: chance = .583.

The classification hit rate is presented in Table 17.

Table 17: Classification Hit Rate

<u>Actual Group</u>	<u>No. of Cases</u>	<u>Predicted Group Membership</u>	
		(Lower 30%)	(Upper 30%)
Lower 30%	44	30 (68.2%)	14 (31.8%)
Upper 30%	45	9 (20.0%)	36 (80.0%)

Percent of grouped cases correctly classified: 74.16%

### Discussion

The discussion which follows includes first, discussion specific to the four research hypotheses, followed by discussion of some limitations of this study. Specifically, limitations related to: OTS selection and success criteria variables; data attrition and the impact on the efficacy of predictive ability; the subsequent diminished sample size and the impact on predictive power; the lack of motivational criteria variables; and, the less than optimal choice of a measure of self-attribution are

discussed. The discussion concludes with observations related to achievement motivation.

Hypothesis One. The results (Table 14) of this study support this hypothesis, i.e. there is a statistically significant difference on CWT using the parameters of the model in this research. It should be noted that not all twelve of the original parameters of the full model are included in the final model which predicts to CWT. The respective centroids of the upper and lower 30% of the candidates are -0.70933 and 0.72545; the difference is obvious. Chi square (equal to 35.526,  $df = 6$ ) is significant at the 0.0000 level. Therefore, this difference is statistically significant, even at the .01 level.

The six parameters which define the final model are: AFOQTVER, T-F, AFOQTQUA, PRIORSER, RATESTAT, and I-E.

Scores on AFOQTVER for the lower 30% ranged from 13.00 to 64.00; for the upper 30% they ranged from 87.00 to 99.00. The respective means/standard deviations for the lower and upper 30% were: 67.84/20.03 and 82.53/15.69. There was wider dispersion among the lower group. It is not surprising that a subsequent one-way ANOVA with AFOQTVER as the independent variable and CWT as the dependent variable yielded an F significant at the .0002



level. These results are presented in Table 18.

Table 18: One-Way ANOVA: AFOQTV ER X CWT

<u>Source</u>	<u>Sum of Squares</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>Sig</u>
Between Gps	4802.44	1	4802.44	14.88	.0002
Within Gps	28083.09	87	322.80		

For T-F, of all 146 original candidates, 118 (80.8%) were classified as thinking; 28 (19.2%) were classified as feeling. A subsequent chi-square analysis using T-F as the independent variable, and CWT as the dependent variable yielded a not surprising significant value of 9.11 at the .00255 level, with one degree of freedom.

Scores on AFOQTQUA for the lower 30% ranged from 17.00 to 54.00; for the upper 30% they ranged from 82.00 to 99.00. The respective means/standard deviations for the lower and upper 30% were: 59.27/18.53 and 74.20/18.03. Similar to AFOQTV ER scores, there was slightly wider dispersion among the lower 30%. Likewise, a subsequent one-way ANOVA yielded a significant F at the .0002 level. These results are presented in Table 19.

Table 19: One-Way ANOVA: AFOQTQUA X CWT

<u>Source</u>	<u>Sum of Squares</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>Sig</u>
Between Gps	4957.20	1	4957.20	14.84	.0002
Within Gps	29055.93	87	333.98		

For PRIORSER, of the 146 original candidates, 58 (39.7%) were classified as having prior service; 88 (60.3%) were classified as without prior service. A subsequent chi-square analysis using PRIORSER as the independent variable and CWT as the dependent variable yielded a significant value of 6.42 at the .02 level of probability with one degree of freedom.

For RATESTAT, of the original 146 candidates, 57 (39%) were classified as rated; 89 (61%) were classified as non-rated. A subsequent chi-square analysis using RATESTAT as the independent variable, and CWT as the dependent variable yielded a probability of .27 which was not significant.

For Intro- extrovert (I-E), of the original 146 candidates, 64 (43.8%) were classified as internalizing; 82 (56.2%) were classified as externalizing. A subsequent chi square analysis using I-E as the independent variable and CWT as the dependent variable yielded a value of 3.30 which was not significant at the .05 level.

Graduation status, (i.e. whether candidates were distinguished graduates, normal graduates, or failed to graduate), appeared to be an interesting issue to look at, in light of the results. Data revealed that of the 146 original candidates, 15 (10.3%) were distinguished graduates, 124 (84.9%) were normal graduates, and 7 (4.8%) failed to graduate. A chi-square analysis using graduation status as the independent variable and CWT as the dependent variable yielded a significant value of 17.27 at the .0001 level, with two degrees of freedom.

CWT scores for the lower 30% ranged from 80.00 to 89.87; for the upper 30% they ranged from 92.80 to 99.20.

As with the findings of Gaiter et al (1982), it might be concluded from this study that mastery (and presumably mastery motive) supports higher levels of learning and continued cognitive development. There is also some inference in these findings that a "competence" component is operating. If academic test scores serve as feedback throughout the program, (which they are intended to do), then competence may be of some consequence towards achievement, and functions differentially between the two groups. This would be consistent with the findings of Sansone (1986).

Assuming academic self-concept in candidates was

derived from test scores, then noteworthy correlations between CWT and the predictive variables would be expected. The respective correlations between CWT, and AFOQTVER, AFOQTQUA, PRIORSER, and T-F are: .382, .382, -.269, and -.320. These correlations are moderate. These findings are consistent with the findings of Muller et al. (1977).

Hypothesis Two. Results (Table 15) supported this hypothesis only partially, i.e. the relative predictive power of all the variables in the model was not consistent with predictions. Additionally, not all predictors were retained in the final model. The six predictors that entered the equation, and their order of entry were: AFOQTVER, T-F, AFOQTQUA, PRIORSER, RATESTAT, and I-E. Table 20 illustrates the contrast between "predicted" and "actual" relative predictive powers of the variables.

Of the six "actual" predictors, four were among the top six "predicted" predictors.

It is noteworthy that PRIORSERV predicted best. This finding is consistent with the findings of Zuckerman et al. (1980). In this study low fear of success candidates were defined as those having prior service. If indeed PRIORSERV is a valid measure of fear of success, then Zuckerman et al. (1980) may have been correct in their assessment of its

salience as a predictor.

Since PRIORSERV proved to be the best predictor, it is worth noting any differences in the other predictors between candidates who had prior service (58 candidates) and those who did not (88 candidates). Table 21 presents this data. The mean AFOQTVER score was slightly higher and the dispersion was slightly less for non-prior service candidates. The reverse was true of AFOQTQUA scores. Of the candidates classified as 'thinking', the larger percentage were non-prior service candidates. Of the candidates classified as 'extroverts', the larger percentage were non-prior service. Non-prior service candidates also constituted the larger percentage of rated candidates.

It is also noteworthy that of the six variables that are predictive of CWT, two (AFOQTVER and AFOQTQUA) fall into a cognitive domain.

A second demographic variable (RATESTAT) is also predictive of CWT. However, it is unclear from the results of this study why it is predictive. One possible explanation might be that RATESTAT implies some general level of aptitude as it applies to categorization or selection in OTS and future Air Force occupation. Also higher AFOQTVER and AFOQTQUA scores are required, in addition to minimum scores on the pilot and navigator-

technical subtests in order to be assigned to a rated slot.

Unexpectedly, Intro- extrovert (I-E) was predictive. There is little correlation (-.193) between this variable and CWT in this sample. A chi-square analysis with I-E as the independent variable and CWT as the dependent variable resulted in a value of 3.30 at the .0694 level of significance. Although it approached significance, it failed to reach the .05 level. In the original 164 candidates, 64 (43.8%) were categorized as internalizing; 82 (56.2%) were externalizing.

Table 20: Predicted/Actual Predictive Powers

<u>Rank Order</u>	<u>Predicted</u>	<u>Actual</u>
(Best to Worst)		
1	AFOQTVER	PRIORSERV
2	WOFOW-M	Thinking-Feeling
3	PRIORSER	AFOQTVER
4	AFOQTQUA	AFOQTQUA
5	Thinking-Feeling	RATESTAT
6	Sensing-Intuitive	Intro- extrovert
7	Judging-Perceiving	
8	WOFOCOMP	
9	Intro- extrovert	
10	WOFOPERS	
11	DUTYSTAT	
12	RATESTAT	

Table 21: Prior Service Versus Non-Prior Service Candidates

	<u>All</u>	<u>Prior</u>	<u>Non-Prior</u>
<u>AFOOTVER:</u>			
<u>Mn/SD</u>	73.82/19.26	72.16/20.16	74.24/20.06
<u>Max/Min</u>	99.00/13.00	99.00/23.00	99.00/13.00
<u>Rng</u>	86.00	76.00	86.00
<u>AFOOTQUA:</u>			
<u>Mn/SD</u>	67.01/20.13	68.17/20.29	66.24/19.87
<u>Max/Min</u>	99.00/17.00	96.00/17.00	99.00/26.00
<u>Rng</u>	82.00	79.00	73.00
<u>Thk/Feel:</u>			
<u>Thk</u>	118	49 (41.53%)	69 (58.47%)
<u>Feel</u>	28	9 (32.14%)	19 (67.86%)
<u>Int/Extr:</u>			
<u>Int</u>	64	28 (43.75%)	36 (56.25%)
<u>Extr</u>	82	30 (36.59%)	52 (63.41%)
<u>Ratestat:</u>			
<u>Rated</u>	57	2 ( 3.51%)	55 (96.49%)
<u>Non-Rat</u>	89	56 (62.92%)	33 (37.08%)



Hypothesis Three. As with Hypothesis Two, the results (Table 16) of this study supported this hypothesis only partially, i.e. only three (AFOQTVER, AFOQTQUA, and PRIORSER) of the four hypothesized variables made the greatest unique contributions to the over-all equation.

The fact that AFOQTVER and AFOQTQUA made significant unique contributions to the equation was no surprise. They are both cognitive predictors, predicting to a cognitive outcome. PRIORSER's significant unique contribution is also supported by the findings of Zuckerman et al. (1980) with regard to fear of success, and the fact that prior service candidates were defined in this study as 'low fear of success' candidates.

WOFOW-M failed to make a unique contribution, as evidenced by Wilks' Lambda and univariate F-tests. Instead, T-F made a unique contribution.

The failure of WOFOW-M to make a unique contribution may be perhaps explained by the findings of Clarke (1973). It may be that the motivation required and/or present in candidates is best measured by a measure other than the WOFO. An alternative explanation is the WOFO measures some other trait in candidates than it was designed to. A final alternative explanation might be that the dimensions of motivation measured by the WOFO are not, present in the

sample examined. The catalyst(s) presumed necessary to drive cognitive ability as measured by CWT may not be the one(s) which the WOFO measures.

T-F may be a significant unique contributor because it measures some self-attributional aspect of cognitive ability. This would be consistent with previous findings. The fact that 72 (80.9%) of the combined upper 30% and lower 30% of the candidates were classified as "thinking" (using the Myers-Briggs Type Indicator) lends support to this explanation. This 80.9% encompassed 58.3% of the upper 30%, and 41.7% of the lower 30% of the candidates, adding additional support to this explanation.

Hypothesis Four. The results (Table 17) of this study failed to support this hypothesis. The hypothesized accuracy of classification rate was 90%. The actual rate was 74.16%. A modest increase of 2.5% over the typical 87.5% rate was believed to be a realistic improvement in prediction, given the number of parameters in the model. The significance of even this modest increase is exhibited in the fact that a .5% improvement in predictive accuracy translated to among programmed assessments from 1993 through 1999 would translate to a \$659,250 recovery of investments. Two-and-a-half (2.5) percent recovered investments equates

to \$3,296,250. Table 22 illustrated this point.

The respective rates of correct prediction for the upper 30% and lower 30% were: 80.0% and 68.2%. One explanation for failure to support this hypothesis is that the original success rate of 87.5% was for over-all success in OTS, and not in CWT, i.e. the two rates of success applied to two different criteria. However, since it was presumed that all four dimensions are applicable in any achievement

Table 22: Recovered Investments As a Function of Increased Prediction

<u>Percent Improvement</u>	<u>Dollars</u>
.5	659,250
1.0	1,318,500
1.5	1,977,750
2.0	2,637,000
2.5	3,296,250

situation, it was reasonable to assume that success in any of the four dimensions alone was comparable to over-all success in OTS. From these results, the inference can be made that other dimensions in addition to cognitive ability are salient in the overall success in OTS. This

inference lends further support for a multidimensional model for over-all success in OTS.

Limitations. There are five noteworthy limitations in this study. They are:

(1) the nature of the OTS selection and success variables. They are both quantitative and qualitative. In the case of selection measures work experience, awards and decorations, leadership potential, letters of recommendation, skills, hobbies, and outside activities, interviews, and warrior qualifications; and success measures letters, briefings, Officer Training Evaluation Reports, flight commander evaluations, and infractions; while they are scored using objective measures, the actual ratings themselves are subjective and qualitative in nature. Other measures, e.g. GPA, AFOQT, academic discipline used in selection, and CWT scores, professional knowledge scores, and physical fitness scores used in measuring success, are objective and quantitative in nature. This mix of variable categories, to

some extent, compromises the ability to accurately predict candidate classification.

(2) the impact of data attrition on predictive ability. Because of a loss of 85 potential subjects due to data attrition (incomplete data sets), the original design of the study had to be altered. The study was originally designed to predict overall success in OTS. Because so few unsuccessful candidates with complete data sets remained in the study, it was impossible to perform the derivation phase of the stepwise discriminant function analysis. The outcome variable was subsequently switched from overall OTS success to upper and lower thirds rankings, based exclusively on CWT (which was strictly a cognitive outcome, and not the multidimensional one on which this entire model was based). Had the study been conducted as originally designed, it is probable that the fourth hypothesis would have been supported. A conscientious effort was made to obtain the missing data. However, because of the nature of collection and storage, i.e. by multiple sources, and retained only partially in

some historical Air Force files, this effort was unsuccessful. One extremely critical observation with regard to the nature of the missing data must be made. That is, there appeared to be no systematic loss of data.

The import of this observation is that subjects for whom there were incomplete data sets otherwise appeared not to differ significantly from their counterparts who were retained in the study. Also, because the data missing across individual subjects was not consistent, it was impossible to obtain a typical profile of these subjects, making it impossible to assess any objective comparisons between them and the retained subjects. No apparent differences is limited to casual observation of available data.

(3) diminished sample size and subsequent loss of power in analysis. As the sample size decreases, and presumably the sizes of the two groups, the standard error of the difference between the two groups increases. Powers subsequently decreases. No power analysis was conducted in this study. While there is often

disagreement on the adequacy of sample size, there are some popularly accepted rules. One such rule, when applied would indicate that if 259 total subjects were available, an adequate sample of subjects would be constituted by a minimum of 154 participating subjects. This study failed to include that minimum. That would suggest that the study lacked adequate power to derive results significant at least at the 95% confidence level.

(4) the lack of motivational criteria variables. There were two major tenets in this study. They were achievement and intrinsic motivation. CWT served as an adequate criterion for achievement. However, no such criterion was available for motivation. Consequently, the primary construct purported to be measured in this study (i.e. achievement motivation) as defined by the research model, can not have been adequately measured. The inclusion of motivational criteria would presumably improve the efficacy of this research.

(5) the less than optimal choice of a self-attributional measure. At the outset of this study an exact measure of self-attribution for this study was not available. Some data was initially collected in an effort to develop such an instrument specific to this study. That effort proved not to be cost effective. Subsequently, an instrument frequently used by the Air Force and thought to measure aspects of self-attribution (i.e. the Myers-Briggs Type Indicator) was used. In light of the study results it is questionable whether this particular instrument was an appropriate one for this study.

Achievement Motivation. WOFOW-M, WOFOPEERS, and WOFOCOMP all failed to yield statistically significant results. Further, none were included as a predictors in the final reduced model. This research therefore failed to demonstrated any statistically valid predictive measures of motivation. While achievement has been indexed, no clear empirical link has been established between achievement and motivation; motivation is, however, assumed and implicit in these findings. Supposition as to why motivation failed to



be demonstrated in this study is included elsewhere in this discussion.

### Conclusions

A number of conclusions may be drawn based on the findings applicable to the respective hypotheses, and about basic assumptions of the model and the nature of OTS.

Hypothesis One. Given the findings applicable to this hypothesis, it may be concluded that:

(1) academic predictors predict better than do motivation predictors to an academic criterion;

(2) prior service is a strong predictor of academic performance in OTS, and an inexpensive selection measure, given the Air Force's previous investment;

(3) academic performance is a strong indicator of over-all performance in OTS;

(4) test scores are salient in academic self-concept, and subsequent academic competence.

Hypothesis Two. Given the findings applicable to this hypothesis, it may be concluded that:

there exists a strong, although not significant relationship, between introversion and academic performance.

Given the percentage of extroversion classification, it is assumed that this is the desired classification in predicting the best academic performance.

Hypothesis Three. Given the findings applicable to this hypothesis, it may be concluded that:

the role of motivation as defined by the WOFO in academic performance in OTS is inconclusive.

Hypothesis Four. Given the findings applicable to this hypothesis, it may be concluded that:

academic performance/aptitude in OTS does not necessarily need to incorporate all four dimensions of the research model.

Model Assumptions/OTS. Given the assumptions of the research model and the nature of OTS, several important conclusions may be made in this regard. They are that:

(1) although the research model was designed to be more efficient over the present OTS selection model, it may be more expensive in predicting academic success. However, findings do suggest that this model may be more efficient at predicting over-all success in OTS;

(2) given the added predictive ability when using the Myers-Briggs Type Indicator (i.e. T-F as a significant predictor of academic performance) versus the cost, the Myers-Briggs may not be a cost effective measure, considering the predictive ability of AFOQTVER and AFOQTQUA;

(3) given that the typical over-all unsuccessful candidate is not prior service (62.71%), is not rated (58.90%), is in reserve status (88.14%), has a mean AFOQTVER score of 82.76, and a mean AFOQTQUA score of 73.45, the Air Force may be able to adjust its selection criteria to reduce

attrition from OTS;

(4) given that the two major reasons for attrition from the program are self-eliminated initiations (45.83%) and military testing deficiency (20.83%), the Air Force may be able to adjust its selection criteria to lessen attrition;

(5) given that most distinguished graduates are prior service (52.17%), the Air Force may be able to adjust its selection criteria to lessen attrition;

(6) there exists some noteworthy discrepancies between OTS selection and success criteria, such as, there are three selection criteria, as opposed to four success criteria. There is not a one-to-one correspondence between the dimensions of the two sets of criteria. For example, there is no "physical fitness" dimension in the selection criteria. The dimensions for which there is some correspondence, (e.g. education/aptitude versus academics), are defined

differently. Tables 4 and 5 illustrate this point.

#### Major Recommendation

Given the statement of the problem surrounding the nature of this research, (i.e. a need for greater predictive validity between OTS selection and success criteria), the single most important recommendation is that the Air Force match selection and success criteria in dimensionality and equivalent forms. This recommendation derives first from the assumption that the research model is a valid one in the OTS setting. A second necessary assumption is that the variables used in the model truly do represent the four dimensions which they purport to. If these assumptions are true, then the results suggest some incongruency between selection and success (at least academic success) criteria. Tables 4 and 5 provide some indications of possible incongruencies. Given that AFOQTVER, AFOQTQUA, T-F, and PRIORSERV were statistically significant predictors in this study, this can be accomplished by:

- (1) either adding a physical fitness dimension to the selection criteria, or deleting that

dimension from the success criteria;

(2) redefining education/aptitude and academics so they are more closely matched; redefining experience and leadership so they are more closely matched; redefining discipline and potential/adaptability so they are more closely matched;

(3) either use the exact same measures to define the corresponding selection and success dimensions, or develop equivalent forms of the same measures for use;

(4) deleting work experience altogether from the definition of education/aptitude.

## Appendix A

### Tables

Table A-1

AFOQT Subtests

<u>Subtest</u>	<u>No. of Items</u>	<u>Pilot</u>	<u>Nav- Tech</u>	<u>Acad Apt</u>	<u>Verbal</u>	<u>Quant</u>
Verbal analogies	25	X				
Arithmetic	25		X			
Reading Compre	25			X		
Data Interpretation	25		X			
Word Knowledge	25			X		
Math Knowledge	25		X			
Mechanical Compre	20	X				
Electrical Maze	20	X				
Scale Reading	40	X				
Instrument Compre	20	X				
Block Counting	20	X				
Table Reading	40	X				
Aviation Info	20	X				
Rotated Blocks	15		X			
General Science	20		X			
Hidden Figures	15		X			

No. - number  
 Nav - navigator  
 Tech - technical  
 Acad - academic

Apt - aptitude  
 Quant - quantitative  
 Compre - comprehensive  
 Info - information



Table A-2

Work and Family Orientation Questionnaire (WOFO)

The following statements describe reactions to conditions of work and challenging situations. For each item, indicate how much you agree or disagree with the statements, as it refers to yourself, by choosing the appropriate letter on the scale A, B, C, D, or E.

A = Strongly agree

B = Slightly agree

C = Neither agree nor disagree

D = Slightly disagree

E = Strongly disagree

PART I

1. I would rather do something at which I feel confident and relaxed than something which is challenging and difficult.

A      B      C      D      E

2. It is important for me to do my work as well as I can even if it isn't popular with my co-workers.

A B C D E

3. I enjoy working in situations involving competition with others.

A B C D E

4. When a group I belong to plans an activity, I would rather direct it myself than just help out and have someone else organize it.

A B C D E

5. I feel that good relations with my fellow workers are more important than good performance on the task.

A B C D E

6. I would rather learn easy fun games than difficult tough games.

A B C D E

7. It is important to perform better than others on a task.

A B C D E

8. I worry because my success may cause others to dislike me.

A B C D E

9. I find satisfaction in working as well as I can.

A B C D E

10. If I am not good at something I would rather keep struggling to master it than move on to something I can be good at.

A B C D E

11. I avoid discussing my accomplishments because other people might be jealous.

A B C D E

12. Once I undertake a task, I persist.

A B C D E

13. I prefer to work in situations that require a high level of skill.

A B C D E

14. There is satisfaction in a job well done.

A B C D E

15. I feel that winning is important in both work and games.

A B C D E

16. I more often attempt tasks that I am not sure I can do than tasks that I believe I can do.

A B C D E

17. I sometimes work at less than my best because I feel that others may resent me for performing well.

A B C D E

18. I find satisfaction in exceeding my previous performance even if I don't outperform others.

A B C D E

19. I like to work hard.

A B C D E

20. Part of my enjoyment in doing things is improving my past performance.

A B C D E

21. It annoys me when other people perform better than I do.

A B C D E

22. I like to be busy at all times.

A B C D E

23. I try harder when I am in competition  
with other people.

A B C D E

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### VITA

Lynn Jared Stone was born in New Orleans, Louisiana, on October 17, 1954, the son of Dora Ruth Chapple Stone and Gordon Howard Stone. After completing his work at Cohen High School, New Orleans, Louisiana, in 1972, he entered Tulane University in New Orleans, Louisiana. He received his degree of Bachelor of Science from Tulane University in May 1976. During the following years he was employed by the United States Air Force as a radar navigator, evaluator, and a test psychologist. In September 1985 he entered the Graduate School of Eastern Washington University in Cheney, Washington. He received his degree of Master of Science from Eastern Washington University in August 1987. In August 1987 he entered the Graduate School of The University of Texas. He received his degree of Master of Arts from The University of Texas in December 1990.

Permanent Address: P.O. Box 173, Randolph AFB, Texas 78148.

This dissertation was typed by the author.