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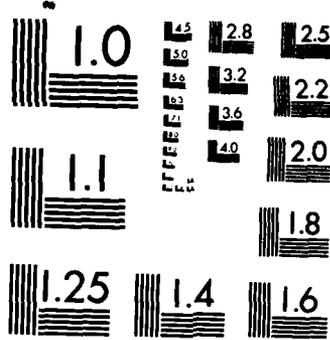
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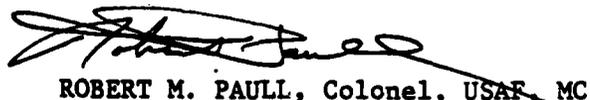
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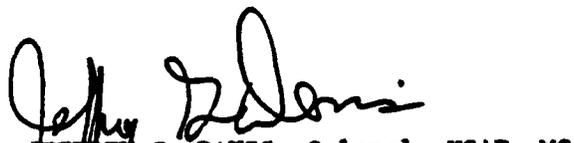
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The Office of Public Affairs has reviewed this report, and it is releasable to the National Technical Information Service, where it will be available to the general public, including foreign nationals.

This report has been reviewed and is approved for publication.


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<p>Aircrew mission effectiveness may uniquely be influenced by subtle psychological factors, not ordinarily brought to the attention of psychiatrists. Pilots tend to be bright, articulate, and anxious to resume their aviation duties when grounded. However, these patients are usually well defended, and rarely psychologically attuned or introspective. Greater insight into what constitutes the normal, healthy motivation to fly will help those who make judgments regarding the return of grounded aviators to flying duty. A review of associated birth order, personality theory, industrial and business psychology, aerospace, and psychoanalytic literature is presented. Highlighted are the difficulties inherent in examining the motivation of a healthy, well-defended population. Our conclusion: an examiner's countertransference feelings are the best available tool for measurement of healthy motivation.</p>							
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description and identification of pathological motivations, while often difficult, are inherently easier than the identification of normal motivation, if for no other reason than the emphasis of mental health training on psychopathology rather than normalcy.

Bucove and Maioriello (2) stated that socially determined conventions define which behaviors reflect mental illness. They pointed out the not-so-obvious consequence that labeling one as having "no evidence of mental illness" leaves the individual with full responsibility for whatever he has done or will do, in the eyes of his commander and subordinates. However, the call is seductive: "Motivation is the most important area to explore. Interest and excitement are common because flying seems to satisfy normal masculine drives." (12)

Applicants (for flying training) have usually thought of becoming pilots since latency or adolescence. In adulthood, flying training is viewed as a growth experience and a step toward autonomy. This normal motive should be contrasted with impulsive and short-lived decisions to enter flying school. Flight surgeons must be wary of men entering aviation because of family problems or to escape work, school, or romance; their motivation is often evanescent. When aviation has been a keen interest since school years, the candidate and his family have a realistic idea of the demands of training and operational flying. Family attitudes are commonly favorable because of the high status of pilots, and this improves chances for a satisfactory adjustment. Identification with a father or other relative who flew in wartime is seen with increasing frequency. The strength of the motivation depends on the quality of the relationship between father and son, uncle and nephew, or between brothers. It requires especially careful study. (12)

Morgenstern (12) also noted, in discussing the selection of pilot trainees, that "Inadequate or misguided motivation has been discussed as the most important danger signal in evaluation."

A Rand Corporation symposium (19) looked at the interplay of pilot motivation and selection only to meet with frustration, stating "motivation is a catch-all word lacking precise meaning but also that even if we accept some general notion of the term, we lack tools to measure it...the meaning of 'motivation' changes constantly with any individual or group, depending upon experiences and perceptions."

DISCUSSION

Several common themes appear among the available literature that touch on the subject of aviation motivation. The interplay (or overlap) of these themes is strong, and the boundaries set here are more for arbitrary convenience than definition of a hypothesis. Among them, birth order and the psychoanalytic study of the mythical Greek hero, Oedipus, appear with the greatest frequency and utility for psychiatry. Contributions from business (industrial psychology) and various personality theories have also been significant. More specific contributions are among the aerospace literature.

Although ignored thus far, women's motivation for aviation is an issue worthy of further investigation. Evidence of striking personality similarities between male and female aviators already exists (13); however, Oedipus' prominent presence in the literature underscores the likelihood of significant differences as well. Regrettably, an investigation of this topic is beyond the scope of this paper.

Birth Order

Altus (1) noted that the relation of birth order to achievement was first investigated over 100 years ago. He cited an impressive array of literature to support the contention that significant social parameters are related to one's ordinal birth position. He stated, "The dice are loaded in favor of the first-born." (This statement is a powerful description of what Altus saw as the lopsided competition between siblings throughout their lives.)

On the importance of birth order and college attendance, Altus (1) pointed to several studies that indicated "the more stringent the standards for admission, the higher the percentage of first-borns," with an apparent upper limit of 66% first-borns in the most selective colleges. Likewise, it appears no coincidence that 12 of 15 subjects referred to Perry (14) for evaluation for space flight suitability were the oldest or only male child in their family.

Altus (1) rounded out his characterization of the first-born with a description he attributed to Adler, among others; that is, first-borns are "power-hungry conservatives," who show more "conscience" development than later-borns. Thus, motivation for aviation is strongly determined by one's birth order as it influences personality development.

Personality

Fine and Jennings (4) emphasized that psychiatric theories of personality development, based on clinical practice, are applicable to the selection of personnel for "specific aerospace tasks, training, and environments."

One application of this principle was provided by Finney's (5) experimental evaluations of personality traits attributed to decision makers. He showed that risk-taking individuals are not seen more favorably than conservatives, simply on the basis of their having made risky decisions; but they are seen favorably when those risks pay off. While Finney's observations were based on the responses of introductory college psychology students, generalizations are tempting. He stated,

Since the predominant American culture seems to value success and status, as well as risk, and risky individuals must succeed in their ventures before they are assigned highly favorable personality traits, it was found that the more of the three apparent cultural values (risk, status, and success) one actually fulfills, the more favorably others will evaluate his personality. (5)

Thus, fliers who take risks and succeed enjoy the status of successful risk takers and benefit in all three realms. Their image is advanced both in their eyes and the eyes of others, but most importantly, in the eyes of their peers.

Industrial and Business Psychology

Aside from aviation, the motivation to fly may be viewed from the perspective offered by the employee psychology literature. Herzberg (6, 7) suggested that employee motivation is accomplished only by providing individuals with challenging work in which one can assume responsibility. His case is persuasive, but simplistic: he charged that what management frequently assumes are motivators, are merely sophisticated KITA techniques. (Herzberg euphemistically defined KITA as "the surest and least circumlocuted way of getting someone to do something is to kick him in the 'pants'.") Surprisingly, his list of these KITAs included the popular personnel "motivators" of reducing time spent at work, spiraling wages, fringe benefits, human relations training, sensitivity training, improved and two-way communications, job participation, and employee counselling. These motivators, he said, result only in short-term attainment of the desired result: employee motivation. He equated motivation with growth factors that

are intrinsic to one's job: achievement, recognition for achievement, the work itself, responsibility, and growth or advancement. Herzberg's studies of job satisfaction and dissatisfaction, drawn from 1,685 workers, indicated that these motivators were responsible for 81% of their job satisfaction. What he termed work hygiene factors (company policy and administration, work conditions, salary, security, status, supervision, and interpersonal relationships) accounted for 69% of employee dissatisfaction. His contention that the opposite of job satisfaction is no job satisfaction, rather than job dissatisfaction, cannot be dismissed as merely a semantic exercise.

One alternative to Herzberg's view was offered by Porter and Lawler (15). For them, systematic selection of employees who value the particular rewards that a company can most readily and feasibly offer is perhaps one way of boosting job motivation. The intrinsic problem with this approach is measuring who values which rewards, how much. Their answer also appears simplistic: use self-ratings of individuals. Simplistic, because management is left to decide who will be rewarded, which rewards to offer, and which to actually grant.

Porter and Lawler (15), in their study of job attitudes and motivation among managers, also found that the best performers reported "significantly more rewards in areas concerned with opportunities to express autonomy and to obtain self-realization in the job."

This information is admittedly a business perspective on worker motivation; however, the focus on job satisfaction and job dissatisfaction as parallels rather than mutually exclusive entities has application for the aviator. With pilots' characteristic desire for autonomy and emotional aloofness (3) a supervisor could easily mistake a lack of job satisfaction for job dissatisfaction. The predictable result: a decline in job performance, unit morale, and possibly safety.

Oedipus: A Psychoanalytic View

Departing the work place for an analytic perspective, we turn now to the Oedipal conflict and its implications for aviators. Oedipus, the tragic Greek hero of Sophocles' play whom Freud labeled as having a classic rivalry with his father for his mother's affection, unwittingly killed his father and married his mother. Purposely lamed at birth and deserted by his parents, Oedipus' name in Greek means "swollen feet." Huss (9), in his discussion of Oedipus from an Adlerian view, claimed the Greek hero's behavior was motivated by a need to overcome his "organ inferiority." In

this view, Oedipus' lameness provides an inferiority complex which he at least partially overcomes through his intellectual development, e.g., answering the riddle of the Sphinx--where the wrong answer would have resulted in instant death. Notably, Huss also pointed out that among Sophocles' metaphors there is frequent mention "of the mountain climber, with its hint that life is a walk upon precarious heights." In this context, Oedipus' strategy arises from his overcompensation for his "organ inferiority." To Huss, an only (or eldest?) child tends to dominate his household by exploiting the deference adults pay to his small stature.

Huss (9) cited Adler as viewing the typical child as coping with the fluid intangibles of life by converting them to measurable entities. These "guiding fictions" are essential for solving life's existential problems. Healthy individuals abandon or substitute these fantasies when they become unsatisfying or unproductive. Neurotics, however, become chained to or suddenly dart from their paths. For some aviators, with childhood dreams of having "danced the sky on laughter-silvered wings" (11), the desire to fly is a compensation for an organ inferiority, or a guiding fiction turned into reality. Oedipus was jealous of mountain climbers' agility; had he not been lamed, the soaring of eagles might have been the subject of his envy.

Contemporary reflections on Oedipus appear useful in light of such an assessment; some of these are among the aerospace literature.

Tucker (20) noted that, like the mythical Greek figures Daedalus and Icarus, modern pilots undergo training throughout their careers in an interpersonal arena. For example, motivation is linked to one's instructor in what Tucker sees as an intense relationship. Tucker pointed out that flight students rarely forget the name of the instructor who readied them for their first solo, and that changing instructors frequently changes the performance of a trainee.

Reinhardt (18) studied 105 outstanding military jet fighter and light attack pilots in search for those traits which might explain their excellence. He found 74% of the group chose military aviation for expediencies such as "career enhancement, officer status, extra pay, or because it was the most attractive of various military options." Only 23% of this group "had long desired a career offering difficult, complex, challenging systems and tasks." Reinhardt found that both subgroups eventually found in themselves "a sense of mastery of, and unity with, the complex man-aircraft unit of great versatility, maneuverability, and speed." Almost universal among this

group of outstanding pilots was a deeply gratifying feeling of being alone while flying. Reinhardt quoted one of his pilots, "This is the best and fastest fighter in the world, and the beauty of it is that no one can take hold of the controls except me, the pilot." This quotation leaves one to wonder who the pilot fears might wrest the controls away; perhaps the pilot was thinking, but could not utter, "Not even Dad!"

Reinhardt (18) found a clue to this question in the pilots' dreams, which he typified as a joy ride in a fighter "just to fool around" which is soon discovered by a "somber commanding officer." The dream's commander shortly thereafter ends the dream with a friendly, accepting smile, and no disciplinary action.

Logan (10) characterized the young Charles Lindbergh as the best pilot of his time, one who was "skillful, cool, meticulous, confident, courageous, in control, and utterly a stranger to panic." Combing Lindbergh's autobiography, Logan highlighted Lindbergh's fear of heights; a fear which ceased to recur in his dreams after he experienced parachute jumping. That Lindbergh was a hero and possessor of the "right stuff" is hardly a matter of dispute. However, Logan contended that Lindbergh's ability to confront his fears, rather than avoid them, is what "sets Lindbergh strikingly apart from the ordinary." But, ordinary what, one might ask? Ordinary person, ordinary pilot, or ordinary son of an upper class Minnesota farmer and Congressman? Logan hinted at the answer: "The desire to prove oneself to a strong father, to achieve success and recognition, plus the feeling of constriction (Most of the world's exciting happenings were geographically removed from the rural midwest.) all add up to a powerful awareness of personal incompleteness."

Aerospace Medicine Experiences

Perry (14) discussed the role of psychiatry in selecting astronauts. In his study group of 15 candidates for space missions, he noted that all candidates had "four plus" love of flying, and possessed "typical" origins for their interest in flying. All of the candidates described themselves as capable of handling previously encountered life-threatening stress in a "cool, detached manner." Perry explained this trait as these men's ability to "override the classic flight-fight response until after the emergency had passed."

Apparently, to have reached this point in the selection process, this group had been carefully screened (likely by the rigors of their training) because Perry's evaluation disclosed no overt psychopathology. Two of the 15, however,

were identified as having motivating drives which "seemed to be neurotically overdetermined." These two were felt to have motivational drives towards excellence which "could eventually serve as the basis for emotional difficulty under appropriate stress circumstances." (14) Interestingly, Perry's team found a correlation (of unknown significance) between the subjects' urinary calcium and their psychological test scores for motivation. An endocrinologist consultant surmised that milk consumption was the most likely explanation for the variation of urinary calcium levels. Thus, by Perry's account, "Those who drank the least milk showed the lesser amounts of urinary calcium and ranked highest in the scale for assertive motivation."

Perry suggested that biographical personality evaluations of historical figures such as Columbus, Magellan, and the Wright brothers could provide valuable information in developing a baseline for comparison of future space flight candidates.

Perry's description of the evolving role of psychiatry in aerospace medicine is eloquent:

Psychiatrists are being called on to provide consultations in situations of increasing variability and complexity from their traditional role. The wide scope of psychiatry as a medical specialty allows for the appropriateness of such requests. But divergence from the traditional role raises problems. In the situation of being asked to select candidates for a space mission the primary problem is in identifying the most healthy individual. (14)

Apparently, at least during training, a pilot's motivation may diminish. Pursch and Reinhardt (16) focused on this phenomenon and found that student pilots whose waning motivation for further training is manifested by conversion symptoms tend to have been raised in families who made "excessive use of rationalization." Situations such as these, they pointed out, are usually seen when pilots in training meet with minor failures which they are unable to overcome. These failures may or may not stem from the aviator's disenchantment (or fear) of flying; but, universally they represent a "face-saving" way of quitting.

Reinhardt (17) gave evidence for the notion that individuals with compulsive personality traits (not neurosis) make the best pilots. Compulsives are "intelligent, safe and dependable." Their only liability, lack of flexibility, may be noted when they meet the frustration of flying in weather or the demands of advanced instrument training; here there is little opportunity for meticulous, advanced planning.

Morgenstern (12) stated that "The aviation industry asks psychiatrists to apply their knowledge of personality dynamics in deciding who should fly." He noted the motivation for this request is primarily financial: "A high percentage of enduring careers is essential to amortize enormous training costs." The tools to best accomplish this task, he stated, are embodied in the psychiatric examination. Support of this view is evident from the earliest days of flight medicine. Ninety percent of British aircraft losses early in World War I were attributed to the pilots' physical and psychological deficiencies (12).

CONCLUSIONS

To this date, pilots may traverse an entire career without ever being questioned about their motivation for flying. Clearly, some understanding of what constitutes the normal motivation for a successful aviation career would be of value to psychiatrists, psychologists, and flight surgeons involved in pilot evaluations. However, such knowledge, even if it were logically detailed, could only be effective with an examiner acquainted with the demands of flying and uncluttered with romantic visions of aviation.

Generally, military aviators are very practical men, who tend to make decisions rationally, while "constantly checking their premises...taking risks to achieve a highly desired outcome but only after the odds are estimated and found acceptable." (18) While successful pilots are among the brightest 10% of the general population (IQs averaging about 120), their intellect is rarely manifested in reflective thought (12). Perhaps this fact explains the difficulty pilots have in expressing their motivation for flying and why we cannot yet know more than its most faint outline. Or, in paraphrase of Morgenstern's words, sensitivity to countertransferential feelings provides the best diagnostic tool in examining basically healthy individuals. (12)

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