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# Winners and losers: The role of personality types in High-Tech business success

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University of Washington, 1991

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Winners and Losers:

The Role of Personality Types in

High-Tech Business Success

by

Robert Adler Blumenthal

A dissertation submitted in partial fulfillment
of the requirements for the degree of

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Abstract

Winners and Losers:  The Role of
Personality Types in High-Tech
Business Success

by Robert Adler Blumenthal

Chairperson of the Supervisory Committee:
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Department of Management and
Organization

This study examined the role personality plays in the
founding and successful operation of High-Tech businesses in
the State of Washington, using field data gathered for this
purpose.  It asked three questions:  Does personality type
affect the likelihood that a person will found a business?
Does personality type affect the kinds of businesses
founded?  Does the personality type of founders affect their
success or failure in running High-Tech firms?

The results showed that personality type does affect
the likelihood that a person will found a business, and that
the types which found most businesses are Myers-Briggs types
sensing-thinking-judging (STJ), intuitive-thinking-judging
(NTJ), and intuitive-thinking-perceptive (NTP).  The results
also showed that NTJs and NTPs founded most of the High-Tech
businesses, whereas the NTJs and STJs founded most of the
non-High-Tech businesses included in the sample.  Finally,
and unexpectedly, the results showed that the NTJs were both
the most successful and the most unsuccessful types in
running High-Tech firms.

The study concluded that Jungian personality theory as operationalized by the Myers-Briggs Type Indicator provided a holistic conceptual and reliable measurement tool for the purpose of evaluating the effect of personality on the founding and successful operation of businesses. It also concluded that a different balance of personality types is needed to effectively run firms in different life-cycle stages. Finally, the study concluded that there is a lack of feeling types among Founder/CEOs of High-Tech firms, which is paradoxical considering the emphasis on participative management practices in the Hi-Tech industry.

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CHAPTER 1

THE FOUNDING AND SUCCESSFUL OPERATION
OF HIGH-TECH BUSINESSES --
THE ROLE OF PERSONALITY

Introduction

The present research examines the role personality plays in the founding and successful operation of High-Tech businesses in the State of Washington, using field data gathered for this purpose. High-Tech businesses are the industry of the future and are being founded at greatly increasing rates (The Directory, 1990). In the United States the success of these enterprises is becoming important to the economy as smokestack industries decline and non-High-Tech production switches to third-world countries (Forester, 1987). The capabilities of the founders of High-Tech businesses contribute significantly to this future success (Peter Drucker, satellite seminar, January 1990). Because personality characterizes the individual capabilities of the founders, it is important to test whether personality can be used to predict that certain types of persons will found High-Tech businesses, and also to predict success or failure in these firms.

If personality is so important as a measure of capability, how then can it be defined? There are many

definitions, but in general personality is defined as a collection of stable behaviors that can be observed by others and used as a totality to characterize an individual (Hellriegel et al, 1989; Knowles & Saxberg, 1970; Marlowe & Gergen, 1969; Stogdill, 1974). The concept of personality has three dimensions: attitudes, traits, and skills. Some of the personality attitudes which enhance the accomplishment of management tasks are extraversion, introversion, perception, and judgment. Some of the traits which allow individuals to accomplish management tasks effectively are orderliness, responsiblity, and creativity. Some of the skills which produce efficiency in the execution of management tasks are: analysis, communication, detail management, conceptualization, and timely closure. Prior researchers using locus of control, needs for achievement, affiliation, and power, and flexibility have been unsuccessful in producing conclusive results (Miller & Toulouse, 1986; Stogdill, 1974).

This study operationalizes personality through the use of the Jung inspired Myers-Briggs Type Indicator which generates sixteen personality archetypes, each with well documented attitude, trait, and skill patterns. Rather than locus of control, need for achievement, and other similar personality characteristics, this research utilizes the four Jungian attitudes (Extraversion, Introversion, Perception,

and Judgment) and the four mental processes, or functions (sensation, intuition, thinking, and feeling) to operationalize personality for research purposes. It is hypothesized in this study that individuals who start High-Tech firms have many personality characteristics in common and that these characteristics are different from those of non-founders of businesses and founders of non-High-Tech businesses.

High-Tech businesses are defined as firms whose core technology is based on advanced and innovative scientific discoveries, or whose purpose it is to discover, through scientific processes, new and innovative technologies (Haug, 1990). Examples of High-Technology industries are: computer hardware design and manufacturing, computer software programming and consulting, genetic engineering, imaging, and other biochemical applications.

High-Technology firms are identified by Standard Industrial Code (SIC) numbers, a system maintained by the U.S. government which classifies businesses by industry and specialties within each industry. Firms used in this research were selected by screening them by SIC number. A list of recognized High-Tech SIC numbers is included in Appendix A, Table 1.

While the technologies associated with High-Tech businesses are exotic, the imperatives for operating these

businesses profitably are the same as those for non-High-Tech firms. Organizing and the establishment of bureaucracies, standardization and quality checking, planning and budgeting, staffing and training, marketing, and financing are routine-producing necessary business functions which require special skills for their implementation and maintenance. The degree to which CEO personality characteristics are required to administer these processes depends on the life cycle stage in which the firm exists.

Initially, at start-up, the founder/CEO is challenged to develop technology, create enthusiasm, and locate supporting investors, suppliers, potential customers, and work associates. These tasks require an energetic person with above average analytical and negotiation skills. In addition, the person must have a charisma adequate to attract and hold team members, good syncretization skills, and vision. The Jungian approach would describe this type of person as extraverted, intuitive, and thinking. The Myers-Briggs system would add that this individual should exhibit the perceptive attitude which implies patience and curiosity.

As the business develops, however, the excitement of the start-up wears off and is replaced by the need for systemization and control. This condition challenges the

founder/CEO to focus on the business management aspects of his enterprise which requires a slightly different set of personality characteristics than those associated with business start-ups. These are introversion, which develops insight; sensing, which implies good detail management skills; thinking, or objective logic; and the judging attitude, implying goal setting and attainment and timely closure skills (Barr & Barr, 1989; Broom & Longenecker, 1979; Keirsey & Bates, 1978; Mancuso, 1984).

Chapter 1 discusses the context surrounding both the start-up of new businesses and the running of older businesses, so that the demands of these contexts on a founder's personality can be understood. For each context, the skills needed to operate both types of ventures are examined. Following this, the chapter examines personality types and their importance. The purpose of the research, the research questions and expected results are presented next, followed by a description of the data collected. The research design is described; the hypotheses are listed. A discussion of the importance of the research, the limitations of the study, and the definition of terms used in the dissertation are presented. The chapter ends with a description of the organization of the dissertation.

## The Problem of Founder Success

> Venture capitalists in this area have learned that a company's founder is not necessarily the best-suited person to run it. (_Puget Sound Business Journal_, 1990)

Recently the success of founders in operating the firms they create has been questioned. Peter Drucker (satellite seminar, February 8, 1990) summarized this apparent problem by saying, "High-Tech is the cutting edge of business today and the casualty rate of High-Tech firms is too high". He went on to say that these firms grow too fast, they outgrow the capabilities of the people who run them, their resources are limited, and, since growth is very demanding, their resources are exhausted very quickly. The resources to which he refers include both the economic and personal categories.

The latter category, personal resources, is also emphasized by George Clute, who is President of the largest venture capital firm supplying investment funds to High-Tech businesses in The State of Washington. Clute (personal communication, December 14, 1990) said, "It's the person that counts most. I want someone who can do what he says he can do." This common aphorism, used by venture capitalists and bankers, establishes the importance of the perception that personality is a critical component of business success to the investors supplying financial support. These purveyors of capital, however, cannot describe the criteria

they use in evaluating character or personality in order to reveal "the right person." The results of this research therefore will provide some of those missing personality criteria which can be used to define and reveal the elusive "right person."

This investigation examines the question: What type of personality characterizes founders of businesses, especially High-Tech businesses? Secondarily, this research pursues the question: What personality types are likely to be more successful at running these businesses over long periods of time? In addition, because many people who found businesses either get into trouble and liquidate their firms, take bankruptcy, or are replaced by new leadership, the research also examines the question: What personality types cease to run the businesses they found?

To answer these questions in ways that will provide insights useful for applying this information to business decisions, it is necessary to examine the context within which the entrepreneur personality operates. This context contains two elements: (1) the motivating factors and personal characteristics which influence individuals to found businesses, and (2) the industry and general business milieu which surrounds business start-ups.

## Motivating Factors and Personal Characteristics
## Which Influence Individuals to
## Found Businesses

In trying to understand what kinds of people create new businesses and why some succeed and others fail, it is important to understand the personal reasons individuals express for founding businesses. These reasons, coupled with individuals' personality characteristics, motivate them to launch new enterprises.

The Reasons People Start Businesses

People are motivated to start businesses for just a few reasons: (1) they have a need to achieve (Mancuso, 1984; McClelland, 1961); (2) they have a marketable idea that they cannot convince their existing employer to support; (3) they feel their own independent action will provide greater personal and monetary rewards than working for others (Baumback & Mancuso, 1975, p. 15); (4) they have been laid off and cannot find other suitable employment; (5) they have been unable to work for others; or (6) their employer asks them to start a business utilizing some new technology or product line (Baumback & Mancuso, 1975; Mancuso, 1984).

The Characteristics of People Who Start Businesses

The people who create new businesses have some specific characteristics in common. Often they are the first born in

their families (McClelland, 1961); they are most commonly married with supportive wives; they are usually men; their average ages are between 30 and 35; and they hold the master's degree as the most common level of advanced study (Baumback & Mancuso, 1975, pp. 1-2). They are often described in the following ways: "He cannot work for anyone else . . . . He is an independent, free spirit. He has great difficulty following others' directions. He seeks to do his own thing" (p. 2). In addition, the primary motivation for their high need for achievement comes from their fathers; they are normally in secret conflict with their venture capitalists; they rely most on external management professionals for critical management advice; they are usually "doers"; and they are usually moderate risk takers (Baumback & Mancuso, 1975; McClelland, 1961).

Hornaday and Aboud (1971) discovered that men who start their own businesses rate higher on scales measuring the importance attached to recognition, independence, and leadership. Palmer (1971) found that successful entrepreneurs have the ability to make decisions under conditions of uncertainty, and "engage in business venture activities that provide concrete feedback on performance (profits), some degree of risk taking, and opportunity for personal achievement" (p. 32). All of these characteristics play an important role in assisting the founder/CEOs to

respond to the business context of their firms.

## The Business Context Surrounding the Founding
## of New Businesses

Generally the context surrounding all newly formed businesses is the same. In many cases, a new business is formed to exploit new technology or innovative strategies which take advantage of market niches devoid of major competition. Creating sales is generally a first priority. However, in many High-Tech business start-ups sales have to be delayed because the design of the product has not been completed. Especially in this case, but usually in all cases, new markets need to be developed, production planned and implemented, qualified personnel hired, and adequate working capital and capital assets acquired. The activities required to achieve the goals in these areas make certain demands on a founder's personality.

Contextual Demands On a New Business Founder

For instance, in traditional business start-ups there may be only one or a very few persons who have to communicate and make decisions. Critical to any business start-up are the many tasks which must be accomplished, all simultaneously, under enormous amounts of pressure produced by short time horizons, inexperience, and lack of staff assistance (Liles, 1974).

Marketing. Typically the new venture has a single product or market niche so unique that competition is not a major concern. Because the business is new and sales are relatively small, the founder does not have to consider past performance, histories with customers and staff, and the firm's reputation in the industry. In the marketing area, products or services can be classified as either stable or dynamic, often referred to as "staple" or "fashion" (McCarthy, 1987). In the staple product environment the pace is slower, it is easier to plan because there is less uncertainty. As a result, merchandising does not have to include as much customer education as might be required by a dynamic product environment. Even though operations in new businesses are simpler than those in older firms, there is a plethora of tasks to accommodate.

The founder/CEO must quickly design and implement a marketing and sales strategy based on the category into which his products are classified. This involves establishing effective distribution channels guaranteed to produce early results, advertising and promotion schedules which provide the customer education needed, sales terms which reflect industry norms, and product literature intended to reveal product specifications and servicing information. It also often involves warranty programs and product servicing networks. The quality of founder/CEO

responses to these demands from the marketing sector of a business is controlled by personality in many ways. The level of organization skills determines the quality of prioritization and delegation when planning and implementing distribution strategies; the level of data gathering and interpretation skills controls the effectiveness of the responses in the product and price arenas. The skill to envision strategies and their future consequences influences the quality with which marketing decisions are made and implemented. Timeliness, a measurable personality trait, often determines effectiveness in the market; and, certainly, computational skills impact the economic viability of marketing plans as much as they do the adequacy of the firm's financial base.

Finance. There is usually only one bank, few suppliers of financing, and few vendors. Financial relationships are relatively simple. Financing, for most firms, occurs in three phases (Liles, 1984; Welsh & White, 1983): Phase 1 is the "seed round" where funds are supplied by the founder, relatives, or a few wealthy, interested friends or potential customers. In Phase 2, the second round, the funds are normally supplied by an interested and wealthy individual, potential customers, suppliers, or by venture capitalists (J. Paros, personal communication, October 16, 1990). Phase 3, the third round, is more often

a combination of types of equity or long term financing, which may include stock issues, long-term debt instruments, mergers, and joint ventures. In phases 1 and 2, there are few suppliers of funds therefore little investor servicing is required; intermittent verbal reassurances may suffice. Vendors are often paid in advance or on delivery (C.O.D.) terms (Baumback & Mancuso, 1975; Hawken, 1987; Mancuso, 1984). In all phases, however, credit from suppliers is an additional source of capital, influenced by levels of negotiation skills available. As in the marketing area, personality controls effectiveness in the financial area. Computational and organizational skills are critical in both forecasting budgets and tracking financial performance. Communication skills are crucial in raising funds and establishing credit, as well as servicing the investor group. Coordination and integration between the parts of a business system are especially critical between the finance and production departments.

Production. The design and implementation of production systems for either products or services require a great deal of thought and, often, special engineering skills. The number of tasks in this area is enormous, even for the simplest enterprise. Site location decisions, acquisition of facilities and equipment, obtaining transportation, planning and storing inventory, recruiting

of supervisory and operating personnel, the purchase of raw materials, production scheduling, and the establishment of shipping and receiving procedures are just a few of the tasks common to all new firms (Liles, 1974; Welsh & White, 1983). Because of the complexity and interdependency of the tasks in this sphere of operations, personality traits which allow collection, integration, and processing of large amounts of data are mandatory for achieving efficiency. In addition, patience, orderliness, and accuracy are essential for optimal administrative performance.

Administration and staffing. Rules and procedures, hierarchical levels of authority, task structures, reward and control systems, and information and decision processes need to be established in all new businesses to achieve administrative objectives. The smaller the enterprise, the more centralized (Hill, 1988) and less formal these processes are required to be; however, even in the simplest of structures, they must be addressed (Galbraith, 1977). Again, personality traits which develop logical thinking skills are important. Prompt decision-making capability, a clearly measureable personality characteristic, contributes significantly to organizational effectiveness and efficiency.

In order to achieve administrative objectives, the quality of staffing decisions also becomes an imperative.

As firms grow, additional people are needed to manage increasing amounts of information and activities. Skill in evaluating, selecting, and motivating people becomes essential to maintain workplace harmony and effect high levels of performance. Certain personality types that are more effective than others in the human resource area can be identified by testing. Those who have skills in managing people, in some cases, may not always be the best choices for planning and allocating tasks; these types, too, can be identified by testing.

In all the areas of administration, especially in staffing, there is a need to plan. In the initial stages of business start-ups, the founder/CEO survives for a time operating the business despite the lack of formal strategic planning (Haspeslagh, 1982). The personality types which can best respond to the planning imperative provide skills in the areas of logical thought, patience, syncretization, and quiet insight. These are often the same skills needed to develop technology.

Technology. There is always a need for expertise in the relevant technology of a new business. It is more common for founders of businesses to have some expertise in the technology of their product than it is for them to possess extensive knowledge about business management. In the garment industry, for instance, it is not unusual to see

a cutter and salesperson leave the manufacturing firm for
which they work in order to start their own business.
Neither one of these "specialists" may understand how to be
managers; they represent only two areas of technical
expertise, "cutting" and "selling." Technical skill in
manufacturing concerns is needed in industrial engineering
categories such as materials, processing, and finishing.
Such technology is also needed in non-engineering
classifications of sales, marketing, and business
economics. Today, management itself is considered a
technology (Barnard, 1938; Drucker, 1974; Simon, 1976;
Sloan, 1972). In High-Tech businesses, it is not uncommon
for the founder to possess the technology around which the
business is started; this founder is usually an engineer.
Typically, engineers can be classified as special
personality types with skills and traits which match the
requirements of their particular engineering specialties.
Non-engineering management specialists can be classified
in a similar manner (Myers & McCaulley, 1985; Myers & Myers,
1980).

<u>Founder Management Skills and Traits Needed to Respond</u>
<u>to the Contextual Demands on Business Start-ups</u>

Managers involved in business start-ups find the
atmosphere to be exciting and exhilarating; the pace is
unbelievably fast. Risk is not fully comprehended. The

requirement is that everything must be done simultaneously. Demands for immediate decisions are incessant. Decisions are more tactical than strategic in nature, and do not lend themselves readily to much long range planning. At the same time that sales, marketing, and financial concerns are being addressed, production must be started. The founders must be concerned with the legal implications of organizing, government registration, and hiring staff to administer the documentation necessary for a business. There is a need to establish a public relations capability. There is a need to relate to fellow workers, customers and vendors. Credit must be established (Fox & Mancuso, 1980; Welsh & White, 1983). The demands on one person are horrendous; it is the unusual individual who possesses the necessary skills at a sufficiently high competence level to be more than minimally effective.

Because of the simultaneity and urgency of the situation described above, technological skills required by founders need to be supplemented by the skills to coordinate, to summarize quickly, and to make timely decisions, often without much exhaustive thought. The skill to convey their vision for the business and to motivate loyalty from staff being asked to work staggering numbers of hours is also needed (Forester, 1987). Founders also need the skill to negotiate effectively, to get the most out of

the time available, to shift from one discipline to another rapidly, and the skill to make things happen, or bring closure. They need to be knowledgeable about the various facets of their industry and that portion of the economy which impacts their business. Lincoln (1961) proposes that heads of businesses need to be philosophers, voracious readers and willing partners in conversation, for it is through these activities that they build their personal management models. In addition, he says that they should be money raisers, technical and production experts, exceptional salespersons, and administrative geniuses. They should also be flexible, able to shift disciplines and refocus instantaneously (Kets de Vries & Miller, 1984; Miller & Toulouse, 1986).

Flexibility is a trait which has been ". . . associated with intuitively formulated, risk-embracing, reactive niche strategies, and extremely informal organization structures. It seems to have the most positive implications for performance in small firms and stable environments, settings in which simplicity and informality are more likely to be virtues." (Miller & Toulouse, 1986, p. 1405). Persons too rigid in their schedules and goals are unable to switch disciplines as quickly as needed in small businesses. Rigid persons will forego timely decisions to complete activities in progress thereby subjecting their businesses to default

decisions which, because they are not appropriate, leave the firm open to unplanned risks (p. 1390). Flexibility also has implications for risk taking.

The business start-up environment puts an emphasis on risk taking for long range objectives. The personality of the founder allows him or her to comfortably "risk big" for objectives unsupported by concrete data. In addition, the founder must be able to motivate, understand, and lead people towards achievement of these objectives. Since the founder is usually the originator of the vision for the business, he or she sees the details of the business with more perspective than the other members of the team. In many cases, the founder is the only person in the organization possessing the operating and technical expertise required. That which seems obvious to the founder may not be obvious to the members of his or her team. This means that the founder must be a teacher, exercising patience in instructing the uninformed members of a team in the things he or she already knows or has just learned. The demands which have been described above provide impressive challenges for even the most seasoned of managers; they are bewildering, at best, to the neophyte.

Because of the young age and limited experience of most new founders, it is advantageous if at least two individuals with complementary skills act as a team in attending to the

needs of the new venture. Unfortunately, because of economic constraints and founders' personalities, this is not always possible. If the firm is fortunate, as it grows it becomes possible for the founder to delegate operational responsibilities among several individuals who have demonstrated appropriate competencies. It is not unusual, however, to find that the ego of the founder prevents this, and the expanding firm suffers (George Clute, personal communicaton, December 14, 1990; Mike Flynn, personal communication, 1991). At this point, the founder may then be removed and replaced by a person better qualified to operate a larger, expanding operation.

The Growing and Maturing Business Over Two Years Old

This research studies successful founders of High-Tech firms who continue to run their firms two or more years after founding. The businesses of these founders usually have greatly increased sales volumes and growing staffs with complicated internal relationship structures needing to be more decentralized (Hill, 1988) and administered both formally and informally. In addition, almost without exception, an older business has to engage in planned product development.

Product development. The development of new and follow-on products is important in older and expanding businesses. Many founders fail to ensure that new products

come on line in a timely manner (C. Anderson, personal communication, September 12, 1990; Kotler, 1982; J. Paros, personal communication, October 16, 1990). This causes business failure because of early market saturation (Joseph Cunninghan, personal communication, September 12, 1985), improved technology marketed by competitors (Robert Wallace, personal communication, August 10, 1990), or because of the implications of undifferentiated product mix (Kotler, 1984). In order to develop new technology and create a marketable product mix, R & D funds must be made available, a capable product engineering staff must be hired, and close customer relationships created. Since not all new products come from internal development efforts, networking within the industry must be accomplished in order to discover new advances in technology which, through purchase or license, could be integrated with the present product line and marketed to existing customers. Through networking, it is sometimes possible to create new customers with product technologies already in existence (Sheldon Detwiler, personal communication, September 18, 1990). Product development and marketing are symbiotic processes.

<u>Marketing</u>. In marketing older businesses, there are more customers, and more types of customers, to be provided with complicated service, order control, and sales management systems than there are in marketing new

businesses. Advertising, promotion, and promotion policy have become more important and more costly, thus requiring additional funds, schedules, and staff. In a growing firm, markets must be analyzed more carefully for new trends, possible new customer segments, and customer needs. Coordination and integration between marketing and production become critical in order to make timely deliveries, to control inventories, and to coordinate cash flow.

Cash flow. Cash flow is a major concern to the ongoing firm. Even with strong profitability, it is still possible to go out of business for lack of a positive cash flow (H. Kierulff, personal communication, March 4, 1982). The founders who are able to create positive cash flows early in their firms' histories seem to succeed better in the other departments of their businesses (Robert Brown, personal communication, October 4, 1978). By succeeding in this area, working capital is continually expanded and pays for future expansion (Drucker, 1986). Accomplishing this is an apparently rare skill (G. Clute, personal communication, December 14, 1990; J. Paros, personal communication, October 16, 1990) predicted by measurable personality traits.

In High-Tech firms, where growth may exceed 100% in a year, the "circulation of working capital" (Smith, 1937) often does not provide enough funds to accommodate the

growth. In this case, the founder/CEO must seek additional funds from the investment community. This usually requires expanded financial relationships. Additional financial relationships put new restraints on operations. Investors need to be kept informed and happy. Banks and investors typically insist on covenants which require the maintenance of specific ranges of working capital, current and debt-to-equity ratios. These additional burdens on the founder/CEO, combined with the growing complexities of the manufacturing function require more time and skill to administer.

Administration. Administration of larger and more diverse manufacturing facilities requiring complicated systems for production, maintenance, and supply is a new reality. Decisions need to be made regarding capital expenditures for new equipment in order to improve manufacturing efficiency. These decisions should be made by people with the required skills. The expansion of manufacturing demands that time and effort be given regularly to new manufacturing technology. This requires a greater number of external contacts and information sources, more intricate ways of evaluating information, and more relationships with professional groups and organizations. The increasing complexities of the growing business, such as those in the manufacturing function, require increased analysis and evaluation skills.

As businesses move through time, they collect a large amount of baggage, much as a submerged submarine which takes on water making it heavier and harder to maneuver. Submarines simply pump out the excess water in order to become more buoyant. Decisions to pump are made by evaluating a collection of gauges which provide a continuous display of ballast conditions. Similar decisions involving control are made in a business, but the data and criteria for those decisions may not be presented as clearly as they are by the gauges in the submarine. Also, the systems of a business may not be as self-contained as those of a submersible. In order to retain control, in the open system environment of a business, a CEO must have the skills to continually plan using ever increasing numbers of interacting variables; continually systematizing, organizing, and evaluating them in an uncertain environment.

The CEO must be able to design standards for operation which become the structure of the organization. Bureaucratizing, or organizing and systematizing, is offset by the need to remain flexible. Simultaneous "loose-tight" controls (Peters & Waterman, 1982) are needed to keep the business viable. There has to be a unique ability to prevent ossification and to remain open to both incremental and "frame breaking" changes (Tushman, Newman, & Romanelli, 1986). Dealing with these opposing forces creates

complexities and intricacies requiring special talents which not everyone possesses. Running a large business is different from running a small, or start-up, firm (M. Flynn, personal communication, February 6, 1991).

Conning a big ship is entirely different from sailing a small one. The person doing the conning can no longer control the wheel and engines directly. Messages have to be passed through others and reaction times become longer. The conning officer has to know what the time sequences are in order to prevent ramming the dock or hitting another vessel. Running a large business is very similar. Some founders already have the skills; others learn them: some do neither.

Skills and traits needed for operating businesses more than two years old. Conning, or managing, a growing business means not doing the tasks yourself, but making sure someone else does them correctly. As the CEO of an older business, the founder is required to have the traits of flexibility, focused internal locus of control, and a need to achieve -- the same as is true in start-up businesses. Need for achievement (nAch), however, has been associated more strongly than flexibility with performance in running older, medium sized firms in dynamic environments and is even more important than flexibility (McClelland, 1961; Miller & Toulouse, 1986).

Because of increased complexity and the availability of greater resources, skills and traits in running mature firms are often differentiated among individuals. Vision is still required, as well as most of the skills and traits listed above for the start-up enterprise. The creative vision for the future of the company should still be centered in one or several persons in top management positions. Now, however, there are a few added competencies needed. The skills of planning, systematizing, controlling, standardizing, and rational decision making become of great importance. These skills require a greater degree of attention to details. Because these are markedly different mental skills from conceptualizing a vision, they often reside in people other than the team, or person, responsible for the vision of the future (Ohsawa, 1975). Attention to detail requires being tuned to incremental risk taking based on substantiated facts and documentation. There is a more concentrated need now for competence at both ends of the spectrum: intuitive vision and systematic detail (Drucker, 1990).

## Personality

Competence in vision and detail, and comfort with risk are controlled by an individual's personality. "Providing an acceptable definition of personality is an age-old problem in psychology" (Marlowe & Gergen, 1969). One formal

definition is that:

> Personality is a stable set of characteristics and tendencies that determine those commonalities and differences in the psychological behavior (thoughts, feelings, and actions) of people that have continuity in time and that may not be easily understood as the sole result of the social and biological pressures of the moment. (Maddi 1980, p. 10)

Hellriegel, Slocum, and Woodman (1989, p. 38) suggest that no single definition is acceptable to all authorities, but that most agree that personality is a collection of personal characteristics recognized by others through an observation of a person's repeated behaviors.

Knowles and Saxberg (1970) defined the term personality as the representation of the ". . . totality of a person's characteristics--his attitudes, needs, traits, abilities, feelings, and other mental processes" (p. 70). They also made the distinction between the internal concept we have of ourselves, the personal self, and our social self. The two concepts are characterized by two orientations: internal and external. The personal self is the internal orientation which describes our own ideas about how we act toward ourselves and others. The social self is the external orientation: "The way we appear to others and the way we think we appear to others" (p. 77). These authors agree with Epstein (1973) who reinforces the theory that we form a "self-concept" by evaluating others' responses to our actions. These repeated interactions and observed responses

help the individual construct a personal model which is used to produce consistent behavior in social settings. According to Epstein (1973), this personal model is quite complex and includes how we incorporate not only our heritage, but also our personally recognized skills. This self-image tells us what our competencies are. Each self-image is different from others, therefore individuals differ in their collection of competencies. The individual differences we notice among people are primarily differences in personality (Epstein, 1973). The manager must understand and appreciate these differences, in order to lead his people in the complex setting of his organization (Hellriegel et al., 1989, p. 37).

Personality differences account for some people being more competent than others at handling details. Differences allow some individuals to see the future with more clarity; they allow some to be comfortable making incremental risks when the stakes are small; they allow others to feel comfortable risking high stakes in an atmosphere of uncertainty. There are people who always strive for closure while others delay decision making; there are people who enjoy socializing and those who are shy. Personality characteristics determine how well a person leads others and manages an organization.

## Sources of Personality Differences

There are many theories about where personality differences originate. Hellriegel et al. (1989), Epstein (1973), Holden (1987a, 1987b), and Myers (1980) believe that a portion of the personality has genetic origins. There is confirmation of this in research especially in the extraversion-introversion dimension (Holden, 1987a, 1987b; Myers, 1980). Hellriegel et al.(1989) and Knowles and Saxberg (1970) believe that culture and the family mold portions of the personality. Group membership and life experiences are also regarded as important. All of these sources are interdependent and must be considered in evaluating an individual's personality at any given moment (Hellriegel et al., 1989). These interdependencies were observed by Carl Jung during his years of clinical treatment of patients. Katherine Briggs was intrigued by Jung's writings and felt that by interpreting his concepts she could make them more useful in people's lives. Influenced by her interest, her daughter, Isabel Briggs-Myers, developed the Myers-Briggs Type Indicator (MBTI) which operationalized Jung's theories.

## The Jungian Approach to Personality

Through clinical psychoanalysis, Carl Jung was able to codify observed behavior and develop a system for specifying

the characterization, or personality profile, of a person. He characterized personality traits as behavior preferences. Jung's system produces three dimensions (orientation, perception, and judgment), or continua, along which a person's personality preferences are described in archetypal fashion. These include four attitudes: Extraversion and Introversion (orientation and energy), Perception and Judgment. The Perception attitude contains two functions, sensing and intuition; the Judgment attitude contains two other functions, thinking and feeling. Isabel Briggs-Myers added a fourth dimension that tells the observer which attitude, perception or judgment, the subject displays to the outer world. Figure 1-1 illustrates the Orientation and Energy continuum which contains the extraversion (E) and introversion (I) preferences. By orientation Jung meant a person's manner of addressing his world. The extravert goes out to meet those in his world, the introvert is inwardly directed, often turning away from the others in his world. Jung stated that extraverts pursue their interests with a more readily identifiable physical vigor than introverts who prefer solitude and physical passivity. The figure emphasizes that these two preferences (extraversion and introversion) are opposites.

ORIENTATION and ENERGY

E                                                                          I

| Extraversion | Introversion |
|---|---|
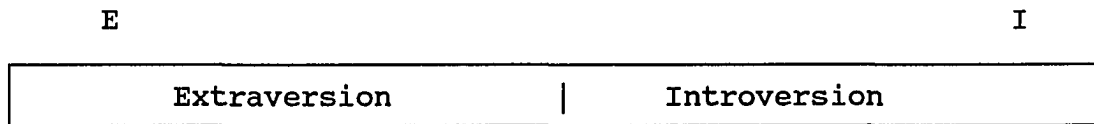
Figure 1-1.  The Orientation and Energy
Dimension.

Figure 1-2 illustrates each dimension and its two preferences. The Perception dimension's two preferences are sensing (S) and intuition (N). The Judgment dimension's two preferences are thinking (T) and feeling (F), and the Orientation-to-the-Outer-World dimension's preferences are judging (J) and perceiving (P).

| Orientation and energy Dimension | Perception Dimension | Judgment Dimension | Orientation to- outer- world Dimension |
|---|---|---|---|
| E   or I | S or N | T or F | J  or  P |

Figure 1-2.  The Dimensions and Their Preferences.

By responding to the Myers-Briggs Type Indicator questionnaire, an individual selects which of the two preferences in each dimension best represents his or her personality characteristics. The four letters selected by this process are combined to form a four-letter acronym which describes a person's archetype. There are sixteen possible archetypes; one type is shown in Figure 1-3.
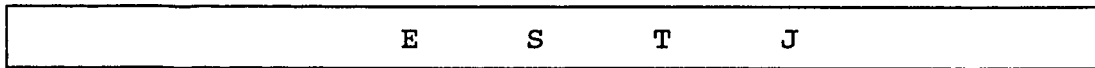
| E | S | T | J |
|---|---|---|---|

Figure 1-3.  The ESTJ Archetype.

## Sixteen Archetypes

The ESTJ archetype describes an extraverted, sensing, thinking, judging type.  Figure 1-4 displays a matrix of the sixteen archetypes.  Each four-letter acronym characterizes an individual's personality profile.  The brief descriptions of each of these types can be read on the matrix.

Sensing Types | Intuitive Types

Introverts

| ISTJ | ISFJ | INFJ | INTJ |
|---|---|---|---|
| Serious, quiet earn success by concentration and thoroughness Practical, orderly matter-of-fact logical realistic and dependable See to it that everything is well organized Take responsibility Make up their own minds as to what should be accomplished and work toward it steadily, regardless of protests or distractions | Quiet friendly responsible and conscientious Work devotedly to meet their obligations Lend stability to any project or group Thorough painstaking accurate Their interests are usually not technical Can be patient with necessary details Loyal considerate perceptive concerned with how other people feel | Succeed by perseverance originality and desire to do whatever is needed or wanted Put their best efforts into their work Quietly forceful conscientious concerned for others Respected for their firm principles Likely to be honored and followed for their clear convictions as to how best to serve the common good | Usually have original minds and great drive for their own ideas and purposes In fields that appeal to them they have a fine power to organize a job and carry it through with or without help Skeptical critical independent determined sometimes stubborn Must learn to yield less important points in order to win the most important |

| ISTP | ISFP | INFP | INTP |
|---|---|---|---|
| Cool onlookers - quiet, reserved, observing and analyzing life with detached curiosity and unexpected flashes of original humor Usually interested in cause and effect, how and why mechanical things work, and in organizing facts using logical principles | Retiring, quietly friendly, sensitive, kind, modest about their abilities Shun disagreements do not force their opinions or values on others Usually do not care to lead but are often loyal followers Often relaxed about getting things done because they enjoy the present moment and do not want to spoil it by undue haste or exertion | Full of enthusiasms and loyalties but seldom talk of these until they know you well Care about learning ideas language and independent projects of their own Tend to undertake too much then somehow get it done Friendly but often too absorbed in what they are doing to be sociable Little concerned with possessions or physical surroundings | Quiet and reserved Especially enjoy theoretical or scientific pursuits Like solving problems with logic and analysis Usually interested mainly in ideas with little liking for parties or small talk Tend to have sharply defined interests Need careers where some strong interest can be used and useful |

Extraverts

| ESTP | ESFP | ENFP | ENTP |
|---|---|---|---|
| Good at on-the-spot problem solving Do not worry enjoy whatever comes along Tend to like mechanical things and sports, with friends on the side Adaptable, tolerant, generally conservative in values Dislike long explanations Are best with real things that can be worked, handled taken apart, or put together | Outgoing, easygoing accepting friendly enjoy everything and make things more fun for others by their enjoyment Like sports and making things happen Know what's going on and join in eagerly Find remembering facts easier than mastering theories Are best in situations that need sound common sense and practical ability with people as well as with things | Warmly enthusiastic high spirited ingenious, imaginative Able to do almost anything that interests them Quick with a solution for any difficulty and ready to help anyone with a problem Often rely on their ability to improvise instead of preparing in advance Can usually find compelling reasons for whatever they want | Quick ingenious good at many things Stimulating company alert and outspoken May argue for fun on either side of a question Resourceful in solving new and challenging problems but may neglect routine assignments Apt to turn to one new interest after another Skilful in finding logical reasons for what they want |

| ESTJ | ESFJ | ENFJ | ENTJ |
|---|---|---|---|
| Practical, realistic, matter-of-fact, with a natural head for business or mechanics Not interested in subjects they see no use for, but can apply themselves when necessary Like to organize and run activities May make good administrators, especially if they remember to consider others' feelings and points of view | Warm hearted talkative, popular conscientious, born cooperators, active committee members Need harmony and may be good at creating it Always doing something nice for someone Work best with encouragement and praise Main interest is in things that directly and visibly affect people's lives | Responsive and responsible Generally feel real concern for what others think or want and try to handle things with due regard for the other person's feelings Can present a proposal or lead a group discussion with ease and tact Sociable popular sympathetic Responsive to praise and criticism | Hearty frank decisive leaders in activities Usually good in anything that requires reasoning and intelligent talk such as public speaking Are usually well informed and enjoy adding to their fund of knowledge May sometimes appear more positive and confident than their experience in an area warrants |

Figure 1-4.   Sixteen Myers-Briggs Personality Archetypes.

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The type matrix is divided in half so that the Orientation types, introverts (I) and extraverts (E), are positioned horizontally in the upper and lower halves. The perception dimension, sensing (S) and intuition (N), divides the matrix vertically in half. The judgment dimension, thinking (T) and feeling (F), is arranged so that the thinking types are in the extreme left and right columns, while the feeling types occupy the two vertical, center columns. The orientation-to-the-outward-world dimension is positioned with the judging (J) types in the top and bottom rows and the perceptive (P) types in the two central, horizontal rows.

By reading the descriptions of each archetype, it becomes obvious that each of the types has different characteristics which suit them for different kinds of work. For instance: ESTJs are:

> Practical, realistic, matter-of-fact, with a natural head for business or mechanics. Not interested in subjects they see no use for, but can apply themselves when necessary. Like to organize and run activities. May make good administrators, especially if they remember to consider others' feelings and points of view (Myers & McCaulley 1985, 20-21).

Based on research summarized by Keirsey and Bates (1978) and Myers and McCaulley (1985), the ESTJ is believed to make an excellent middle-manager and is often characterized by the words "director" and "commander".

## Selection of the Myers-Briggs Type Indicator (MBTI)

The Myers-Briggs Type Indicator (MBTI) is not the only instrument available to measure personality. Others include McClelland's instruments for achievement, affiliation, and power; Reid's Personality Index; Keirseyan [sic] Temperament Test; Strong-Campbell Interest Inventory; Gray-Wheelwright Psychological Type Indicator; The Singer-Loomis Inventory of Personality; The Eysenck Personality Questionnaire; the Rorschach tests; and the analytic-heuristic part of the Minnesota Multiphasic Inventory. Each of these systems measures one or several elements of personality (flexibility, introversion, extraversion, etc.) also measured by the MBTI. The MBTI results, in these same personality elements, correlate highly with the results from the tests named above (Berens, 1985; Dillon & Weissman, 1987; Grant, 1965; Loomis, 1982; Ross, 1963 and 1966; Steele, 1976; Wagner, 1981; Waite, 1976; Zmud, 1978). None of these other measures, however, provides a comprehensive composite profile in as coherent and accessible a manner as the MBTI.

## Relevance Of Personality Type To Business

Each of the four dimensions of the MBTI depicts particular skills relevant to the business world (Barr & Barr, 1989). For example orientation as an extravert (on the introversion-extraversion dimension) predicts a high

energy person eager to know what is expected of him or her and to see what constitutes high-quality performance. The extravert is a good communicator. On the other side of the coin, orientation as an introvert predicts a quiet person, anxious to set his or her own standards. The introvert is not a facile communicator, wants to be right, is slow to try something not well understood, and prefers to do mental work privately.

A person's orientation to Perception (on the sensing-intuition dimension) describes a person's learning, motivation, data gathering, and problem solving modalities. Such an orientation can also predict skills in perceptual organization, pattern recognition, and closure. It can predict the manner in which data will be acquired. It can predict, as well, possible errors in perception, such as the tendency of individuals to protect themselves against threatening ideas, objects and situations. Preference for sensing (S on the sensing-intuition dimension) predicts that an individual would work best in a structured environment. This individual is more comfortable, more productive, in a business situation where large amounts of data have to be collected and there is a need to be in constant touch with present reality. An intuitive (N) type on this same dimension would be happiest in a business situation requiring future orientation, strategic planning,

and creative vision.

Knowledge of the individual's preference on the Judgment dimension provides information on the use of objective or subjective logic. It also predicts the type of analysis and interpersonal skills possessed by a person. A thinking (T) type (on the thinking-feeling dimension) would be excellent where data analysis skills were demanded by the business situation. T-types are also good at creating organization and structure in situations where impersonal approaches are important. T-types can fire people. Feeling types (F) find this difficult to do. Feeling types do best in settings where interpersonal skills are needed, as in human resources management, health care, or the arts. F-types are excellent judges of people, understand human values and how to apply them; they are motivators, catalysts, and charismatic leaders.

Understanding the preference of an individual in the fourth dimension, orientation-to-the-outer-world, offers clues to levels of closure ability or flexibility. Judging (J) types close quickly, easily, and often; they set goals and reach them; and they are impatient to get things accomplished. Perceptive (P) types are flexible, patient, open to many options, and curious. They are often late, and reticent to close (Hellriegel et al. 1989; Keirsey & Bates, 1984; Lawrence, 1984; Myers, 1980; Myers & McCaulley, 1985).

## The Purpose of This Research

The purpose of this research is to determine whether the personality type of a person can be related to the founding of a business. An additional purpose is to discover whether the personality type of a founder affects success or failure in operating a High-Tech business. The role played by the personality of a CEO in running his business is frequently cited in theoretical works on management (Barr & Barr, 1989; Knowles & Saxberg, 1970; Meindl, Sanford & Ehrlich, 1987; Miller & Toulouse, 1986; Miller & Kets de Vries, 1984; Mintzberg, 1973). The role played by personality in the founding of a business has been seriously considered by McClelland (1961), Baumback and Mancuso (1975), and Mancuso (1984). However their investigations were limited to specific components of personality such as McClelland's need for achievement, affiliation, and power; The California Personality Index's measure of flexibility; and Baumback and Mancuso's measures of competitiveness and patience. Even though self-image theory has provided a unifying concept of personality, empirical researchers have not worked with an instrument which would reflect the holistic concepts of the self-image. The MBTI approaches this holism in an analytically acceptable manner, allowing dependable research to be accomplished in the field.

## Research Questions and Expected Results

The research presented here seeks answers to three questions. The first question asks: Does personality type affect the likelihood that a person will found a business? This question will be answered affirmatively if the distribution of Myers-Briggs personality types is different for founders of businesses compared to the distribution for non-founders of businesses. The expected result is that personality type does indeed affect the likelihood that a person will found a business and that will be shown by different distributions of Myers-Briggs personality types for founders and non-founders of businesses

The second question asks: Does the personality type of founders affect the kinds of businesses founded? This question will be answered affirmatively if the distribution of Myers-Briggs personality types for founders of High-Tech businesses is different from the distribution of founders of non-High-Tech businesses. The expected result is that personality type affects the kind of business founded and that will be shown by different distributions of Myers-Briggs personality types for founders of High-Tech and non-High-Tech businesses.

The third question asks: Does the personality type of founders affect their success or failure in running High-

Tech firms over time? This question will be answered affirmatively if the distribution of Myers-Briggs personality types is different for successful founders of High-Tech firms compared to founders who have been replaced, or whose firms have been liquidated or become bankrupt. The expected result is that personality type affects success and failure in running High-Tech firms; that will be demonstrated by different distributions of Myers-Briggs personality types for founders managing successful firms compared to founders who have been replaced, or who have liquidated their firms or experienced bankruptcy.

## Overview of the Research

The data were collected from 595 male founders of businesses and 312 male non-founders of businesses. The data describe the personality types of: (1) founders of High-Tech businesses, (2) founders of non-High-Tech businesses, (3) founders operating successful High-Tech businesses more than two years old, (4) non-founders of businesses, (5) founders of all types of businesses, and (6) founders of High-Tech businesses which have failed. These data were measured by the Myers-Briggs Type Indicator (MBTI), Form G. This instrument, devised by Isabel Briggs Myers, provides a four-letter acronym describing a person's

personality type. The Myers-Briggs Type Indicator, or MBTI as it is commonly known, poses over 100 questions about how the test-taker usually feels or acts in particular situations. For instance, "In a group, do you often introduce others, or wait to be introduced?" Extraverts tend to introduce, introverts to be introduced. "Do you find it harder to adapt to routine or to more-or-less constant change?" Judging types have a tougher time with change, perceiving types with routine. In 1986 some 1.5 million people completed the Myers-Briggs Type Indicator in the U.S. Companies that administer it include Allied-Signal, Apple, AT&T, Citicorp, Exxon, GE, Honeywell, and 3M. Colleges, hospitals, churches, and the U.S. armed forces also administer the test (Moore, 1987).

Additional data collected for High-Tech founders were: (1) age of founders, (b) founders' years of schooling, (c) and how well the founders liked their jobs. A questionnaire designed for this research also provided the following information: (a) formal title of founders, (b) age of business, (c) the self-perceived specialty skills of the founders, (d) the self-perceived primary duties of the founders, (e) the self-stated leadership skills of the founders, and (f) the products produced by the founders' firms.

## Research Design

The research design used in this study is a series of eight by two factorials employing, as the dependent variables, the frequencies of three-dimension (i.e., three letters in the indicator) Myers-Briggs types, rather than the usual four-dimension types. The Extraversion-Introversion dimension is not included in the analysis because this variable is assumed to be equally distributed in the population with no significant difference when tested. The independent variables which may affect the Myers-Briggs typing are the categories of businessmen, i.e., non-founders, founders of businesses, founders of non-High-Tech businesses, founders of High-Tech businesses, successful founder/CEOs of High-Tech businesses more than two years old; and replaced founders of businesses or founders of businesses which were liquidated or bankrupted. A total of 907 male subjects were surveyed. The significance of the differences in distributions of frequencies of MBTI types is determined by Chi-square analysis, and the significance of the difference between the sum of the high frequencies versus the sum of the low frequencies is confirmed by use of the t-test.

To test the validity of the hypotheses, the samples of the various independent variable categories were randomly split 50%-50% into sub-samples (calibration and validation

samples) and the two sub-samples were tested for differences using Chi-square analysis. In other words, the results obtained in the calibration sample were validated by doing the same analysis on a 50% randomly set-aside validation sample. Averages, medians and modes were computed on the following demographic data: age of founder, years of schooling, job title, and whether the subject likes his work.

Finally, structured interviews were conducted with founders and CEOs of businesses more than two years old and were analyzed for recurring themes among the respondents in the samples of Founder/CEOs of existing Hi-Tech businesses and Founders who have liquidated or bankrupted their firms, or who have been replaced in their leadership roles. These results are presented in histograms, tables, and narrative.

## The Experimental Hypotheses

The hypotheses which form the basis for this research are as follows:

Hypothesis 1: there will be a greater frequency of Myers-Briggs personality types STJ, NTJ and NTP than STP, SFJ, SFP, NFJ and NFP types among those who found their own businesses.

Hypothesis 2: there will be a greater frequency of Myers-Briggs personality types STJ, STP, SFJ, SFP, NFJ and NFP types than of NTJs and NTPs among people who are non-

founders of businesses.

Hypothesis 3: there will be a greater frequency of Myers-Briggs personality types NTJ and NTP than of STJ, STP, SFJ, SFP, NFJ, and NFP types among founders of High-Tech businesses.

Hypothesis 4: there will be a greater frequency of Myers-Briggs personality types STJ and NTJ than of NTP, STP, SFJ, SFP, NFJ, and NFP types among founders of non-High-Tech businesses.

Hypothesis 5: there will be a greater frequency of Myers-Briggs personality types STJ, NTJ, and NTP running successful High-Tech businesses than there will be of STP, SFJ, SFP, NFJ, and NFP types;

Hypothesis 6: there will be a greater frequency of STP, SFJ, SFP, NFJ, and NFP Myers-Briggs personality types of High-Tech firms who have applied for bankruptcy, liquidated their firms, or who have been replaced as CEOs than there will be of STJ, NTP, and NTJ types.

## Importance of The Research

This investigation is important because it provides a basis on which to evaluate the role personality plays in founding businesses and in operating them successfully. If it is found that personality type is correlated with founding and successfully operating High-Tech businesses,

this knowledge can be used to guide founders of new businesses by suggesting to them in advance whether their personality traits are compatible with individuals who have successfully founded and operated High-Tech ventures. The value of this advice is that the potential founder will be clued in to the probability of success for his type, and he will know what types of people he will need to hire to complement himself. This will increase the probability of success of a new founder. In addition, if a correlation is found between personality type and successful operation of a High-Tech business, it will be possible to advise existing CEO/Founders of their strengths and weaknesses; show them how to become more effective with their strengths; and show them how to minimize the effect of their weaknesses. It might also be possible to develop and train founders to manage the individual differences of those in their work groups.

The results of this research will help investors make informed decisions about the qualifications of management teams requesting finances, which, when added to the already used financial and business plan data will reduce the frequency of failures. This knowledge may make it possible to lower the failure rates of new businesses. It may begin a new era in the education of business students, an era based on reliable behavioral theory, which can then be

integrated with existing management theory.

No prior research has directly addressed the hypotheses included in this research. Assumptions have been made from research with other emphases (Miller & Toulouse, 1986). Many reports of empirical research (Miller et al, 1986; Mintzberg & Waters, 1983; Van de Ven, 1986) refer to the importance of personality type in the successful operation of a business, but none of them, other than Miller and Toulouse, has confirmed this importance by empirical research results. Miller and Toulouse used need for Achievement (McClelland, 1966), locus of control (Rotter, 1965), and the California Psychological Inventory's measure of flexibility as tools to attempt correlation of CEO performance with CEO personality characteristics.

The Myers-Briggs Type Indicator (MBTI) and its theory base provide an integrated profile of human behavior which is highly validated and proven to be extremely reliable. It is a more comprehensive instrument than those used by Miller and Toulouse for determining the effect of the whole personality on many areas of concern in business. It has been used by Ginn (1988) to collect data on founders of businesses, but no inquiries similar to those set forth here have been made.

## Limitations of This Study

There are several limitations to this study. Samples have been drawn only from the State of Washington. Generalizations for other geographic areas cannot be made. Since the study focuses mostly on founders of High-Tech firms, generalization to all businesses is not possible. Only male respondents were studied so no conclusions about female founders can be made. Very few High-Tech business founders appear in the bankruptcy files of the State of Washington. Because of this and the difficulty in encouraging failed founders to respond, the sample size of liquidated, bankrupt, or replaced founders is limited.

## Definitions Used In This Study

Several terms which are used in describing this research must be defined in order to insure precision of understanding. These terms are defined as follows:

### Founder

A founder is defined as a person who starts a business enterprise. In many businesses there may be several persons who, as a group, could be considered founders. In this case, the person central to the starting of the business, whose idea it was to start the business, and who originally assumed the Chief Executive Officer (CEO) position is considered the founder. In this research, all founders have

equity positions in the firms they found. This person may or may not be the spokesperson for the group. Groups of persons who could be considered founders, who also have equity positions in the firm, but who are not the CEO, are considered co-founders.

## Chief Executive Officer (CEO)

The Chief Executive Officer (CEO) is the top line manager of a firm. The CEO is responsible for designing and implementing policy and strategy in all areas and functions of the business. This person may or may not be directly responsible for the day-to-day operations of the firm. The CEO's title could be Chairman, CEO, President, Chief Operating Officer, or any combination of all of these. In all cases where holding stock is not mentioned, it is assumed that the founder retains stock or ownership in the company.

## Age of the Business

Age of the business is simply the length of time in years a business has been operating since it was founded. A common assumption is that enterprises go through phases measured in years since start-up. A one through five year range, when a firm is growing rapidly, is considered the first phase. During these years most business failures occur (Small Business Administration, 1989) with the greatest percentage occurring in the first two years. In

years six through ten (second phase) consolidation occurs.
In a successful firm that is expanding rapidly, the fifth
through seventh years are when the CEO often first finds
that he requires help because of the needs for
rationalization and differentiation of the internal
structure (Jon Shirley, personal communication, November
10, 1990). The years eleven through twenty are normally
thought of as the third phase during which the business
matures. During these years the final touches on a basic
policy framework and organizational structure are completed
and put in place. Beyond this time, the character of the
business and its structure do not change much (Drucker,
satellite seminar, February 8, 1990).

It is assumed that the complexity of running a business
increases with its age. The ability to handle increasing
complexity is relevant to the leadership skills required of
the CEO. Certain personality types are better able to cope
with increasing complexities and organizational discipline
than others. In this research, founders were studied
who were successfully operating their businesses for more
than two years. The assumption was made that the founder
would have had to establish his ability to manage
successfully in that period of time. Further assumptions
made were that, if the founder was not still the operating
leader of the company after two years the founder, if he

preferred not to take the operating leadership position, would have installed someone else more qualified to operate the business or someone whose skills complemented his own; or that he may have been forced either from the CEO position or out of the business entirely by a Board of Directors (or the financing entity) and replaced by a successor; or that the business would have been liquidated either through bankruptcy, simple closure, or liquidation of assets.

Success

Success and successful as used in this research mean that the firm is existing and continuing its operations. The terms do not suggest a qualitative evaluation of financial, marketing, production or any other functional performance levels. In High-Tech businesses success may be viewed in various ways. For example, profit may not have been planned for or expected for years, as in several of the bio-tech research firms where profit has not appeared for as much as twelve years. In spin-offs, where large sales volumes are expected and which require large investments, profits may not be expected for from four to twelve years. In these cases, criteria such as achieving objectives, success in funding and managing the internal organization, attracting outstanding talent, and achieving interim research goals represent success. Succinctly, staying alive

may equal success.

## Bankruptcy/Liquidation/Replacement

There are many ways businesses are discontinued, indeed the Small Business Administration prefers the term "discontinuance" rather than "failure" to identify their statistics (Ceebe Wallace, personal interview, January 15, 1991). In this study only three forms of discontinuance are used. First is bankruptcy, which means that the owner of the firm has applied for relief under the bankruptcy laws of the United States. No differentiation is made in terms of the classifications of bankruptcy, i.e., Chapters 7, 11, 12, or 13 of the Bankruptcy Code. Second is liquidation, which means that the assets of the firm have been sold, the firm closed down, and the founder no longer present. And lastly, replacement, which means that the firm was not sold, but the founder was removed and replaced by a successor.

## High-Tech Business

Breheny, Cheshire, and Langridge (1985), Haug (1990), and Markusen, Hall, and Glasmeier (1986) define High-Tech firms as firms:

A.  which are developing scientifically generated electronic, chemical, biological, or software technology which has not had prior existence;

B.  which are innovating and marketing

products, services, or software which

depend on the application of new electronic,

chemical, or biological technology;

C. which are employing new electronic, chemical

biological, or software technology in a

manner which changes the nature of a mature

industry.

High-Tech firms are often selected by standard

industrial classification (SIC) codes. In this method

> . . . two criteria are generally applied: 1)
> proportion of scientists, engineers, technicians,
> and mathematicians to total employment, and 2)
> proportion of research and development
> expenditures to product sales. The U.S.
> Department of Commerce (1983) defined advanced
> technology industries based on industries that
> normally spend 10 percent of the gross product
> (value added) on R & D and/or at least 10 percent
> of total employment consists of natural
> scientists, engineers, and technicians (Haug,
> 1990, p. 7).

Appendix A displays 29 high-tech sectors and their

occupational mix (Markusen et al., 1986).

Non-High-Tech Businesses

Non-High-Tech businesses are defined as those which are

not developing advanced scientific technology and which do

not use advanced scientific technologies as core ingredients

of their operations. Often these are businesses which use

scientific innovations to increase the efficiency of their

operations, but this use is not for the purpose of advancing

scientific technology and is not the central reason for

their existence. Examples of this are retail stores such as markets, discounters, and department stores which use computers to improve efficiency. Other examples are manufacturers, such as the auto industry, which use computers, robotics, and other scientific processes to increase production efficiency.

## Personality

Personality is a holistic view of the "bundle of traits" which form a person's character and produce a coherent pattern, identifying a person to others. This "bundle of traits" is operationalized by the person's basic goals and life plan (Adler, 1929). "Personality consists of two essential parts: a driving force and a set of strategies designed to satisfy that overriding drive" (Kaplan, 1989, p. 8). A person constructs in his or her head a "self-image." This self-image is formed by the evaluation of others' responses to behaviors of the individual over time (Epstein, 1973), personal experiences, and genetic inheritance (Hellreigel et al., 1989; Knowles & Saxberg, 1970). Often the personality characteristics of the individual may be more easily identified by observers than by the individual himself. This is especially true if the individual does not have a system by which to do the evaluation.

## Organization of the Dissertation

Chapter 1 establishes the importance of personality type, explains why people start businesses, describes the business start-up context as well as the skills founders must have. Chapter 1 also describes the growing and maturing business context and discusses the skills necessary for founder/CEOs to successfully operate growing and maturing firms more than two years old. The chapter sets forth the primary questions addressed and the expected results of the study. Definitions of terms used are presented, the purposes of the research, an overview of the research design, and the importance of the research are presented, as well as the limitations of the study. At the end of Chapter 1, the organization of the dissertation is discussed.

Chapters 2 and 3 review the theoretical and empirical literature. Chapter 2 covers the theory established surrounding the Myers-Briggs personality type indicator and relevant leadership, strategy, creativity and decision-making theory. Chapter 3 reviews the empirical literature on these topics.

Chapter 4 describes the research methodology. First, the context and setting of the study and the research subjects are reviewed. The hypotheses are stated, after which the research design, operational definitions of the

variables, and the sampling methods are discussed. The chapter ends with a description of the statistical techniques used to analyze the data.

Chapter 5 sets forth the results of the data analysis for the personality type, demographic, and structured interview data.

Chapter 6 presents the conclusions, the limitations with respect to internal and external validity, and the implications for practice and future research.

CHAPTER 2

THEORETICAL FOUNDATIONS OF JUNGIAN PERSONALITY TYPE
AND THE HIGH-TECH BUSINESS ENVIRONMENT

Introduction

Because of an increase in the importance of
business firms which develop and apply advanced
scientific technology there has been an interest among
researchers in the qualifications of the people who
lead them (Drucker, satellite seminar, February 18,
1990). Researchers Kets de Vries and Miller (1984)
argued that organizational configurations reflect the
personalities of their chief executives. Miller and
Toulouse (1986) suggested that, if this is true,
personality types "can be of use in studying
organizations since they may relate consistently to,
and even be at the root of, some common [business]
configurations" (p. 1389). Even though these
researchers posit the importance of personality type
in understanding the configurations of businesses, they
have only performed pilot studies to investigate these
relationships. Their measures of personality
(flexibility, locus of control and need for
achievement) are limited in scope and do not present a
whole picture. The implication of current studies is

that personality type controls the specific kinds of skills which are available to CEOs and may also control the application of these skills to the contexts within which they operate. This, in turn, determines the configurations of the firms under their leadership.

If this line of reasoning is accurate, then knowing the personality types of chief executive officers (CEOs) of High-Tech firms may be helpful in discovering the specific skills individual CEOs bring to bear on their business environment. These skills fall into two main categories: the classical management skills advanced by such theorists as Barnard (1938), Drucker (1974), Fayol (1930), and Weber (1947); and a new set suggested by Byrd (1987). Research in large corporate organizations shows that classical managerial skills can be successfully delivered by sensing personality types who demonstrate skills in logic, data management, and closure (Myers & McCaulley, 1985). Byrd (1987) proposed several new categories of skills to be added to the classical ones. He suggested the new categories of (1) anticipatory skills, (2) visioning skills, (3) value-congruence skills, (4) empowerment skills, and (5) self-understanding skills (p 36). Byrd believes that these intuitive traits of future orientation and meaning

synthesis, in addition to the sensing traits of inquiry and environmental awareness, are required to deliver the needed behaviors for running businesses. Measuring both the classical and new requisite skills can be accomplished by administering the Myers-Briggs Type Indicator which is based on the concepts of Carl Jung. Since the present research employs the MBTI, it is important to understand the underlying Jungian-Myers-Briggs concepts.

<div align="center">

Jungian Personality Theory and The Myers-Briggs
Type Indicator

</div>

Pertinent to the cynic's remarks that typing human personalities is like developing a new astrological system (Bell, personal communication, August 15, 1990), are Jung's comments explaining why he wrote Psychological Types (Jung, 1921/1971). He stated that anyone with similar long-term professional experience might well be impressed with the breadth of diversity "of individual psychic dispositions, tendencies, and convictions" extant in the world (p. xiv). Because of the "chaos" surrounding this condition and the difficulty even a professional has in trying to integrate relevant theoretical material, Jung believed he could make a contribution by providing a broader, more general frame of reference which would not only

make the area more accessible to the "medical specialist," but also understandable to the "educated layman" (p. xi). In particular, he wished to provide the practitioner with a "critical orientation and . . . general principles and criteria, not too specific in their formulation, which may serve as <u>points de repere</u> in sorting out . . . empirical data" (p. xiv). His data came not only from the professional literature, but also from his own voluminous clinical case records. After years of clinical practice, Jung believed he had identified the basic elements of the human personality. These elements include four attitudes (extraversion, introversion, perception, and judgment) and four mental functions (sensing, intuition, thinking, and feeling), and their interactions, which he believed people exhibit daily in the conduct of their lives. The MBTI operationalizes Jung's concepts by establishing four measurement dimensions representing the relationships between these attitudes and functions. The four dimensions of the MBTI, with each function, are shown in Figure 2-1.

Dimension I:          <u>Orientation to the World</u>

**(E) Extraversion          Introversion (I)**
|_____X_____|_____|

Dimension II:          <u>How One Perceives the World</u>

**(S)  Sensing          Intuition (N)**
|_____|____X_____|

Dimension III:     <u>How One Makes Judgments About the</u>
<u>World</u>

**(T) Thinking          Feeling (F)**
|___X_____|_____|

Dimension IV:     ____ <u>The Outer Directed Attitude</u>

**(J)  Judging          Perception (P)**
|_____|____X_____|
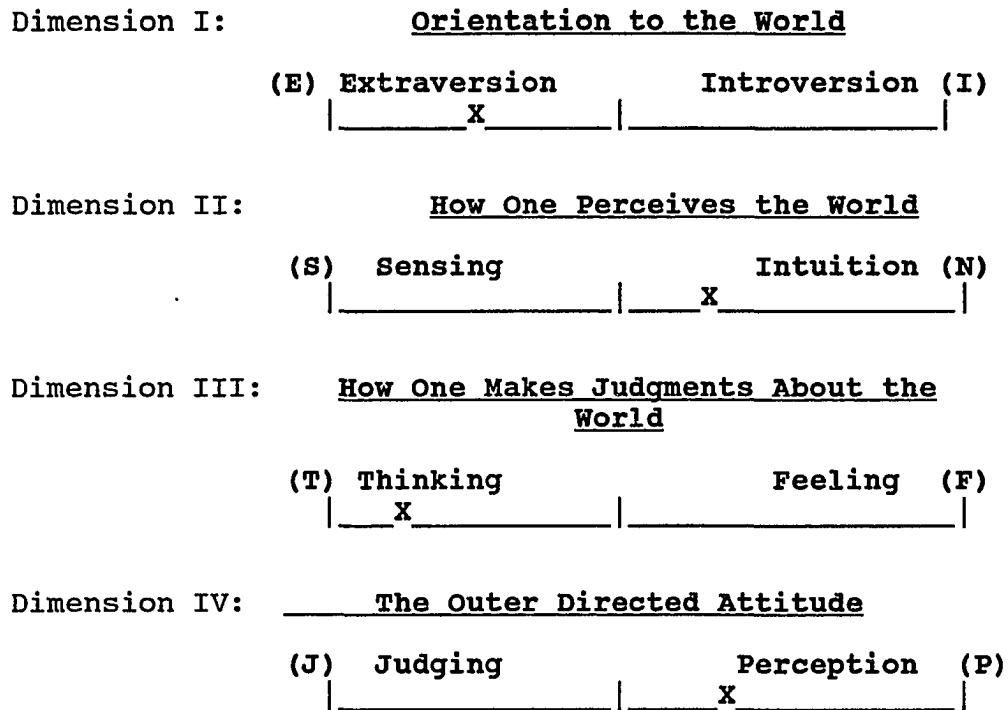
Figure 2-1.   The   MBTI Model With Four
Measurement Dimensions.

By testing a subject with the MBTI questionnaire,
a four-letter acronym is developed indicating a
person's placement on each of the above continua, or
dimensions.   The "Xs" on the above continua indicate
such placement and, in this case, develop the four-
letter acronym ENTP, which   describes the person's
personality preference profile.

<u>Dimension I, the extraversion and introversion</u>
<u>attitudes</u>.   Dimension I demonstrates Jung's concept
that the attitudes of extraversion and introversion are
two opposing forces creating tension. Measurement on
this dimension shows the degree of each attitude

exhibited by an individual in his or her behavior. The closer the measurement gets to the polar ends of the dimension, the greater strength of that attitude the person exhibits in his behavior. This does not mean that a person's behavior becomes exclusively one or the other, it simply means that the preferred behavior is better understood and can be applied more expertly and consistently.

Dimension II, the perception attitude. Dimension II demonstrates what Jung called the perception attitude, or how the person perceives the world. The perception attitude, however, is described differently than the extraversion or introversion attitude. Through the processes (functions) of perception, individuals gather data about their worlds. They do this by employing one of two functions, sensing (S) or intuition (N). In this case, S and N are opposite functions, and the position of the X on the dimension indicates which function is most preferred by an individual, and how strongly that preference is expressed. For instance, the X in the far left of the sensing portion of the dimension indicates that the person actively and consciously directs his or her senses to gather data and organize it. This person also is aware of the power of his or her sensing skills

and will often remark to others about the keeness of his eyesight, smell, or hearing. The same logic applies if the x is located far to the right in the intuitive portion of this dimension. This person, as an example, will often defer conscious cogitation relying instead on unconscious, intuitive mental processes. This person will consciously delay perception, knowing that time is needed to arrive at conclusions; it takes longer for the intuitive process to work. If the X, on the other hand, is near the center of this dimension, the person is usually not aware of his or her skills, applying the preference with less conscious direction and awareness.

Dimension III, the judgment attitude. Dimension III models the judgment attitude which measures the way people make decisions about their world. Jung believed that there were two mental processes (functions) by which judgments or decisions are accomplished: by thinking (T) or by feeling (F). Again, the position of the X on the dimension indicates the strength of a person's preference for the chosen, or preferred, function. As in Dimension II, the more the X is located near the poles, the more awareness and conscious direction the person exercises in applying the function.

<u>Dimension IV, the outer directed attitudes</u>.
Dimension IV constitutes a major Myers-Briggs
contribution to Jung's theory, and the relationships
are highly complex. This dimension postulates that
perception and judgment are opposing attitudes, between
which there is tension. It also reveals to the onlooker
the personality traits an individual demonstrates
outwardly, either his preferred perception traits (S or
N) or his judgment traits (T or F). The J refers to
Dimension III, the judgment attitude. Individuals who
direct their judgment attitude outwardly to others will
be perceived by those others as either logic oriented
and impersonal (thinking) or as caring and values
oriented (feeling). The P refers to Dimension II, the
perception attitude. Those directing their perceptive
attitude outwardly to others will be perceived by those
others as either data and history oriented (sensing) or
as meaning and future oriented (intuitive). In other
words, this dimension measures which of the four
functions (S, N, T, or F) is noticed by the observer of
a person who is behaving in an extraverted manner.
This complex relationship employs Jung's theory that
one of the four functions dominates a person's
behavior. This "dominant" function is readily noticed
by an observer interacting with an extravert. The

dominant function, however, is not visible to an observer of an introvert. This subject is further expanded upon in the section on the dominant function.

Figure 2-2 demonstrates the MBTI acronym derived from the use of this model in testing a subject. The MBTI develops sixteen personality archetypes in this manner, each represented by a similar four-letter acronym.
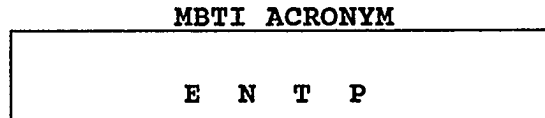
**MBTI ACRONYM**

| E  N  T  P |
|---|

Figure 2-2. Acronym Representing
One of Sixteen MBTI
Archetypes

By interpreting the meaning of the ENTP acronym in terms of Jung's attitudes and functions, it is possible to say, briefly, that an individual classified as an ENTP archetype prefers to use the extraversion (E) attitude in relating to others (Dimension I), the intuitive (N) function in the perceiving attitude to gather data about the world (Dimension II), and thinking (T) function in the judgment attitude to make decisions (Dimension III). Because the perception attitude's intuitive function is outwardly directed to others, an observer will be able to characterize the ENTP as future oriented, creative and intuitive. The attitudes and functions which appear in the Myers-

Briggs indicator Jung classifies as "preferences."

## The Concept of Preference

By preference Jung implied that an individual has an inventory of available behaviors, from which a combination will be chosen (preferred) and used. This is similar to the choice of the writing hand, either right or left; both hands can be used, but one hand produces better results, more quickly, and with more ease than the other. Jung believed that basic preferences are established at birth and are reinforced by the child's experience in the environment in which he or she lives. A child learns to specialize in his or her preferences by doing things which are liked or which feel good. For instance, an extraverted child interacts assertively with others by talking to and smiling at everyone, thereby strengthening this preference through experience. The preferred behaviors are the four letters appearing in the Myers-Briggs indicator. The letters not appearing in the indicator are the non-preferred behaviors. In the case of the ENTP, the E, N, T, and P are preferred. The I, S, F, and J behaviors are non-preferred behaviors. Both preferred and non-preferred behaviors may be strengthened, but the preferred ones will always be that individual's strongest traits.

After childhood, the adolescent and adult works to strengthen all traits which are perceived to be important to him or her. Experience at school and decision making about life serve to accomplish this strengthening, making the formerly unspecialized behaviors more readily available for use as a conscious choice. The well developed personality, in selectively improving performance in both preferred and non-preferred behaviors, achieves a balance between the two. Jung maintained that a well balanced person learns to operate effectively within a large portion of the characteristic behaviors associated with each dimension. In other words, even though a person's preference is for intuitive perception, training and experience can sharpen his use of his senses as accurate perception tools. A well-balanced person, then, can shift more effectively from intuition to sensing, whichever he or she perceives is more appropriate for a given situation. This theoretical preference structure provides a personal set of templates for a person's general behavior. The person uses whichever template from his collection he judges will best suit a situation. This collection, or set, of templates can be regarded also as a person's self-image. In a sense, the development of this collection

of preferences corresponds highly with the psychological concept of the self-image, where responses from others to an individual's behavior construct and reinforce the self-image (Epstein, 1973), thereby creating an integrated personal preference package which controls behavior.

Jung's lists of the characteristic, preferred behaviors associated with the attitudes and functions was enhanced by subsequent researchers (Keirsey & Bates, 1978; Lawrence, 1982; Myers & McCaulley, 1985) and are discussed next.

## The Attitudes

Jung (1921/1971) defined attitude as "expectation [which] always operates selectively and with a sense of direction" (p. 415); a readiness to act or react in a certain way (p. 414). Jung believed that readiness to act was an a priori orientation to a definite thing, whether this something be represented in consciousness or unconsciousness.

> Attitude in the sense of ordinary attention can be a relatively unimportant subsidiary phenomenon, but it can also be a general principle governing the whole psyche. Depending on environmental influences and on the individual's education, general experience of life, and personal convictions, a subjective constellation of contents may be habitually present, continually moulding a certain attitude that may affect the minutest details of his life. Every man who is particularly aware of the seamy side of

existence, for instance, will naturally have an attitude that is constantly on the lookout for something unpleasant. The conscious imbalance is compensated by an unconscious expectation of pleasure. Again, an oppressed person has a conscious attitude that always anticipates oppression; he selects this factor from the general run of experience and scents it out everywhere. His unconscious attitude, therefore, aims at power and superiority (p. 416).

The four attitudes he labeled extraversion, introversion, perception, and judgment. He saw extraversion and introversion as complementary attitudes, or orientations toward life. He believed that, while these attitudes are opposites, they are both needed by an individual to cope with life. Simply, there are times when a person needs to talk and interact socially, and there are times when the same person needs solitude to develop insight. In this sense the two attitudes complement each other. Jung postulated that the Extraversion-Introversion attitudes control the four functions: sensing, intuition, thinking, and feeling.

The extraversion attitude. The extravert likes action and variety, "thinks, feels, acts, and actually lives in a way that is directly correlated with the objective conditions and their demands" (Jung, 1921/1971, pp. 334-5); likes to do mental work by talking to people; acts quickly sometimes without much reflection; likes to see how other people do a job, and

see results; and wants to know what other people expect

of him (Keirsey & Bates, 1978; Lawrence, 1982;

Myers, 1980).

> In the extraverted attitude (E),
> attention seems to flow out, or to be drawn
> out, to the objects and people of the
> environment. There is a desire to act on the
> environment, to affirm its importance, to
> increase its effect. Persons habitually
> taking the extraverted attitude may develop
> some or all of the characteristics associated
> with extraversion: awareness and reliance on
> the environment for stimulation and guidance;
> an action-oriented, sometimes impulsive way
> of meeting life; frankness; ease of
> communication; or sociability (Myers &
> McCaulley, 1985, p. 13).

> The extravert never expects to find any
> absolute factors in his own inner life, since
> the only ones he knows are outside himself.
> His whole consciousness looks outward,
> because the essential and decisive
> determination always comes from outside. His
> interest and attention are directed to
> objective happenings, particularly those in
> his immediate environments. Not only people
> but things seize and rivet his attention,
> thereby determining his actions. The actions
> of the extravert are recognizably related to
> external conditions . . . the tendency of his
> type is so outer-directed that even the most
> obvious of all subjective facts, the
> condition of his own body, receives scant
> attention . . . . The body accordingly
> suffers, to say nothing of the psyche. The
> extravert is usually unaware of this latter
> fact, but it is all the more apparent to his
> household . . . . A too extraverted
> attitude can also become so oblivious of the
> subject that the latter is sacrificed
> completely to so-called objective demands --
> to the demands, for instance, of a
> continually expanding business, because
> orders are piling up and profitable
> opportunities have to be exploited (Jung
> 1921/1971, p.335-6).

Jung believed that hysteria was the most common affliction of the extravert. "A constant tendency to make himself interesting and to produce an impression is a basic feature of the hysteric" (p. 336). Jung goes on to say that the more intense the attitudes described above are (the more complete the conscious), the more "infantile and archaic" the unconscious attitude will be. This manifests itself as extreme egotism, and childish selfishness which verges on the ruthless and brutal. For instance, the extraverted feeling type "who enjoys excellent feeling rapport with the people around him," may express opinions of "unsurpassable tactlessness" (Jung, 1921/1974, p. 341). Jung approached extraversion in a mildly sardonic fashion, observing it from an introvert's perspective.

The introversion attitude. Jung perceived introversion as the opposite of extraversion. "In the introverted attitude (I), energy is drawn from the environment, and consolidated within one's position. The main interests of the introvert are in the inner world of concepts and ideas" (p. 13). Energy flows in from the environment and there is a propensity to relegate concepts and ideas to the "inner world." The characteristics of introverts are: interest in the clarity of concepts and ideas; reliance on enduring

concepts more than on transitory external events; a thoughtful, contemplative detachment; and enjoyment of solitude and privacy" (Myers & McCaulley, 1985, p. 13). The introvert likes quiet time to consider things, likes to do mental work privately before talking, may be slow to try something without understanding it first, likes to understand the idea of a job and to work alone or with just a few people, and wants to set his or her own standards (Keirsey & Bates, 1978; Lawrence, 1982; Myers, 1980). The introvert does not like to speak without a high probability that he or she is right and often has a short oral attention span. Jung maintained that the introvert orients himself by subjective factors rather than by objective ones; introverts turn in on themselves and orient themselves from an inner awareness. Jung talked about the introvert from a very personal reference so one can assume that he regarded himself as one. He reacted to charges that introverts are philautic and egocentric as objectionable attributions

> . . . because they arouse the prejudice that it is always a question of the beloved ego. Nothing could be more mistaken than such an assumption. Yet one is continually meeting it in the judgments of the extravert on the introvert. The extravert inevitably comes to the conclusion that the introvert is either a conceited egoist or crack-brained bigot. Today he would be suspected of harbouring an unconscious power-complex. The

introvert certainly lays himself open to these suspicions, for his positive, highly generalizing manner of expression, which appears to rule out every other opinion from the start, lends countenance to all the extravert's prejudices. Moreover the inflexibility of his subjective judgment, setting itself above all objective data, is sufficient in itself to create the impression of marked egocentricity. Faced with this prejudice the introvert is usually at a loss for the right argument, for he is quite unaware of the unconscious but generally quite valid assumptions on which his subjective judgment and his subjective perceptions are based. In the fashion of the times he looks outside for an answer, instead of seeking behind his own consciousness (Jung, 1921/1974, pp 376-7).

The introvert finds difficulty in expressing himself so he appears conspicuous for his apparent calmness and passivity. A stimulus from the object (real persons or situations) may be received, but it is instantly replaced by a subjective reaction (a predisposition influenced by the psyche). If the object happens to be a person, that person will feel completely devalued during a relationship. In other words, that person may be offended because he would be receiving a reaction from the introvert which is inappropriate and has been influenced by the introvert's predisposition, not by the realities of the situation. Because of this, others often characterize introverts as haughty "sphinx's" or snobs. When the influence of the object does not remain strong, the introvert, cogitating in a state of isolation without

reference to reality, develops a state of neutrality and may then become a victim of the aggressiveness and domineeringness of others. Such men allow themselves to be abused and then take their revenge on the most unsuitable occasions with redoubled obtuseness and stubbornness (Jung, 1921/1971, pp. 396-397). Since the introverted type is "guided by . . . subjective sensation excited by . . . objective stimulus" (p. 395), and the dynamic is unpredictable, it is not possible to forecast what will make an impression on the introvert from the outside.

The perception attitude

The third of Jung's attitudes, perception, is meant to explain how people become aware of the details of their existence. While he discussed perception, he did not set it aside as a differentiated topic; his message regarding perception was implied in his discussion of the functions. "Perception includes the many ways of becoming aware of things, people, events, or ideas. It includes information gathering, the seeking of sensation or of inspiration, and the selection of the stimulus to be attended to" (Myers & McCaulley, 1985, p. 12). Jung operationalized the perceptive attitude through two different processes or functions, those of sensation (S) and intuition (N).

The sensing-perceptive type (SP), for example, is attuned to the past and immediate realities; the intuitive-perceptive type (NP) notices the possibilities and speculates on the future. Because of the complicity of attitude and function, and in order to completely understand the perception and judgment attitudes, it is first necessary to understand Jung's concept of "function."

The functions. Jung recognized four mental functions which, when combined with the attitudes, produce distinctive behavior. He defined function as "a particular form of psychic activity that remains the same in principle under varying conditions" (Jung, 1921/1971, p. 436). Jung concluded "I distinguish these functions from one another because they cannot be related or reduced to one another" (Jung, 1921/1971, p. 437). Two of the functions, sensation (S) and intuition (N) he called irrational. By irrational he meant data which are "beyond reason" and which are accepted by an individual as given (Jung, 1921/1971, pp. 454-5). The other two functions, thinking (T) and feeling (F), he called rational, by which he meant the conforming of thought, feeling, and action to objective value (pp. 458-9); or conclusions arrived at through a reasoning process. The role of these functions is to

direct conscious mental activity toward different goals:

* Sensation (S) seeks the fullest possible experience of what is immediate and real.

* Intuition (N) seeks the furthest reaches of the possible and imaginative.

* Thinking (T) seeks rational order and plan according to impersonal logic.

* Feeling (F) seeks rational order according to harmony among subjective values (Myers & McCaulley, 1985, p. 12).

The functions have an hierarchical relationship to each other. Sensation tells us that something exists, thinking tells us what it is, feeling tells us what it's worth, and through intuition we have a sense of what can be done with it (the possibilities). Any one function by itself is not sufficient for ordering our experience of ourselves or the world around us; all four, writes Jung, are required for a comprehensive understanding. These four functions represent a person's orientation to conscious and unconscious thought. By the conscious, Jung means the psychic contents of the ego -- thoughts and memories mentally available to a person. Unconscious thoughts are ". . . all the acquisitions of personal life, everything forgotten, repressed, subliminally perceived, thought, felt . . . and in the inherited structure of the brain" (Jung, 1921/1971, pp. 484-5). Conscious and unconscious

thoughts, in part, provide the framework for the individual's construction of a self-image. Jung employed the concept of "function" to explain the perception and judgment attitudes. The functions of sensing and intuition explain the perception attitude and the functions of thinking and feeling explain the judgment attitude.

The sensing function. Sensing persons pay most attention to experience as it is, like to use their eyes, ears and other senses to find out what is happening, dislike new problems unless there are standard ways to solve them, enjoy using skills already learned rather than learning new ones, and are patient with details but impatient when the details get complicated (Keirsey & Bates, 1978; Lawrence, 1982; Myers, 1980). Sensing (S) types are generally regarded as realists:

> No other human type can equal the extraverted sensation type in realism. His sense for objective facts is extraordinarily developed. His life is an accumulation of actual experiences of concrete objects, and the more pronounced his type, the less use does he make of his experience. In certain cases the events in his life hardly deserve the name "experience" at all. What he experiences serves at most as a guide to fresh sensations; anything new that comes within his range of interest is acquired by way of sensation and has to serve its ends. Since one is inclined to regard a highly developed reality-sense as a sign of rationality, such people will be esteemed as very rational.

> But in actual fact this is not the case,
> since they are just as much at the mercy of
> their sensations in the face of irrational,
> chance happenings as they are in the face of
> rational ones . . . . On the lower levels,
> this type is the lover of tangible reality,
> with little inclination for reflection and no
> desire to dominate. To feel the object, to
> have sensations and if possible enjoy them—
> that is his constant aim . . . . Once an
> object has given him a sensation, nothing
> more remains to be said or done about it. It
> cannot be anything except concrete and real;
> conjectures that go beyond the concrete are
> admitted only on condition that they enhance
> sensation (Jung, 1921/1974, pp 362-366).

In the above discussion, Jung approaches sensation
from the perspective of an extravert. He maintains
that, without the balance of objectivity, the
extraverted sensing person resorts to reliance on the
present and "archaic" [historical]. Because of his
reliance on the past and present, the sensor attempts
to avoid consideration of the future, and is
uncomfortable with strategies involving future risk.
The case is slightly different with the introverted
sensing type. The development of the introverted
sensing type alienates him from the reality of the
object and leaves him at the mercy of his subjective
perceptions. This is a strange and unexpected
aberration, often not perceived by observers. With the
introverted sensing type,

> . . . the object is not consciously devalued
> in the least, but its stimulus is removed
> from it and immediately replaced by a
> subjective reaction no longer related to the

> reality of the object. This naturally has the same effect as devaluation. Such a type can easily make one question why one should exist at all, or why objects in general should have any justification for their existence since everything essential still goes on happening without them. This doubt may be justified in extreme cases, but not in the normal, since the objective stimulus is absolutely necessary to sensation and merely produces something different from what the external situation might lead one to expect (Jung, 1921/1971, pp. 396).

This results in seemingly illogical behavior based somewhere between mythology and fantasy. For instance, an ISTJ company official of a large Washington State company, in charge of union negotations, consistently imposed traditional logic in a situation he described as a repeat of past performances even after it was made eminently clear to him that the current situation bore no resemblance to any former condition and that his proposals were patently inappropriate. Even after negotiations between the CEO and the union President had been successfully completed, producing creative solutions never before employed, the ISTJ persisted with his paradigms-gone-by which had no relationship to anything. (R. Blumenthal, personal experience as CEO of Washington Farms, December 1989). The effect of this rejection is for the introverted sensor to resign himself to his isolation and "the banality of the world, which he has unconsciously made archaic" (Jung, 1921/1971, pp. 397-398).

The intuitive function. The intuitive, on the other hand, finds the present boring and likes the challenge of risking on the uncertainties of the future. The intuitive process is the second of the two ways individuals perceive and is the opposite of the sensing function. Jung describes the intuitive by saying,

> . . . the intuitive raises unconscious perception to the level of a differentiated function, by which he also achieves his adaptation to the world. He adapts by means of unconscious directives, which he receives through an especially sensitive and sharpened perception and interpretation of dimly conscious stimuli. To describe such a function is naturally very difficult on account of its irrational and quasi-unconscious character (p. 145).

Keirsey and Bates (1978), Lawrence (1982) and Myers (1980) have clarified Jung's approach to the intuition function by elaborating the intuitive's personality preferences in a more pragmatic fashion. They declared that the intuitive type pays most attention to the meanings of facts and how they fit together; likes to use imagination to come up with new ways to do things, new possibilities; likes solving new problems, and dislikes doing the same thing over; likes using new skills more than practicing old ones; and is impatient with details, but does not mind complicated situations.

Jung's comments about intuitives who prefer the extraverted attitude are especially helpful in understanding how this attitude influences the exercise of intuition which:

> . . . is wholly directed to external objects. Because intuition is in the main an unconscious process, its nature is very difficult to grasp. The intuitive function is represented in consciousness by an attitude of expectancy, by vision and penetration; but only from the subsequent result can it be established how much of what was "seen" was actually in the object, and how much was "read into" it . . . intuition is not mere perception, or vision, but an active, creative process that puts into the object just as much as it takes out.

> The primary function of intuition, however, is simply to transmit images, or perceptions of relations between things, which could not be transmitted by the other functions or only in a very roundabout way. These images have the value of specific insights which have a decisive influence on action whenever intuition is given priority. . . . If I ask an intuitive how he orients himself, he will speak of things that are almost indistinguishable from sense-impressions. Very often he will even use the word "sensation." He does have sensations, of course, but he is not guided by them as such; he uses them merely as starting-points for his perceptions. He selects them by unconscious predilection. It is not the strangest sensation, in the physiological sense, that is accorded the chief value, but any sensation whatsoever whose value is enhanced by the intuitive's unconscious attitude. In this way it may eventually come to acquire the chief value, and to his conscious mind it appears to be pure sensation. But actually it is not so . . . intuition tries to apprehend the widest range of possibilities, since only through envisioning possibilities is intuition fully

satisfied (Jung, 1921/1971, pp 366-8).

Some further comments Jung makes about the extraverted intuitive type are:

> . . . never to be found in the world of accepted reality-values, stable conditions suffocate him, . . . seizes on new objects or situations with great intensity, sometimes with extraordinary enthusiasm, only to abandon them cold-bloodedly, without any compunction and apparently without remembering them, as soon as their range is known and no further developments can be divined . . . . No matter how reasonable and suitable it may be, and although every conceivable argument speaks for its stability, a day will come when nothing will deter him from regarding as a prison the very situation that seemed to promise him freedom and deliverance, and from acting accordingly. Consideration for the welfare of others is weak . . . . He has equally little regard for their convictions and way of life, and on this account he is often put down as an immoral and unscrupulous adventurer. Since his intuition is concerned with externals and with ferreting out their possibilities, he readily turns to professions in which he can explain these capacities to the full. Many business tycoons, entrepreneurs, speculators, stockbrokers, politicians, etc., belong to this type . . . . It goes without saying that such a type is uncommonly important both economically and culturally. If his intentions are good, i.e., if his attitude is not too egocentric, he can render exceptional service as the initiator or promoter of new enterprises. . . . Naturally this attitude holds great dangers, for all too easily the intuitive may fritter away his life on things and people, spreading about him an abundance of life which others live and not he himself. If only he could stay put, he would reap the fruits of his labours; but always he must be running after a new possibility, quitting his newly planted fields while others gather in the harvest (Jung, 1921/1971, pp 369-70).

Whereas true extraverted intuition is

> possessed of a singular resourcefulness, a
> "good nose" for objectively real
> possibilities, this archaicized intuition has
> an amazing flair for all the ambiguous,
> shadowy, sordid, dangerous possibilities
> lurking in the background (Jung, 1921/1971,
> p. 398).

In the same way that Jung's comments about the extraverted intuitive clarify the effect created by the combination of the extraverted attitude and intuition, his comments about the introverted intuitive clarify this combination:

> The peculiar nature of introverted intuition,
> if it gains ascendency, produces a peculiar
> type of man: the mystical dreamer and seer
> on the one hand, the artist and the crank on
> the other . . . the intensification of
> intuition often results in an extraordinary
> aloofness of the individual from tangible
> reality; he may even become a complete enigma
> to his immediate circle . . . he is
> frequently a misunderstood genius, a great
> man "gone wrong" (Jung, 1921/1971, p. 401).

The greatest frustration with this type is their isolation from, not only their loved ones, but from their working associates. Often, not even close and trusted friends can break through the barrier of their introversion. Their isolation is often considered tragic by their closest associates, and insulting by those who do not understand.

The introverted intuitive has little inclination to make a moral problem of perception, a slight intensification of the judgment (T or F) will shift intuitive perception from the aesthetic to the moral

sphere.

> The moral problem arises when the intuitive
> tries to relate himself to his vision, when
> he is no longer satisfied with mere
> perception and its aesthetic configuation and
> evaluation, when he confronts the questions:
> What does this mean for me or the world?
> What emerges from this vision in the way of a
> duty or task, for me or the world? The pure
> intuitive who represses his judgment, or
> whose judgment is held in thrall by his
> perceptive faculties, never faces this
> question squarely, since his only problem is
> the "know-how" of perception. He finds the
> moral problem unintelligible or even absurd,
> and as far as possible forbids his thoughts
> to dwell on the disconcerting vision. It is
> different with the morally oriented
> intuitive. He reflects on the meaning of his
> vision, and is less concerned with developing
> its aesthetic possibilities than with the
> moral effects which emerge from its intrinsic
> significance. His judgment allows him to
> discern, though often only darkly, that he,
> as a man and a whole human being, is somehow
> involved in his vision . . . he feels bound
> to transform his vision into his own life (p.
> 402).

These qualities often prevent the introverted intuitive from making commitments, or expressing loyalty, to organizations, individuals, or ideas presented by others. This is why these types are perceived as highly independent and aloof.

The judgment attitude. The judgment attitude is the fourth of Jung's attitudes. Behavior in the judgment attitude, like in the perception attitude, is created by two processes (functions): thinking (T) and feeling (F). As with the perception attitude, Jung

does not directly discuss the judgment attitude; Myers (1980) and Myers and McCaulley (1985) have interpreted his logic thus providing the workable definition which follows.

According to Jung, judging (J) is concerned with making decisions, seeking closure, planning operations, or organizing activities (Myers & McCaulley, 1985, p. 14). He implies the behavior of the judging attitude by describing the two functions of Dimension III: thinking (T) and feeling (F). For the thinking-judging (TJ) type, for instance, activities are more apt to be based on objectively logical analysis while for the feeling-judging (FJ) type, they are more apt to be based on subjective human factors.

The thinking function. Thinking is one of the two ways in which the judging attitude is manifested. Individuals who prefer thinking (T) like to decide things with objective logic, want to be treated with justice and fair play, may neglect and hurt other peoples' feelings without knowing it, give more attention to ideas or things than to human relationships, and do not need harmony (Lawrence, 1982). A thinking person who favors the extraverted attitude

> . . . will, by definition, be a man whose
> constant endeavour -- in so far, of course,

as he is a pure type -- is to make all his activities dependent on intellectual conclusions . . . . This type of man elevates objective reality, or an objectively oriented intellectual formula, into the ruling principle not only for himself but for his whole environment. By this formula good and evil are measured, and beauty and ugliness determined. Everything that agrees with this formula is right, everything that contradicts it is wrong, and anything that passes by it indifferently is merely incidental. Because this formula seems to embody the entire meaning of life, it is made into a universal law which must be put into effect everywhere all the time, both individually and collectively. Just as the extraverted thinking type subordinates himself to his formula, so, for their own good, everybody round him must obey it too, for whoever refuses to obey it is wrong -- he is resisting the universal law, and is therefore unreasonable, immoral, and without a conscience. His moral code forbids him to tolerate exceptions; his ideal must under all circumstances be realized, for in his eyes it is the purest conceivable formulation of objective reality, and therefore must also be a universally valid truth, quite indispensable for the salvation of mankind. This is not from any great love for his neighbour, but from the higher standpoint of justice and truth . . . "oughts" and "musts" bulk large in this programme. If the formula is broad enough, this type may play a very useful role in social life as a reformer or public prosecutor or purifier of conscience, or as the propagator of important innovations. . . . Their best aspect is to be found at the periphery of their sphere of influence. The deeper we penetrate into their own power province, the more we feel the unfavourable effects of their tyranny . . . all those activities that are dependent on feeling will become repressed in such a type -- for instance, aesthetic activities, taste, artistic sense, cultivation of friends, etc. (Jung, 1921/1971, pp 346-354).

The above types are often characterized as being

impatient, brilliant, and innovative in business. These are the ENTJs and ENTPs, very prominent among the founders of all businesses, but especially among those founding High-Tech businesses. The introverted thinking type, on the other hand,

> . . . will follow his ideas like the extravert, but in the reverse direction: inwards and not outwards. Intensity is his aim, not extensity. In these fundamental respects he differs quite unmistakably from his extraverted counterpart . . . . His judgment appears cold, inflexible, arbitrary, and ruthless, because it relates far less to the object than to the subject . . . . He may be polite, amiable, and kind, but one is constantly aware of a certain uneasiness betraying an ulterior motive -- the disarming of an opponent, who must at all costs be pacified and placated lest he prove himself a nuisance . . . . Although he will shrink from no danger in building up his world of ideas, and never shrinks from thinking a thought because it might prove to be dangerous, subversive, heretical, or wounding to other people's feelings, he is none the less beset by the greatest anxiety if ever he has to make it an objective reality. That goes against the grain. And when he does put his ideas into the world, he never introduces them like a mother solicitous for her children, but simply dumps them there and gets extremely annoyed if they fail to thrive on their own account. His amazing unpracticalness and horror of publicity in any form have a hand in this . . . . Casual acquaintances think him inconsiderate and domineering. But the better one knows him, the more favourable one's judgment becomes, and his closest friends value his intimacy very highly (Jung, 1921/1971, pp 383-385).

The feeling function. Feeling is the second way the judgment attitude is manifested. Jung's

comments about this function indicate that he had a great deal of trouble understanding it.

> No one will dispute that thinking is essentially rational, but when we come to feeling, weighty objections may be raised which I would not like to brush aside. On the contrary, I freely admit that this problem of feeling has been one that has caused me much brain-racking (p. 538).

Jung confines his discussion on feeling mostly to women and makes the statement that his experience with this type has been almost exclusively with women. To the amazement of the thinking person who generally regards feeling as irrational (Myers & McCaulley, 1985), Jung clearly expresses his opinion that feeling, like thinking, is a rational process. Feeling types steadfastly maintain that feeling is as much a logical function as thinking is (Susan Brock, personal communication, July 7, 1984; Patricia Blumenthal, personal communication, August 15, 1989). Keirsey and Bates (1978), Lawrence (1982) and Myers (1980) maintain that feeling types like to decide things with personal feelings and human values and are more subjective than objective. They like to praise, and like to please people even in unimportant things; are aware of other peoples' feelings and can predict how others will feel. In addition, they get upset by arguments and conflicts, and value harmony. The

feeling function has many characteristics which make business activities difficult for the type. In a recent conversation with Robert Woodworth (personal communication, December 22, 1990) a portion of the nature of this difficulty was revealed. Woodworth reported research at Idaho Intermountain Hospital which identified the language of the feeling types as a major problem. This research concluded that the feeling type actually speaks a different language which has to be translated in order for T types to understand. A comment made by Jung (1921/1971), central to some of the problems individuals have in the business environment, is that "Nothing disturbs feeling so much as thinking. It is therefore understandable that in this type thinking will be kept in abeyance as much as possible" (p. 354). Since objective logic is one of the most common processes employed by managers in business, feeling types not only feel uncomfortable, but are often not taken seriously. Feeling types often are dysfunctional as managers in business organizations, often requiring the support of S and T types to maintain efficient operations (Tim Hansel, personal communication, May 15, 1978). Feelings, however, are central to fashion (i.e., clothing, architecture, music, and literature) where the design

objective is to please peoples' sense of the aesthetic. Feelings are also valuable for all activities associated with the support of social, philanthropic, and other cultural institutions (Jung, 1921/1971, p. 355). Because of this, there is a greater abundance of F types involved in organizations with objectives in these areas. There are some exceptions, however. Dexter (personal communication, November 11, 1989) interestingly reported that there are an unusually large number of feeling types employed in the Apple Computer organization. This seems to be an anomaly, but becomes understandable when considered in the light of Apple's fame in developing people-friendly products.

Characteristic of the extraverted-intuitive-feeling type (ENF) are: outgoingness, caringness, joyfulness, creativity, human values orientation, and polychronism. These traits do not work easily in businesses requiring objective logic. It is unusual, for instance, to find F types in CPA firms. When they do occupy places in atypical business settings, they are known for their ability to retain customers because of their caring, and service orientation. They keep their clients happy, reducing turnover to almost zero, but are not great creators of new clients (Robert Bunting, interview, May 4, 1988). In this type of

business setting, the feeling type is usually viewed with consternation by thinking types.

Jung declares that the feeling types who favor the introverted attitude are especially difficult to understand. He says:

> It is extremely difficult to give an intellectual account of the introverted feeling process, or even an approximate description of it, although the peculiar nature of this kind of feeling is very noticeable once one has become aware of it . . . it seldom appears on the surface and is generally misunderstood . . . . The existence of positive feeling can be inferred only indirectly . . . . The depth of this feeling can only be guessed -- it can never be clearly grasped. It makes people silent and difficult of access; it shrinks back like a violet from the brute nature of the object in order to fill the depths of the subject. It comes out with negative judgments or assumes an air of profound indifference as a means of defence. They are mostly silent, inaccessible, hard to understand; often they hide behind a childish or banal mask, and their temperament is inclined to melancholy. They neither shine nor reveal themselves. As they are mainly guided by their subjective feelings, their true motives generally remain hidden. Their outward demeanour is harmonious, inconspicuous, giving an impression of pleasing repose, or of sympathetic response, with no desire to affect others, to impress, influence, or change them in any way. If this outward aspect is more pronounced, it arouses a suspicion of indifference and coldness, which may actually turn into a disregard for the comfort and well-being of others . . . . Although there is a constant readiness for peaceful and harmonious co-existence, strangers are shown no touch of amiability, no gleam of responsive warmth, but are met with apparent indifference or a repelling coldness (pp. 388-391).

Introverted feeling men carry an aura of caring and friendliness which close acquaintances can identify. They are hurt easily and are extremely cautious to protect themselves against attack. They will often use recognized authorities to support their work and do not risk being wrong (Keirsey & Bates, 1978; Lawrence, 1982; Myers & McCaulley, 1985). This is quite different from the extraverted feeling types who will publicly risk their reputations, and adapt in whichever way it is necessary to correct themselves. Since business is conducted primarily in an environment of rationality, neither the extraverted nor introverted feeling types are often found as top managers.

## The Dominant and Auxiliary Functions

Jung believed that the four functions pull in different directions. Because of this tendency toward anarchy, he believed that a unifying force was necessary. He reasoned that one of the functions will provide leadership and he called it the "dominant function." It can be likened to the analogy of a ship which needs a captain to provide unquestioned direction. The other functions serve the dominant function's goals and are important, but subordinated to it. How the dominant function works and shows itself depends on the extraversion and introversion attitudes.

The dominant function is an individual's strongest personality trait, the one which is used the most in his life. The second most used trait Jung called the auxiliary function. Extraverts extravert their dominant function and introvert their auxiliary function, while introverts introvert their dominant function and extravert their auxiliary function. The formula for identifying the dominant and auxiliary functions for any Myers-Briggs type involves the use of the extraversion-introversion dimension (Dimension I) and Dimension IV (outwardly directed judging and perception). With an extravert "what you see is what you get"; the extravert wants others to observe his or her best qualities, therefore extraverts them. The letter in the fourth position (J or P) indicates which function is extraverted, outwardly directed, and dominant. Figure 2-3 demonstrates that for all extraverts who prefer the perception attitude (P), the dominant function is the second letter of the indicator and the auxiliary function is the third letter.

**Myers-Briggs Indicator**

| E | S/N[d] | T/F [a] | P |
|---|--------|---------|---|

Figure 2-3. Relative Positions of the Dominant ([d]) and Auxiliary ([a]) Functions.

An example of this case would be the ENTP, where the N is dominant ($^d$) and the T is the auxiliary ($^a$). An observer would be conscious of this person's intuitive (N), or best traits. Another example of this case would be the ESFP, where the S is the dominant ($^d$) and the F is the auxiliary ($^a$). This time an observer would be conscious of the subject's sensing (S), or best traits.

Figure 2-4 illustrates the relative locations for these functions when the extraversion attitude (E) is combined with a preference for the judging attitude (J).

### Myers-Briggs Indicator

| E | S/N $^a$ | T/F$^d$ | J |
|---|---|---|---|

Figure 2-4. Relative Positions of the Dominant ($^d$) and Auxiliary ($^a$) Functions.

An example of this case is the ESTJ, where T is the dominant ($^d$) and S is the auxiliary ($^a$). An observer of this subject would be aware of the subject's thinking (T) traits. Another example would be the ENFJ, where the F is the dominant and the N is the auxiliary. An observer of this subject would be conscious of the subject's feeling (F) traits.

The manner in which the dominant and auxiliary are

determined for the introvert is slightly different. The introvert does not direct his best qualities outwardly to others, and he reserves his dominant function for himself. Instead the auxiliary, or second best function, is outwardly directed towards others; in other words is extraverted. Figure 2-5 illustrates the relative positions of the dominant ($^d$) and auxiliary ($^a$) functions for an introvert (I) preferring the perception attitude (P).

**Myers-Briggs Indicator**

| I | S/N$^a$ | T/F$^d$ | P |
|---|---------|---------|---|

Figure 2-5.  Relative Positions of the
Dominant ($^d$) and Auxiliary
($^a$) Functions.

Contrary to the case of the extravert, an introvert introverts the dominant function and extraverts the auxiliary function. The I in the indicator establishes the subject as a person who prefers the introversion attitude. The P in the indicator establishes the fact that the perception attitude's function (S or N) is extraverted, therefore is the auxiliary ($^a$). By default, then, the judgment attitude's function is introverted, therefore is the dominant. An example of this case would be the INTP, where N is the auxiliary and T is the dominant. An observer would classify this person as intuitive (N).

A further example would be the ISFP, where the S is the auxiliary and the F is the dominant. An observer would be aware of the individual's sensing qualities.

Figure 2-6 illustrates the case of the introvert who prefers the judging attitude.

**Myers-Briggs Indicator**

| I | S/N$^d$ | T/F$^a$ | J |
|---|---|---|---|

Figure 2-6. Relative Positions of the Dominant ($^d$) and Auxiliary ($^a$) Functions.

An example of this case would be the INTJ whose auxiliary is T and whose dominant is N. An observer would use words which describe this person as a thinking person: logical, critical, analytical, and perhaps stubborn. Another example of this case would be the ISFJ, whose auxiliary is F and whose dominant is S. An observer would be aware of the feeling qualities of the subject.

The most impressive lesson to be learned from this discussion is that observers will be immediately aware of the extravert's best qualities and may remain ignorant of the introvert's best qualities. Without understanding these relationships, serious mistakes can be made in appraising the introvert's skills and thinking processes, therefore serious errors may be made in assigning introverts to tasks and

responsibilities.

Another important implication of these relationships is that extraverts use their dominant function to be extraverted. In other words, an ESTJ, when socializing (talking), will do so by exercising his thinking function (T) (i.e., will structure his topics rationally, will demonstrate his analytical skills, and may be quite critical). In order to introvert, or become silent and insightful, the ESTJ will use his auxiliary function (S); he will be internalizing facts, data, and criteria. The principle of this phenomenon works in opposite fashion for the introvert. For instance, the INTP will use his thinking (T) function when he is quiet and not socializing. When forced to talk and be outgoing, however, he will employ his intuition (N) function. These relationships allow one to predict extraverted and introverted behavior, and allow leaders to assign persons to roles, appropriate to their type skills, with confidence.

A nuance that Jung makes is that the processes surrounding the dominant function are conscious, i.e., the subject is so aware of how these processes work that he can consciously manipulate them. Meanwhile, the mental processes of the auxiliary function are

unconsciously applied.

## Importance of Each Type to Business

Each type, because it possessses specific skills, is peculiarly suited to specific business functions. A short review of the skills each type offers to the business environment follows.

Extraverted types. Extraverted types are important to business because they bring overt energy and enthusiasm to a situation. They like to see that things get done and motivate others to achieve. In addition, these types, because of their skill at oral communications, can best represent their companies to the public and convey management's messages to the work force. These skills are different from those brought to the workplace by the introvert.

Introverted types. The introvert brings the skills of thoughtful introspection, careful analysis, and accuracy to the workplace. This type works quietly to uncover and clarify the behind-the-scenes phenomena which act to control the situation. Introverts are especially valuable in developing enduring concepts and visions from which strategy can be developed. When combined with sensing, introverts become the place-keepers and historians of the organization.

Sensing types. The sensing types do well at work

requiring precision. These types work best, and are patient with, routine programs. They work steadily through to a conclusion, seldom making errors of fact, and are upset by new problems not having standard, predetermined solutions (Myers & McCaulley, 1985 p. 3).

Intuitive types. The intuitive types enjoy work involving new problems, dislike repetitive tasks, work in bursts of energy and enthusiasm, and often jump to conclusions. They are patient with complicated situations, but become impatient when precision and analysis involving large amounts of routine details are required. They often make errors of fact (p. 3).

Thinking types. The thinking types are relatively unemotional and uninterested in peoples' feelings. Interpersonal disharmony does not interfere greatly with their work. Fairness in interpersonal relations is important to them. They like work involving analysis and logical ordering (p. 3).

Feeling types. The feeling types generally give other persons the benefit-of-the-doubt. They enjoy pleasing others and giving and receiving praise. Their work efficiency can be negatively impacted by unharmonious interpersonal surroundings, and they find hard decisions about people difficult to make. They are influenced heavily by their own and others' likes and

dislikes. They are the catalysts in groups; the ones to insure that the environment is conducive to comfort and good personal interactions (p. 4).

## THE MYERS-BRIGGS TYPE INDICATOR

"The Myers-Briggs Type Indicator (MBTI) was designed specifically to make it possible to test C. G. Jung's theory of psychological types (Jung, 1921/1971) and to put it to practical use" (Myers & McCaulley, 1988). The Myers-Briggs Type Indicator was devised by Katherine Briggs and Isabel Briggs-Myers based on Carl Jung's division of psychological type into three continua: (1) how a person relates to the world, by being an extrovert (E) or an introvert (I), Dimension I; (2) how a person perceives the world by a sensing (S) or intuiting (N) process, Dimension II; and (3) how decisions or judgments are made about his or her world, by a thinking (T) or feeling (F) process, Dimension III. Briggs added Dimension IV to describe which of the perception or judgment attitudes is outwardly directed to those with whom the person relates.

The Myers-Briggs Type Indicator, or MBTI as it is commonly known, poses over 100 questions about how the test-taker usually feels or acts in particular situations. For instance: "In a group, do you often

introduce others, or wait to be introduced?"
(Extroverts tend to introduce, introverts to be
introduced.) "Do you find it harder to adapt to
routine or to more-or-less constant change?" (Judging
types have a tougher time with change, perceiving types
with routine.) In 1986 some 1.5 million people took
Myers-Briggs personality tests in the U.S. Companies
that use this measure include Allied-Signal, Apple,
AT&T, Boeing, Citicorp, Exxon, GE, Honeywell, and 3M.
Colleges, hospitals, churches, and the U.S. armed
forces also administer the test (Moore, 1987).

There have been several correlations with other
well-known tests such as the Fundamental Interpersonal
Relations Orientation Behavior (FIRO-B) (Shutz, 1966)
and the Reid Personality Index (Reid, 1987). These
other tests are often used in management development
settings to train leaders.

Summary of the Jungian-Myers-Briggs Personality System

A combination of Jung's three-dimension concept
with the added dimension supplied by Katherine Briggs
and Isabel Briggs-Myers provides a four-dimension,
eight-type system for constructing a profile of an
individual's personality. This profile is represented
by a four-letter acronym which establishes that
individual's preference for behavior on each of the

dimensions. These dimensions are variously called Orientation, Perception, Judging, and Outward Directed. Each dimension has two poles of behavior; extraversion (E) and introversion (I) for the Orientation dimension; sensing (S) and intuition (N) for the Perception dimension; thinking (T) and feeling (F) for the Judging dimension; judging (J) and perceiving (P) for the Outward Directed dimension. Discrete behaviors are attributed to each type. A summarized review of the behaviors included in each dimension follows:

<u>Orientation Dimension</u> (Orientation of Energy)

|  |  |
|---|---|
| Extraversion | An extravert (E) is a social, verbally communicative, enthusiastic and energetic individual who goes out to meet his/her world enjoying contact and interacting with large numbers of people. |
| Introversion | Introverts (I) are quiet, introspective, often shy individuals who wait for the world to seek him/her out, who enjoy relating to only one or two persons at a time, who do not like to be wrong, and who need solitude. |

<u>Perception Dimension</u> (Attending To The World)

|  |  |
|---|---|
| Sensing | Sensing (S) individuals are reality and NOW oriented. They tend to perceive the details and avoid generalities. They like detail and data as long as it is kept simple, and they are most comfortable with structure and clear expectations for their performance. They are also |

comfortable with routine.

Intuition Intuitives (N) are future oriented, impatient with routine and details, and constantly searching for the meaning of things. They tend to perceive generalities and only search for the specifics when needed for the achievement of their goals.

## Judgment Dimension (Deciding)

Thinking Thinking (T) people tend to prefer scientific and objective logic in making decisions, basing those decisions on principle and policy. They do not need harmony, are often critical or thoughtless of others, and are characterized as being stubborn.

Feeling Feeling (F) persons tend to prefer relying on emotions and their personal value systems in making decisions. Reward comes from providing services and comfort to others. They always give the other person the benefit-of-the-doubt; and they need harmony.

## Outward Directed Dimension (How Others Perceive Your Behaviors)

Judging Judging persons prefer quick decision-making, and setting goals. These types are single-minded and inflexible in pursuing their goals, and they regularly seek closure.

Perceiving Perceptive (P) persons are slow decision makers, seeking more data and time with which to decide. They are flexible, and prefer keeping their options open. These people are often polychronic in time orientation.

The combination of the preferred behaviors from each

dimension, represented by the four-letter acronym,

describe a synthesis of these behaviors into an wholistic profile of the individual's personality image.

## Leadership and Personality

Organizations, in order to survive and achieve, have to be held together, provided with vision and direction. Groups and individuals within organizations must solve problems, adapt to change, and accomodate risk. All of these activities must be coordinated. Without coordination, organizations do not achieve and eventually disintegrate. The responsibility to provide coordination, provide vision and direction, and accomplish cohesion, is usually the primary reponsibility of the top managers of organizations (Barnard, 1938; Simon, 1945; Weber, 1947). The skills with which these activities are accomplished by managers are referred to as leadership skills (Stogdill, 1974). The act of applying these skills is called leading. The presence or absence, and the quality of application, of these skills by a manager determines the success or failure of an organization. Which skills are available to a manager, and the quality of their application, is a function of that manager's personality type. Because this research

studies the personality types of Chief Executive Officers of High-Tech firms and the success or failure of these CEOs in leading their firms, it is necessary to understand exactly what these leadership skills are. Also, it is important to understand the role personality type plays in helping CEOs deliver the skills needed, when they are needed, and with acceptable quality. While the subject of leadership has been addressed in detail for centuries, a unified theory of leadership accepted by all authorities has not emerged. The subject is here addressed with two objectives in mind: (1) to present some of the classical leadership concepts relevant to the successful operation of business organizations; and (2) to provide insights on the role personality type plays in delivering the leadership skills which ensure organizational success as they apply to High-Tech firms.

Classical Leadership Concepts

Classical concepts of leadership are employed everywhere today and derive from the experiences of thousands of leaders from ancient times to the present. Vestiges of these concepts can be found in military manuals (Heinl, 1977), and texts on leadership both old and new (Aristotle, ca. 410 B.C./1934; Barnard, 1938;

Bennis, 1990; Hellreigel et al., 1989; Maccoby, 1983; Sloan, 1972; Tsun Tsu, 6th Century). These concepts are summarized by George Homans (1950) in eleven tenets which apply as much today as they have in the past.

1. <u>Establishing discipline</u>. The leader will maintain his position (a reference to power). The leader must insure that people will follow his orders and to this end must use whatever power is available to establish and maintain authority (Heinl, 1977).

2. <u>Reinforcing group norms</u>. The leader will live up to the norms of his group. The leader must be sensitive enough to the forces extant in the group to be a role model in a manner which motivates loyalty and commitment.

3. <u>Being aggressive</u>. The leader will lead. The leader must initiate action. This means giving orders and delegating responsiblities in order to be sure something happens, not waiting for someone else to get things started (Tsun Tsu, 1988).

4. <u>Being realistic</u>. The leader will not give orders that will not be obeyed. The tacit message in this adage is that leaders have to be sensitive enough to what Rousseau and Machiavelli called "the general will" (Blair, 1974) to know what kinds of orders will be unquestionably obeyed by subordinates. There are

limits beyond which groups will not allow their leaders to venture. A leader needs to be perceived by subordinates as competent in order to be unquestionably followed. Subordinates find it easier to accept orders from a leader they regard as knowledgeable of and competent in the technology of their field of endeavor.

5. Establishing an hierarchy. In giving orders, the leader will use established channels. The first task is to develop a "chain of command" (Galbraith, 1976). This allows delegation to function smoothly. The most important implication is, however, that the chain will be maintained by policy and the leader's behavior in not "jumping the line," or in allowing others to jump it.

6. Maintaining austerity. The leader will not thrust himself upon his followers. Maintaining a respectable distance from subordinates so that personal entanglements and loyalties do not get in the way of fairness and objectivity is a classic maxim (Barnard, 1938; Heinl, 1977; Sloan, 1972).

7. Being compassionate. The leader will neither blame nor, in general, praise a member of his group before other members (Heinl, 1977). This involves being protective of others' feelings. It is an adage which was espoused by Aristotle and is still

emphasized in recent literature (Aristotle, ca. 410 B.C./1934; Hellreigel & Slocum, 1990).

8. <u>Being strategic</u>. The leader will take into consideration the total situation. Homans argues that the leader's main task is to create forward movement while maintaining a "moving equilibrium" (p. 423). In order to do this, the leader must survey both the present and future elements of a situation. This requires attention to present and past detail (a sensor's skill) and the ability to make conjectures about the future (an intuitive's skill) (Drucker, 1980).

9. <u>Establishing a culture</u>. In maintaining discipline, the leader will be less concerned with inflicting punishment than with creating the conditions in which the group will discipline itself. Homans' message here is to create a culture which maintains group discipline through group norm enforcement.

10. <u>Listening</u>. The leader will listen. The danger which faces so many leaders is that they "sometimes have too much invested in their own feelings and opinions to hear clearly what others are saying" (Quick, 1979, p. 109). Sincerity in relationships with subordinates, augmented by listening, will produce new and valuable insights as well as creative solutions to

difficult problems.

11.    Self-knowledge.    The leader will know
himself.  If a person takes the time to learn about
himself through the use of a system which can help him
generalize about others, he will be able to act with
more confidence and assurance (Heinl 1977; Homans,
1950).

The message implicit in this literature is that
success in achieving the goals of an organization are
dependent on the leader's competency in executing these
eleven behaviors.  By competency in these behaviors, a
leader will maintain authority and control, a
stabilizing "moving equilibrium," and the successful
accommodation of change.  Each leader accomplishes this
through an individual style.

Personality Type and Leadership Styles

Personality types make it possible to identify
leadership style:  qualities, behaviors, and attitudes
of leaders.  The Myers-Briggs system provides the tool
which makes this possible.  There are other systems for
measuring personality such as the FIRO-B, California
Psychological Inventory, and the Reid Personality
Index, however, they either do not provide as
comprehensive a personal profile of the individual, or
are not as holistically predictive (Clark & Clark,

1990; Dillon, Michael & Weissman, 1987).

By the same token, several authors have attempted to establish typologies based on the integration of anecdotal research (Kets de Vries, 1989; Maccoby, 1983). The theory which forms the basis for their archetypes, however, is not flexible or complete enough to build holistic profiles of specific individuals. Their theories, also, do not lend themselves to operationalization for rigorous research purposes as well as does the Myers-Briggs interpretation of Jung. Jung approached the concept of leadership style in his discussions of Greek mythological heroes, developing a typology of temperaments based on the recorded personalities of these leaders. The myths recorded the behaviors of these leaders in overcoming obstacles and successfully achieving goals, and, in so doing, provided role models for ancient society (Campbell, 1988). These classical role models are still appropriate for today's leaders, and Keirsey and Bates (1984), using the Myers-Briggs Type Indicator, have adapted Jung's mythological references to leadership temperament paradigms which describe leadership styles.

## Leadership Temperaments

Keirsey and Bates (1984) studied leadership using

the MBTI as a measurement tool. Their method is to approach the subject from the combination of two MBTI indicators thus forming "four temperaments": SP, SJ, NT, and NF. In doing this, they were able to combine the "useful contributions" of Adler(1956), Jung (1921), Kretschmer (1925), Freud (1920), Sullivan (1940), and Maslow (1954). They define temperament as that which places a signature or thumbprint on each of one's actions, making it recognizably one's own. Temperament can denote a moderation or unification of otherwise disparate forces, a tempering or concession to opposing influences, an overall coloration or tuning, a kind of thematization of the whole, a uniformity of the diverse. They named each temperament after a Greek god whose assignments from Zeus were to make man more like the gods. These gods represent different and separate types of leadership behaviors.

> Who worships Apollo (spirit) does not worship
> Prometheus (science) and who desires
> Dionysian joy (or release) is not content
> with Epimethean duty. We see that the four
> temperaments are different from each other in
> very fundamental ways (Keirsey & Bates, 1984,
> p. 29).

Keirsey and Bates attribute causes of behavior to temperament since behavior "is the instrument for getting us what we must have, satisfying our desire for that one thing we live for" (p. 30). They claim we are

"born to" exercise these temperament attributes.

The sensing-perceptive temperament (SP). The SP temperament, called the Dionysian (joy), includes the ISTP, ESTP, ISFP, and ESFP. The Dionysian is an excellent negotiator, is swift and sure in a crisis, is a troubleshooter, and a diplomat. The SP exhibits little self-doubt and operates from a base of strong sense of reality. This type considers everything negotiable and is not bothered by sacred cows or policy. This type does not like the unfamiliar, may seem unpredictable and react negatively to changes made by others. This type is not threatened by the possibility of failure in himself and others, so will take risks and encourage others to do the same. He changes his position easily as new facts and new situations arise -- seldom finding this shift in position a threat to his self-esteem (Keirsey & Bates, 1984, pp. 133-138). The SP is best at verbal planning, will detect early signs of trouble, and will be aware of the comfort and working conditions of others. The SP, however, needs help in setting and keeping to schedules; and needs being reminded that unpleasant tasks need to be completed.

The sensing-judging temperament (SJ). The SJ temperament, called the Epimethean (duty), includes the

ISFJ, ESFJ, ISTJ, and ESTJ. The sensing-judging manager's skills lie in establishing policies, rules, schedules, routines, regulations, and hierarchy. They are good at drawing up lines of communication, at following through. They are patient, thorough, steady, reliable, orderly. They value policies, contracts, and standard operating procedures. This sort of manager can be relied on to arrange the environment, bringing stability to an organization (Keirsey & Bates, 1984, pp. 138-142).

The SJ is a traditionalist. This type of leader usually likes to know what his or her duties are. The SJ has a tendency to resist change. One of the problems with this type is that only the highest achievers are noticed and appreciated among subordinates. People in this type category may be treated severely and often embarrassed before others, perhaps being regarded as lacking depth of understanding. In addition, the tendency to respect policy, law, and standard operating procedures makes it difficult for this type to be creative or flexible when the situation requires.

The intuitive-feeling temperament (NF). The NF temperament, called the Apollonian (spirit), includes the INFJ, ENFJ, INFP, and ENFP. The NF leader is often

called the catalyst because of his or her ability to make things happen between people. The catalyst's focus is on the growth of the people in the organization, rather than on the organization itself. The personal desires of the catalyst are often subordinated to the desires of others, creating exhaustion for the leader and diverting attention from organizational objectives.

> The NF leader has, when he is at his best, the talent, more than any other temperament, for seeing how a liability can be turned into an asset, particularly when dealing with people problems. He forgets very easily yesterday's negative, disagreeable events and tends to remember the agreeable, tending to be romantic about both the future and the past -- always the optimist in his public presentation of self. Generally he hides his pessimistic moments, wanting to spare others any discomfort that might arise from these "down" times (Keirsey & Bates, 1984, pp. 148-153).

Personal goals may get in the way of organizational goals. These types are good communicators and can sell the organization effectively.

The intuitive-thinking temperament (NT). The NT temperament, called the Promethean (science), includes the INTP, ENTP, INTJ, and ENTJ. Often called the visionary leader, or the architect, the NT needs to be conceptualizing to feel good. This person takes pride in possessing technical know-how and wants to use

intellect to figure things out. Even though the NT's strength is in visualizing how things will look in the future, communication of that knowledge to others is difficult. The NT is a skeptic. He also loses interest after the designing and initial implementation stages of projects, feeling that the challenge has been met and it is time to move on to other things. The visionary is often unaware of the feelings of others, often viewed as cold and unapproachable; does not like repeating things that have been said before; and values only those regarded as intellectual equals. The visionary is willing to turn over implementation of his ideas to others, but is critical of the ways in which that implementation takes place.

> Characteristically he is able to see how the needs of the immediate system he serves interlock with those of other systems within the total structure. He sees the interworkings of the system itself and the long and short range implications of events which occur and behaviors which people display....This managerial type is often intellectually ingenious and can pioneer in technical or administrative areas (Keirsey & Bates, 1984, p. 146).

Temperament theory provides a wholistic way of looking at leaders' combined behaviors so that it becomes possible to "fit" a temperament type to a current situation. For instance, because the Epimethean temperament forecasts comfort in an

hierarchical organization, and predicts competence in establishing routines, regulations, and schedules, it is possible to predict that a person favoring this style (temperament) would "fit" into a supporting role in a situation requiring the "visionary," or Promethean, in the top leadership role. By the same token, a crisis situation requiring a troubleshooter or negotiator would best be served by a Dionysian. This approach predicts that primarily Prometheans assume top business leadership positions with Epimetheans in the secondary roles. It also predicts that Dionysians and Apollonians, while leaders, would be lower level ones in business organizations.

## Summary of Personality Type and Leadership

George Homans has established eleven classical leadership behaviors, offering criteria with which good leadership can be evaluated. Competency in these behaviors ensures success. These eleven behaviors can be correlated with the Jungian-Myers-Briggs personality type concepts by themselves and also by using the Keirseyan temperament descriptions, in order to understand what characteristics would best fit a business situation. The conclusions of this Keirseyan type of analysis predict that the Promethean temperament (the INTP, ENTP, INTJ, and ENTJ in MBTI

terminology) is the best qualified style for top leadership in founding or running a business organization. Further, this analysis predicts that the best supporting roles, second level, to top management are played by the Epimetheans (ISTJ, ESTJ, ISFJ, and ESFJ). Lessor business leadership roles are predicted to be played by the Apollonians (INFJ, ENFJ, INFP, and ENFP) and the Dionysians (ISTP, ESTP, ISFP, and ESFP).

## The High-Tech Environment

Understanding the High-Tech business environment helps us to recognize the demands for performance this environment makes on the personality of founders and CEOs of High-Tech firms. Changes in the environment force changes in the strategies of running any business. Chandler (1962) says that changes in structure follow changes in strategy caused by environmental conditions. For instance, if the conditions of the market serviced by a business change, the firm must redesign its marketing and product strategies in order to maintain or increase its market share. These changes then force internal structural changes in the company: increase or decrease of staff, new product development, new manufacturing systems, new facilities, and new integration and coordination

policies. With remarkable insight for linking the conditions of the environment to the behavior of the manager, Charles Summer (1980) emphasized the need to continually "align" the elements (structure) of an organization to fit the strategies demanded by the environments to which the organization must respond. Daft (1989) and Miller and Toulouse (1986) state that these alignment activities are the job of the CEO. What this means is that the CEO must be comfortable working in a continually changing environment, and must provide leadership for his staff under conditions of high strategic risk and uncertainty.

Change, Risk, and Strategy

Discussions of business strategy, risk, and change imply the need for a CEO to address two simultaneous strategic conditions: short term efficiency and long term effectiveness (Drucker, 1974). Short term efficiency is present and past oriented. Long term effectiveness is future oriented. In Mastering Change, a book which describes some of the problems the world might experience in the future, Leon Martel, former Executive Vice-President at the Hudson Institute wrote,

> Managers -- whether of their own or other's business or professional activities -- have many responsibilities: to keep up with the state of the art of their industry or pro- fession, to preserve their plant and resources, to maintain liquidity to overcome any crisis or

> take advantage of any opportunities, to serve
> well their customers and clients, and to
> increase earnings. Their ability to fulfill
> these responsibilities requires a wholly new
> way of dealing with the future (Martel, 1986,
> p. 13).

This quotation embodies the need for CEO strategic effectiveness in managing for both the short and long term. Implementing change is the way CEOs attain this effectiveness. Two basic kinds of change, both having implications for the future, must be responded to by CEOs of organizations. The first of these Martel (1986) calls structural, non-reversible change; changes generally associated with permanent adjustment and shifting from start-up to mature business conditions. Tushman, Newman, and Romanelli (1986) labelled this frame-breaking change; changes requiring strategies of major realignments due to the appearance of new technology, new government regulations, or new market conditions. To be able to accommodate this type of change requires radical surgery and quick action. A CEO needs to be comfortable with future risk and uncertainty, and to be inclined to creativity and innovation. These are the special traits of the intuitive personality (Myers & McCaulley, 1985).

The second type of change Martel calls cyclical, or repeating, change. This may be associated with seasonal changes in demand, incremental product design

updates, and temporary economic conditions associated with supply and demand. Tushman et al. label this converging change. Creation of this type of change requires strategies of slow incrementalism. It is relatively risk free and does not require a substantial tolerance for uncertainty. It is the domain of the sensing personality type (Myers & McCaulley, 1985).

Herbert and Deresky (1987) maintain, "How well a business performs depends in a large part on how well its strategy has been formulated. Successful strategic implementation in any business depends on how well a CEO's talents are matched with the requirements of a specific strategic situation." In an interview with the Chief Operating Officer of a highly successful software firm (Shirley, interview, March 29, 1990) the author was impressed by the differentiation of strategic risk and change management skills in that firm. The need to be technologically positioned ahead of the industry was the responsibility of an N type in the firm while the responsibility to manage the resources, liquidity, and customer servicing was vested in an S type. Largely because of the differentiation of responsibilities between the two personality types, this company has been able to sustain enormous growth effectively from cash flow and has not had to borrow;

an unusual achievement for any type of firm.

Business Skills and Personality Types

The present research gives credence to the knowledge that some types inherently do better than others in meeting environmental challenges. The expectation is that "S" types will usually make "converging" alignment decisions, and that "N" types will usually make "frame-breaking" alignment decisions. Because of the greater need for frame-breaking decisions in start-up enterprises, these enterprises will be more successful with "N" types in leadership positions. Conversely, "S" types will be more successful in older firms because of the greater need for incremental or converging type decisions. The general expectation, however, is that, in order to be successful, there needs to be a balance of skills available within a firm, whether it be embodied in one or several individuals. Highlighting the need for a balance of CEO skills, David K. Kurst (1985) asserts that "strategic management is bankrupt" because management continues "to make decisions for the future based only on their historical perspective of the past." Because sensing (S) types eschew the future and make decisions based on historical and present realities, Kurst implies that they can be found leading

older companies.

    <u>Role and personality type matches</u>. According to theory associated with the Jung-Myers-Briggs concepts, there are specific types which better "match" the roles which are being and will be structured for CEOs of the future. It is highly probable that better "matches" can be made through the use of MBTI testing. Barr and Barr (1989), The Center For The Application of Psychological Type (1990), Myers and McCaulley (1985), and Keirsey and Bates (1978) suggested that the best matches for CEOs are the ESTJ, ISTJ, INTJ and ENTJ personality types. The word "predominant" is used to categorize these four types. The word "rare" is used to refer to those remaining types which are not well represented in research as top managers, therefore not suitable for roles as CEOs or top managers. These personality types are the ISFJs, INFJs, INTPs, ISFPs, INFPs, ESFPs, ESTPs, ESFJs, ENFPs, ISTPs, ENTPs and ENFJs.

    Charles W. Ginn (1988) suggested that the INTP and ENTP should be added to the list of predominant types for business. In his research, the INTP appears on an equal percentage basis (14.47%) with the ISTJ. His findings, derived from the INC 500 list of fastest growing small companies, suggest that entrepreneurial

and young businesses could be led successfully by INTPs and ENTPs.

MBTI descriptions establishing "fit" criteria for the leadership of young businesses. The descriptions of personality types from which assumptions about the leadership of young firms are made are those suggesting that:

 (1) the "N" or "intuitive" type is better at future orientations and creative strategic decisions than is the "S", or "sensing" type;

 (2) the feeling (F) types, succeed best in environments where human values are critical and conditions are stable;

 (3) perceptive (P) types "fit" situations where it is necessary to develop many options and the time horizons are not too short;

 (4) judging (J) types excel at planning, organizing and closing; and,

 (5) extraverts (E) often represent the firm better to its publics than introverts (Barr & Barr, 1989; Hoy & Hellreigel, 1990).

MBTI descriptions establishing "fit" criteria for the leadership of older businesses. The major descriptions from which assumptions about the leadership of older firms are made are that:

 (1) the introvert (I) is more analytical than the extravert (E);

 (2) the sensing type (S) is better at data management than the intuitive

(N);

(3)  the thinking type (T) deals better
with organization and structure
than the feeling type (F); and

(4)  the judging type (J) is more
decision oriented than the
perceptive type (P).  (Barr & Barr,
1989; Hoy & Hellreigel, 1990).

Although these may be the major personality type
assumptions employed by business researchers, they do
not go totally unquestioned.    There is some
disagreement in the literature about what the main
leading skills for business are.   The "TJs"   are
considered the only reliable types that can lead
businesses by Ramaprasad and Mitroff (1984), Church
(1982), Hellriegel and Slocum (1980); while  Myers and
McCaulley (1985), Barr and Barr (1989), Keirsey and
Bates (1978) believe that any style can lead  depending
on the organization's situation and the training of the
person involved.

The uncertainty surrounding the relationship of
personality types to business leadership inspires
questions relevant to the leadership of High-Tech
firms.  The answers to these questions affect the
selection of top management by these businesses.  The
questions are:     What leadership qualities and
personality traits does it take to be successful in the
High-Tech environment? In what percentage of cases do

founders continue leading their companies through rapid expansion? In what percentage of cases are they replaced by successors and at what stages of growth does this occur? Which personality types are best suited for the special tasks High-Tech CEOs are responsible for completing?

## Three Spheres of Involvement in High-Tech Firms

The environment in which High-Technology business operates is composed of the scientific technology, economic, and internal administrative spheres (Shirley, seminar presentation, March 20, 1991). Founders of businesses face the need to learn to manage so as to balance successfully the effects of each of these spheres on their enterprises. Each sphere is complex and technical; each requires not only intelligence but experience to manage it efficiently and effectively. Technology is usually the base from which High-Tech founders start their new enterprises, so they are often most comfortable in the technological sphere.

The technology sphere. Innovating new products, the tasks which belong to the technology research and development sphere, is characterized by great competitiveness. It is also characterized by constantly developing new technology which needs to be financed and marketed. The business objective of

scientific research is to invent a new basic technology from which a tree of new products can be created (Floathe, interview, October 23, 1990; Paros, seminar, March 20, 1991). Venture capitalists try to evaluate the technology behind each new venture proposed to them on this basis (George Clute, interview November 30, 1990; George Still, personal communication October 25, 1990). The hope is held by these venture capitalists that a new "MS-DOS" will be discovered which will guarantee rapid growth, high profits, and product longevity. "MS-DOS" is a computer operating system which allowed the personal computer to be developed and from which a many-branched tree of highly merchandisable software products was and is being created.

A technique recently demonstrated by Jerome Paros (seminar, March 20, 1991) is an example of this strategy made possible by the environment. In this case a core technology involving a specialized quartz crystal was invented; differentiated for use in five markets, with multiple applications for each market; and patented. This strategy, driven by the environment, and devised by the genius of the CEO, created both short and long term profits of sizeable amounts. In addition, the venture capitalists hope that enough

barriers to entry will be generated by the product to prevent competition from taking the profitability out of the venture in less than five years. In the Paros case, these barriers were constructed by the obtaining of patents and the licensing of the technology.

This situation is aggravated by competition from foreign concerns and the flagging domestic educational system (Brandin & Harrison, 1987) which produces too few high quality engineers and scientists. The horizon of opportunity is broad however. New technology proliferates from the need of users of new technology which has not even reached maturity. The inventor need only be ingenious enough to convert a customer need into a viable new base technology. To the CEO of an expanding High-Tech business it seems that the technology environment is driven less by the intensity of basic research than it is by economic motivators (Cook, personal communication, December 5, 1990).

The economic sphere. Another area in which environmental factors affect the leading of High-Tech businesses is the economic sphere. High-Tech grows, according to Markusen et al. (pp. 40-57) through the mechanism of a "product-profit" cycle. The product-profit cycle concept is a combination of the product life-cycle, adoption, and experience curves, and of

the Growth Share Matrix concepts of the Boston Consulting Group. These theoretical tools summarize the conditions of innovation, market penetration, market saturation, and rationalization which control a company's operations.

This sphere demands attention to detail, planning, budgeting, and control. It also demands quick response to unexpected financial realities (Shirley, workshop, March 20, 1991). Careful sales projections and control limits on staffing and spending must be planned and then enforced. If sales decline or increase unexpectedly, swift action to revise expense allocations must be instituted. This phenomenon suggests the need for skill in consolidating gains within a firm to allow it to achieve and keep high market shares. A firm can achieve greatly expanded market shares very quickly, however, unless alignment of the internal structures which service the customers is achieved simultaneously, the advantage of the increased sales is lost. Shirley (workshop, March 20, 1991) suggested that these structural changes can be planned in the budgeting process. This consolidation function is a skill peculiar to the STJ.

Concentration, agglomeration, and location. The Markusen research found that the more mature sectors of

High Tech industry exhibited a higher "concentration ratio" than newer firms (p. 65). The concentration ratio is used as a measure of market power which sums the percentage of sales, or value added, that the top 4, 8, 20, or 50 firms account for in a particular industry (Mueller, 1970; Scherer, 1980). This theoretical perspective is not well understood by most first-time founders of new High-Tech firms. Understanding the concept, however, is one of the keys to successful competition because it drives marketing innovation and the structure of market niches (Paros, ibid).

Agglomeration describes the bunching of businesses in specific geographic locations. Markusen et al. hypothesized that nascent high-tech enterprises tend to agglomerate in locations favorable to their operation in some way, i.e., near to suppliers, technology centers (universities), markets, or skilled labor pools. As these enterprises mature, competition develops, and production processes become more standardized. As firms' sizes increase, it is likely that they will be acquired by wealthy, large corporations; as this happens, they begin to disperse geographically. This phenomenon, agglomeration, which actually structures an environment by its inhabitants,

often produces profitable advantages for the firm. Ease of access to suppliers, for instance, reduces costs. An increase in the number of firms in an area, increases the size of the professional pool and reduces recruiting costs which can become excessive (Shirley, ibid).

The Markusen group's research indicated that there were five major regions and five smaller ones for High-Tech businesses in the United States. The major core areas are: Pacific Southwest, Western Gulf, Chesapeake/Delaware River, Old New England and the Lower Great Lakes. The states of strongest concentrations are: California, Arizona, Texas, Louisiana, Oklahoma, New Jersey, Maryland, Massachusetts, Connecticut and Illinois. The minor core states are: Florida, Minnesota, Kansas, Colorado, and Utah. Markusen et al. remark that one striking feature of the major agglomerations is that states adjacent to the acknowledged centers are often apt to have a higher proportion of High-Tech jobs in their manufacturing complexes than are core states. Arizona, Connecticut, and Maryland are examples.

One cannot fail to be impressed, also, with the performance of states such as Florida, Minnesota, and Colorado, all of which are clearly far-distant from

such traditional centers of manufacturing innovation as Chicago, New York or Los Angeles, but have nevertheless demonstrated an ability to become High-Tech hosts. The results of this research were published in 1986, and, as of that date, the State of Washington was not an important area providing residence for High-Tech firms.

Washington State. Founders of Washington State High-Tech firms located their businesses in that State because they wanted to live there (Haug, 1990). Conditions extant in the State of Washington are now important to this research because the number of firms has increased significantly, and all of the samples for this study were assembled in the State. The Advanced Technology Directory (Directory) reports for 1989 that employment in High-Tech in the State of Washington, exclusive of Boeing, was 90,565. Including Boeing (53% of all High-Tech jobs), total number of High-Tech jobs approximated 192,692.

> The State's heaviest concentration of advanced technology firms is in the Puget Sound area. The communities to the east and north of Lake Washington are home to about one-third of the companies. Seattle is home to 25% or 297 of the firms. [The City of) Spokane has the largest number of firms, 80 or 7%, in the State's eastern counties and is continuing to add companies. On the Westside, the more active areas include Seattle, and the Interstate 405 Technology Corridor in north King and south Snohomish counties. 1990 reports are [show] small but increasing activity on the Olympic Peninsula,

the Puget Sound islands and, east of Seattle,
on the Interstate 90 corridor (The Directory,
1990).

Figure 2-7 tabulates the Markusen et al. report of
High-Tech employment figures for 1977.

| States | Employment |
| --- | --- |
| California | > 641,000 |
| Texas | 236,000 |
| Florida | 120,000 |
| New Jersey | 232,000 |
| New York | 337,000 |
| Pennsylvania | 314,000 |
| Connecticut | 160,000 |
| Massachusetts | 205,000 |
| Illinois | 360,000 |
| Indiana | 153,000 |
| Michigan | 169,000 |
| Ohio | 295,000 |
| Wisconsin | 129,000 |

Figure 2-7.  1977 High-Tech Employment By States

The Markusen group reported total employment for all
states as 4,760,000 with Washington accounting for only
45,000.  Employment for Washington State, since 1977,
has more than quadrupled.  Not only is this increase
important for the State's economy, but it has large
implications for founders who need to recruit

experienced professionals and to find experienced High-Tech suppliers; manufacturers of circuit boards, and peripheral equipment for example.

The Markusen group refers often to A. Marshall and his <u>Principles of Economics</u> (1890). According to Marshall, the second major element of Weberian location theory, agglomeration, may be significant for the high technology industry. High-Tech industries are supposed to be highly innovative and dominated by small firms, at least at the outset. Creativity and innovation are the special competencies of the NTJs and NTPs. Creativity and innovation are enhanced by professional, collegial interaction made easier by geographical proximity. These conditions are associated with the development of specialized industrial concentrations with a high degree of reliance on external economies. The firms rely on the same skilled labor pool and scarce technical information, as well as on specialized services which are uniquely available. Silicon Valley, as described by Rogers and Larsen (1984) and Saxenian (1981, 1985) corresponds uncannily to the classic account of agglomeration economies in Marshal (1890).

> When an industry has chosen a locality for itself, it is likely to stay there long: so great are the advantages which people following the same skilled trade get from near neighbourhood to one another. The mysteries of the trade become no mysteries;

> but are as it were in the air, and children
> learn any of them unconsciously. Good work
> is right appreciated, inventions and
> improvements in machinery, in processes and
> the general organization of the business have
> their merits promptly discussed; if one man
> takes up a new idea, it is taken up by others
> and combined with suggestions of their own;
> and thus it becomes the source of further new
> ideas. And presently subsidiary trades grow
> up in the neighbourhood, supplying it with
> implements and materials, organizing its
> traffic, and in many ways conducing to the
> economy of its material (1890).

The implication of the above for this study is that collegial networking is one of the elements which defines professionalism, and professionals aggregate in places where collegial networking is facilitated. Silicon Valley and similar areas, in other words, are no more than the modern equivalents of the old industrial quarter, such as the garment district of New York (Hoover & Vernon, 1959) or London (Hall, 1962; Martin, 1966); or the small trades of Birmingham, England (Wise, 1949).

Siting high-tech businesses. The siting of High-Tech firms becomes interesting when one considers that a great number of founders of Washington State high-tech firms were already living in the state prior to founding their businesses (Haug, 1990). Microsoft, for example, was originally started in Albuquerque, New Mexico and was moved to Seattle because Bill Gates grew up there and wanted to live near his birthplace

(Shirley, ibid). This behavior, independence and concern about the quality of their lives, is characteristic of the NTJs and NTPs. The Markusen group arrived at eleven hypotheses for the siting of High-Tech firms which are useful to consider in this research because these variables are contemplated regularly by the heads of these businesses.

(1) High tech industry is attracted to major airports with good national and international passenger and air cargo activities.

(2) High tech industries are drawn to areas with good natural amenities, in particular mild and sunny climates.

(3) High tech industries concentrate in areas offering attractive housing at reasonable prices.

(4) High tech industries are attracted to areas with educational and cultural advantages, including good educational opportunities, an array of specialized cultural services, low levels of pollution and good recreational opportunities.

(5) High tech industries are attracted to regions which are weakly unionized, and have low wage rates and high unemployment rates.

(6) High technology industry will be attracted to areas with a high degree of internal accessibility and connectivity, as for instance areas with well-developed highway systems.

(7) High technology industries will be drawn to areas with a well-established infrastructure of specialized business services.

(8) High technology industries are drawn to places which have an anti-regulatory, free-enterprise ideology.

(9) High tech industry will be drawn to centers of industrial R&D which will tend to locate close to the headquarters of major industrial corporations.

(10) High tech industry will be generated in locations with concentrations of federally funded fundamental scientific research.

(11) High tech industry will be generated in areas with high concentrations of defense spending (Markusen et al, 1986, pp. 133-142).

The results of the Markusen tests showed that seven of these variables contributed significantly to variations in plant sitings, in 1977, and six to variations in job distribution.

> Housing prices and per capita defense spending were significant in investigations based on the "availability-of-jobs" case but not for plant location. On the other hand, airport access, the presence of Fortune 500 headquarters and minority presence figured significantly in plant location but not for job availability. In general, the labor force variables were disappointing, as was the university research and development variable (Markusen et al. 1986).

The Markusen group concluded that high tech location was explicable, therefore manipulable. The variables which were confirmed as being predictable were those coming under the three headings of amenities, access, and agglomeration. The factors which were insignificant or negative provided equally striking insights: "unionization, wage rates, and -- most surprising of all -- a strong research component. The last proved to have little significance; indeed, it was

negatively associated with high tech growth" (p. 121). This finding does not seem intuitively valid however. If it is true, research may be perceived as more important in start-up firms than in older companies, therefore, because of their known creativity and analytical skills, one might expect to find more NTJs and NTPs as CEOs in the former and more STJs in the latter.

Forester (1987), in his description of the Silicon Valley region, subscribes to climate, an open society, "good communications infrastructure, ready supplies of venture capital; an abundance of skilled, mobile and mostly non-union labor; and a high value placed on the individual, entrepreneurship and money-making" as secrets of success. He added semiconductor industry characteristics, which included a preponderance of small firms; high spending on R&D, a risk that NTPs understand; a premium on being first with a new product, risks with which TJs are comfortable; high rates of job mobility; networks of contacts between firms, which characterizes the independence of NTJs and NTPs; and intense competition to attract and hold industry "stars," something at which STJs excel (p. 54).

Implications for policy-making. Finally, the

Markusen group offered some implications for local policy making. Almost any place can compete for plant siting, with the possible exception of some of the older, single-smokestack-industry centers. Almost any state and city can work to strengthen its positive, High- Tech attracting factors. It can improve its accessibility to the national highway system; improve its airport; work to strengthen its attraction to business services of all kinds, including headquarters units of companies. It can simultaneously work to improve its amenities. Defense may now be the key factor. While defense spending declined as a major factor during the early 1970's, it has since been reestablished to a stronger degree than at any time previously, with the Strategic Defense Initiative (Star Wars) being the major motivator.

The most surprising conclusion of this study, for the Markusen group is that research spending did not prove a significant factor in explaining the long-term location patterns, or the short-term shifts, of high tech industry (Markusen et al.,p. 142, 1986). Without further disaggregation of variables, one of the most cherished myths of High-Tech policy, that a strong research university is the key to high tech growth, seems to be without empirical foundation (Markusen et

al.,p. 141, 1986). Markusen et al. are inclined to think that the explanation lies in the importance of defense spending because, during the development of Highway 128 and Silicon Valley next to Stanford University, there was concentration of defense spending at MIT and Stanford Universities. This developed the needed expertise in electronic engineering just at the right time. Since that time, development of this kind of strength in other universities has not had such a locational effect. Indeed, universities developing expertise later find themselves exporting their graduates to the High-Tech cores.

Will the future replicate the past? This is uncertain. Product innovations could create new High-Tech industries with different geographical patterns than those occurring in the past. Similarly, shifts in federal policy could lead to a massive cut in spending for defense, causing a shift to occur toward other, more peace-oriented High-Tech industries. On the other hand, there is considerable inertia present in any system; new High-Tech applications might be produced in the old locations. As a result, peaceable uses of biotechnology would be developed in the same laboratories as now do research in biological warfare (Markusen et al. p. 143, 1986).

Political scenarios are important. Much of what happens in the future will be dependent on national policy. ". . . the pattern of disbursements, direct and indirect, into defense, research and development, transportation and communication infrastructure -- will reflect both ideology and political obligation" (Markusen et al, 1986, pp. 176-180).

Trends in the industry. "The nations of the world are caught up in a revolution: a technological revolution, which is bringing about dramatic changes in the way we live and work -- and maybe even think. . . . Three broad economic, technological and political trends provide the main driving forces behind the high-tech revolution. Their coming together in the 1980's is resulting in an explosion of technological and social innovation on a scale not seen for many decades, perhaps not since the Industrial Revolution two hundred years ago" (Forester, 1987, p. 1).

The first of these trends is the rapid decline in the cost of computing power and memory. Computers are proliferating as never before: there are now at least 100 million in the world, over half of them born this year and last (Forester,p. 4, 1987). The second of these trends is the digitization of information through the common language of the binary code (which) is

bringing about the convergences of voice, image and data -- and of the telecommunications, electronics and computing industries based upon them (Rodney Cook, interview, November 19, 1990; Forester, 1987; William Paterson, interview, November 13, 1990). The third trend,

> . . . the worldwide wave of deregulation and the privatization of public monopolies by governments, especially in the field of telecommunications, has sparked off an explosion of entrepreneurial and corporate activity designed to take advantage of the new business environment. New companies enter and leave product areas as never before. New products emerge as never before. Established companies don't know what business they are in, as the boundaries between traditional sectors have become increasingly blurred. As a result, we are witnessing the emergence of an international, integrated information-processing industry based upon digital technology (Forester, 1987, p. 2).

A good illustration of the nature of the High-Tech environment is the development of the pocket calculator, which was first marketed in 1972 at a cost of $250; and, by 1977, could be had in a more reliable, more complex, and cheaper-to-run model for around $10.

> Other industries have similar experience curves, but only micro-electronics can boast a doubling of complexity, a doubling of output and a 30 percent reduction in prices every year. In such an industry, therefore, the motivation to do research and development in order to stay one jump ahead of the rest is overwhelming (p. 27).

This implies the need for NTJ and NTP traits for

research, and STJ traits for economics.

Small business survival and failure rates. Another effect the environment has on businesses is the survival and failure rates of enterprises. Survival and failure of businesses affect the communities in which they reside, and a particular industry, such as High-Tech, which has agglomerated, suffers or prospers in direct proportion to these rates. Statistics surrounding small business survival usually quote first to five year failure rates of start-up enterprises as being from 50% to 80%. "Professor Albert Bruno of the University of Santa Clara found that a relatively high 95 percent of Silicon Valley start-ups survive the first four years, but 25 percent fail to survive their 'adolescent transition' and collapse the second four years. Of 250 firms founded in the 1960's, 31 percent survived, 32 percent had been acquired or merged and 37 percent had gone bust" (p. 57).

Statistics on failure rates are not accurate. What are normally purported to be failures more accurately should be referred to as "discontinuances." Figures reported by Dun and Bradstreet, taxing authorities, and other government agencies are composites of bankruptcies, sales and mergers, simple

closures, liquidations, and name changes (interview, Gray, January 17, 1991). Actual failures may well be as low as 10-12% annually (interview, Bruce Phillips, January 17, 1991).

Among the many causes for business discontinuances are investment and over-expansion costs which plague the semi-conductor industry. As production technology becomes more automated and more sophisticated, costs rise steeply. For example, a state-of-the-art chip production line might cost $100-200 million, anything from four to eight times what it cost only a few years ago. Some devices for special production processes have gone up 20 times in cost" (Forester, 1986, p. 62). The industry's major response to this has been mergers.

> . . . Thus, in recent years IBM has purchased 20 percent of Intel, a leading chip-maker....and 100 percent of Rolm, which makes specialist telecommunications equipment. Wang has bought into VLSI Technology, NCR into Ztel, Sperry into Trilogy, Magnetic Peripherals into Centronics and Control Data into Source Telecomputing. With technology moving fast, product lives shortening and the cost of developing new products increasing, not even giants like IBM can afford to develop and produce a full range of products. Even so, companies are finding that they are in the information processing business, and therefore must offer a range of products in a "one stop shopping" format, and "teaming-up" helps them to do this (Forester, 1986, p. 63).

The above discussion describes the reasons why many High-Tech firms seem to disappear. Recent

research, however, by Phillips and Kirchhoff (1989) provides a statistically more accurate version of what may believably be called "failure rates".

> 'Four out of five new firms fail within the first five years.' This statement has been made so many times that most people believe it is true. But it isn't. In fact, using a relatively new data source developed by the U.S. Small Business Administration, we found that on the average 39.8 percent of new firms survive six or more years. This is equivalent to a failure rate of three out of five, substantially lower than popularly believed.

> Survival rates vary by industry with manufacturing having the greatest (46.9 percent) and construction the smallest (35.3 percent). More important, however, is the discovery that survival rates more than double for firms that grow. Even a small amount of growth boosts the average survival rate to 66.3 percent, that is, two out of three growing firms survive. The earlier in the life of the business that growth occurs, the higher the chance of survival.

> But, most firms do not grow in the first four years. On average, only ten percent of firms show growth in the first four years. By the sixth year, however, 34.3 percent of the firms show growth and over fifty percent show growth within eight years.

> To put an old adage to rest, two out of five new firms survive at least six years and over half of the survivors grow (Phillips & Kirchhoff, 1989).

To founders, the above narrative provides some sound advice. First, founders should not let anyone convince them that the odds are against them. While most founders are usually very optimistic, they are

often thwarted in obtaining finance by investors who believe the myths. Secondly, founders should plan on and achieve early growth. This usually means sales, and, since many High-Tech business founders are technologists, marketing is mystery to them. Growth and more sales means that cash flow becomes a problem because of increasing staff and operational complexity. It means there is a need to manage internally more efficiently (Shirley, workshop, March 20, 1991).

The Internal Personnel and Administration Sphere

An environmental trend which appears to be spreading, is the change in the work ethic associated with High-Tech culture. Fifteen hour days, seven-day weeks are not uncommon, and burn-out is a fact-of-life. "A recent MIT study by Professor Louis Smullin found that many computer and electronics whizz-kids were washed-up by the time they were 35 or 40 and were fighting a losing battle to keep from falling behind intellectually.' Each year, about 10,000 electronics and electrical engineers -- or 5 percent of the US total -- transfer out of the field altogether. In Silicon Valley, this is called 'dropping off the edge'"(Forester, 1987, pp. 77-78).

High-Tech is more of a meritocracy because of the importance attached to an individual's work. Rather

than working regular 9 to 5 hours, being family oriented and having his single dwelling in the suburbs, "High Tech Man" is a "High-Tech Entrepreneur" and "is more likely to be divorced and living with someone else in a condo. He rarely sees his kids and doesn't give a damn about rules, dress or peer group pressure. This high-tech man is a high achiever; he prefers to work in a small outfit and shows no loyalty to any company, only himself [NTJ and NTP traits]. Indeed, he is secretly planning his own start-up, and confidently expects to retire a millionaire at the age of 40. Personal relationships and leisure do not much interest him" (pp. 78-79).

Recruiting and keeping professionals is a matter of providing not only money, but also an environment which supplies recognition, networking with other professionals in the same fields, offering opportunities for technical or publishing development, academic sabbaticals, technical assistants, private offices, and, as set forth above, the amenities of good living (Humphrey, 1987, p. 69; Shirley, ibid). The provision of this environment requires ever increasing management skill and profits. As exemplified by Steven Jobs at Apple, not all start-up entrepreneurs can handle the fine tuning necessary in a

rapidly expanding business. Managers with a preference for sensing (S) are the type best suited for this kind of environment.

## Summary of the High-Tech Environment

CEOs find that there are three spheres of the business in which they must be involved: technology, economic, and internal administration. In the technology sphere, new product development is the imperative. The economics sphere requires that marketing be coordinated with costs and prices. It also requires activities pursuant to favorable siting of the firm's facilities which takes into account: climate, labor pools, communications facilities, availability of suppliers, and transportation. These needs tend to cause an agglomeration of firms in the same industry. Trends seem to indicate that, as industries mature, tendencies toward concentration dissipate. Likewise, as firms grow and mature, failure rates decrease. The third sphere, internal administration, emphasizes professional staffing. In this area of concern, the CEO must learn to hold on to professionals who burn-out soon, are not loyal to the firm for which they work, and are secretly waiting for the day they start their own firms.

# CHAPTER 3

## A REVIEW OF THE EMPIRICAL LITERATURE ON THE RELATIONSHIP BETWEEN PERSONALITY AND MANAGEMENT BEHAVIOR AND SUCCESS

### Introduction

This study investigates the distribution of the Myers-Briggs personality types among founders and CEOs of High-Tech businesses in order to determine how personality type affects the founding and successful operation of these businesses. Founding and operating High-Tech businesses require competence in the skills associated with leadership, creativity, problem solving, and decision making. Effectiveness in the application of these skills to founding and operating businesses determines whether a firm is born and survives. Competence in these skills is in part determined by the founder/CEO's personality type. This chapter reviews the empirical research literature reporting on the distribution of Myers-Briggs personality types in top management. As well, it reviews the empirical literature reporting on the relationship of Myers-Briggs personality types to leadership, creativity, problem solving, and decision making. It also reviews the latest empirical research on the birth and survival of businesses.

## The Distribution of Myer-Briggs Personality
## Types in Top Management Positions

The most complete data about the distribution of Myers-Briggs personality types in business management categories come from the Center for the Application of Psychological Type (CAPT). The compendium of these data, known as The Atlas of Personality Profiles, presents career sector results of both a single research effort and the aggregated results of many efforts. Each Atlas page presents what is called a "profile" of a career sector. The Atlas as a whole reports results in such career areas as Religion, Education, Health Care, Counseling, and Business Management. An Atlas profile reports, in frequencies and percentages, the distribution of the sixteen Myers-Briggs archetypes (i.e., ENTP, ISTJ, etc.) for a given professional occupation. Results in the Atlas are also presented for each individual letter indicator (i.e., E, I, S, N, T, F, J, and P), for 2-letter combinations (TJ, SJ, etc.), and for each of the four dominant functions (i.e., S, N, T, and F).

Eight Atlas profiles are relevant to this study. They are titled: Managers and Administrators, High Level Corporate Executives, Self-Employed Managers (Owners), Managers of Small Business, Top Managers of Large Japanese Companies, Japanese Chief Executives, English

Managers, and Founders of INC 500 High Performance Companies. Figure 3-1 summarizes the results of the research represented in these profiles. This summary shows that STJs, and NTJs become CEO's or top managers more frequently than other types (Agor et al., 1986; Ohsawa, 1981, 1986). It also shows that a plurality of managers are classified as TJs (Hoy, 1979). Only one Atlas profile (Ginn, 1987) provides contradictory results.

For founders of INC's 500 fastest growing firms, Ginn reported a lower frequency of STJ types and a higher frequency of NTJ, and NTP types than reported by the other business profiles included in the Figure 3-1 summary. He found that the INTP and ENTP frequencies are roughly equivalent to the ISTJ, INTJ, and ENTJ frequencies. He also reported a higher frequency of introverts (I) than reported by the other profiles found in the above summary. These findings are important because, while they deviate from the findings of the other research reported in the summary, they agree with the results of the present study.

CAPT ATLAS
CATEGORIES

| | STJ % | NTJ % | NTP % | STP % | SFJ % | SFP % | NFJ % | NFP % |
|---|---|---|---|---|---|---|---|---|
| Managers, England | 45 | 15 | 7 | 8 | 12 | 2 | 4 | 6 |
| Managers, High Level Corp. Executives | 44 | 28 | 11 | 7 | 2 | 4 | 2 | 3 |
| Self-Employed | 26 | 13 | 11 | 8 | 13 | 6 | 7 | 15 |
| Managers, Small Businesses | 57 | 8 | 3 | 14 | 9 | 6 | 1 | 2 |
| Japanese CEOs | 27 | 32 | 5 | 9 | 9 | 8 | 5 | 4 |
| Inc. 500 Founders | 24 | 25 | 26 | 12 | 1 | 3 | 4 | 5 |

Figure 3-1. Distribution of Myers-Briggs personality
types for various categories of managers/
executives (CAPT ATLAS, 1986).

Figure 3-2 summarizes the frequencies of the
single-letter indicators reported by the eight Atlas
business profiles relevant to this study. These profiles
relate to CEOs of large companies. It shows higher
frequencies of extraverted (E), sensing (S), thinking
(T), and judging (J) types; and lower frequencies of
introverted (I), intuitive (N), feeling (F), and
perceptive (P) types in top business management
positions.

| SINGLE LETTER INDICATORS | FREQUENCIES | Significance | Total | % of Sample |
|---|---|---|---|---|
| E | 5,131 | .10 | | 56% |
| I | 4,050 | -.10 | | 44% |
| S | 5,277 | .05 | | 58% |
| N | 3,883 | -.05 | | 43% |
| T | 5,886 | .01 | | 65% |
| F | 3,295 | -.01 | | 36% |
| J | 6,395 | .02 | | 70% |
| P | 2,786 | -.02 | | 31% |

Figure 3-2. Frequencies of single-letter MBTI types appearing in Atlas profiles of top management positions with significance levels at 1 df. Total sample size equals 9,181 (CAPT, 1990).

Personality Type and the Processes of
Problem Solving and Decision Making

Business problem solving and decision making are constant, on-going processes that are especially important to founders of new businesses and CEOs of growing ones. The consequences can be serious if the head of a business has trouble making timely decisions and concluding problem solving efforts. There is general agreement on the steps in these processes: diagnosis and definition, data gathering and analysis, the generation of alternate solutions, choosing a solution, implementing

that solution, and controlling or evaluating the results of the solution. Personality type theory suggests that not all individuals are equally competent in the execution of each step. For instance, type theory declares that sensing (S) types may be the best ones to gather data and describe the problem, while intuitive types, especially the NTJs and NTPs, are best at analyzing the data and generating alternative solutions. According to type theory, it takes Js to actually make decisions, and STJs to implement them. The empirical research which supports this reasoning is reviewed below.

## TJ Types Best Suited To Business Decision Making

Many researchers have hypothesized that decision making is primarily the province of the TJ. The T tends to be dispassionate, principle oriented, and logical; the J is goal oriented, driven to closure, and single-minded. Empirical research done by Craig, Craig, and Sleight (1986) found that "TJs tend to predominate in decision-making roles even in professional groups composed mainly of Fs" (pp. 33-37). The combination TJ produces a person who makes timely and rational, company-oriented decisions (Kiersey & Bates, 1978; Isabel Briggs-Myers, 1987). This is contrary to the F who is "values and human oriented" and normally finds it hard to be objective or to focus easily, and the P who likes to keep

his or her options open, gets distracted with the possibilities, and avoids closure (Myers & McCaulley, 1988).

Feeling Types and problem-solving. Hoy and Vaught (1981) stated that ". . . one would expect entrepreneurs who possess a disposition to be extraverted, feeling, and perceptive to also be effective in handling interpersonal problems with their subordinates" (p. 42). They found, however, that ". . . although some entrepreneurs are predisposed to act in an extraverted and supportive (EF) manner they do not necessarily possess the behavioral skills to solve interpersonal problems" (p. 43). Perhaps the founders "in this study might prefer (sic) to exhibit the interpersonal behavior of empathy and guidance, but have found them to be dysfunctional in their organization . . . . In the long run, entrepreneurs are not going to practice unrewarded behavior" ( p.43).

A Combined-Process Model of Problem-Solving.
Problem-solving is not the province of a single type. Statements which imply simple generalities can be misleading. For instance, Mitroff et al. (1977, 1978) stated that managers who are sensing (S) dominant have problems developing strategic designs which leaves the impression that sensing (S) types should not be relied upon for the development of strategic plans. More

current theory suggests that problem-solving is a process which combines the skills inherent in all the functions (S,N,T,and F). Ramaprasad and Mitroff (1984), in their research on strategic problem formulation, developed a typology based on managers' preferences as suggested by the Myers-Briggs Type Indicator. They postulated that an hierarchical method based on Piaget's rational "Logico-Mathematical Structure" (LMS) may be the most effective way to develop quality in strategic planning. Their LMS model proposes three processes; application (AP), simple abstraction (SA), and reflexive abstraction (RA) each of which employs various combinations of the Jungian functions. They suggest that the mutually exclusive condition of the preferences in the Myers-Briggs instrument is not generally applicable and that many individuals actually demonstrate a preference ambivalence. For instance, they reason that in addition to one function, a person can strongly prefer a combination of two, three, or all four of the functions. To simplify the understanding of this concept they developed the following typology.

(a) Synthesizers (SNFT) -- strongly prefer all four functions.
(b) Linkages (SNF, SNT, FTS, FTN) -- strongly prefer three functions.
(c) Analyzers (SF, ST, NF, NT)/Observers (SN)/Data processors (FT) -- strongly prefer two functions.
(d) Technicians (S, N, F, T) -- strongly

prefer only one function (p. 602).

They based their beliefs on the critique that the MBTI does not adequately establish the relative strengths of the preferences in each dimension, and that these relative strengths do exist. This has important implications for Founder/CEO success because it may explain, in part, why some Founder/CEOs succeed and others fail. In other words, it could be hypothesized that success could be predicted by a person's position in the above typology; greatest success being attributed to the Synthesizers and least success attributed to the Technicians, all contingent on the situation.

McCaulley (1987, pp. 44,45) added the attitudes (E, E, J, and P) to the Ramaprasad and Mitroff functions-oriented typology, and proposed the following step-by-step model for problem-solving.

1. Use extraversion (E) to see events in your environment and to seek information from people about them.

2. Use introversion (I) to consider ideas and to look for eternal truths that may be obscured by fads, and to take time alone to think deeply.

3. Use sensing (S) to gather the facts and to be realistic.

4. Use intuition (N) to discover all of the possibilities.

5. Use thinking (T) to make an impersonal analysis

6.  Use feeling (F) to how deeply you care about what your choice will gain or lose.

7.  Use judgment (J) to stay on track and not to be diverted.

8.  Use perception (P) to make sure that you have looked at all aspects of the problem.

McCaulley implies that this model can be applied by either a single individual or by a group. She confirms the validity of the Ramaprasad-Mitroff model, enhances it with the addition of the attitudes, and extends its application to the group. By doing this, she lessens the probability that a firm will succeed or fail solely on the strengths or shortcomings of the Founder/CEO.

Problem-solving at different management levels. Ben Roach (1986) maintains that problem solving is a requisite task of managers. Further, he claims that personality impacts problem solving, and hypothesized that problem solving requires different behaviors for supervisors, middle-level managers, and executives. The results of his research, summarized in Figure 3-3, demonstrate that there is a greater frequency of Ss and Fs at the supervisor level than there is at the manager and executive levels, and that there is a greater frequency of Ns and Ts at the manager and executive levels than at the supervisor level. His research also found that, in large organizations, Ss and ISs cluster in the lower levels of management while the Ns and ENs

are found more frequently among higher executive levels.

## Jungian Functions

| Group | S | N | T | F |
|-------|------|------|------|------|
| Supervisors | 39.1% | 12.5% | 32.8% | 15,6% |
| Managers | 30.0% | 21.9% | 36.9% | 11.2% |
| Executives | 14.9% | 29.1% | 47.8% | 7.4% |
| Totals | 26.5% | 21.6% | 38.6% | 11.3% |

Figure 3-3.  Distribution of Functions Among Managers.

Figure 3-4, an additional summary of his work, reveals that STs predominate in the supervisor and manager groups, while NTs dominate the executive group.

| Rank | Supervisors | Managers | Executives |
|------|-------------|----------|------------|
| 1 | ISTJ 24.3% | ISTJ 21.7% | ENTJ 20.9% |
| 2 | ESTJ 15.7% | ESTJ 14.3% | ESTJ 16.4% |
| 3 | ISFJ 10.0% | ENTJ 11.2% | 10.4% INTJ/INTP/ENTP ISTJ* |

Figure 3-4.  Distribution of MBTI Types in Three Decision Making Roles (Roach, 1986) Ranked by Percentage.
* Equally ranked by percentage

Research by Kilmann and Mitroff (1976), Hellriegel and Slocum (1975), Taggart and Robey (1981) and Greig (1984) established evidence that most business managers were TJs, the types found in the four corners of the Type

Table (Figure 1-4). This condition has become known as the "four corner theory." There are only two deviations from the "four corners" theory in Roach's report. The first is the appearance of the ISFJ, ranked third under supervisors. This might be explained by his inclusion of women in the sample. It is believed that 60% of F types are women, 40% men in the general population (Myers & McCaulley, 1988). The second deviation from the "four corners" theory is the inclusion of the INTPs and ENTPs in the Executive column. No conjecture can be made as to why this occurred, however it is interesting for the current research because when Roach's results are added to Ginn's, it is possible to assume that certain P types can be successful managing, and that the "four corners" theory is not universally applicable.

Personality types and participative problem-solving. In a study labeled "Problem-Solving Styles and Participative Decision Making," Schweiger and Jago (1982) found that sensing types (S) tended to be more participative in their decision styles than intuitive types (N). This has implications for the on-going management of firms. Many change agents optimistically believe that "people, in collaboration with others, can do a better job of goal setting, diagnosing and solving problems, and implementing plans" (French & Bell, 1984,

p. 51). Schweiger and Jago (1982) found that sensing (S) types are more eager to gather more data, look at more options, and to communicate their findings, than intuitive (N) types who get impatient with detail and are reticent communicators of detail. Their results for thinking (T) and feeling (F) preferences were inconclusive. In particular, they found that situational variables heavily influenced the results of their experiments in this latter (TF) dimension.

Group problem-solving. In group problem solving situations, groups made up of highly diverse types seem to do better than groups made up of similar types. In particular, strong commitment and patience with the group process seem to be more significant among the SJs and SPs where the process is highly structured and the rules are clear (McCaulley, 1987). Blaylock (1983), however, reasoned, in an experiment performed in a group setting, that SJs and SPs, while maintaining a high interest level, did not perform well. In the same study, agreeing with Jung, he commented about the NTs and NFs: "Both NT's and NF's showed drastic reductions in interest. These temperaments [types] pride themselves on technical 'know how.' Consequently, one might speculate that these groups enjoyed the complexity of a new environment, but once the redundancy set in, they lost

interest.    Once they lost interest can poor performance be far behind" (pp. 64, 65)?

Improving problem-solving performance. In attempting to discover whether certain personality types could learn problem-solving skills Yokomoto and Ware (1982) investigated variables they called "attention-to-detail,"  "practical application," and "seeing-the-conceptual picture."   They found strong correlations between the sensing (S) type and "attention-to-detail," and "practical application;" and between the intuitive (N) type and "seeing-the-conceptual picture." Yokomoto and Ware also found that it was possible to help sensing students learn to improve their recognition and understanding of concepts by replicating problem sets involving concepts. In addition, they found that the sensing types could do well on problems which were exact replicas of the practice sets they had done, but when presented with problems which needed translations based on an understanding of the concepts, the students felt they were faced with "trick" questions.   Yokomoto and Ware also found that it was also possible to help intuitive students improve their attention to detail and application.    Intuitives, they found, could be taught practical application by replicating use of concepts in a large number of practice sets.    They found that

intuitive students often understood the concepts, but had not taken the trouble (thinking) to see the alterations in behavior necessary to deal quickly with changes in applications. In terms of the present research, this means that personality type does not totally restrict performance to the areas of a person's strengths because the effects of his weaknesses can be partially mitigated by training.

## Summary of Personality Type and the Processes of Problem Solving and Decision Making

The seven empirical studies of personality type and problem solving/decision making reviewed in this chapter agree that TJ types predominate at all levels of business management. Evidence indicates that the sensing (S) types are more numerous at lower levels of management where current and historical data are important and the consequences of decision making impact shorter time periods. Intuitives (N) are more often found in higher management positions where decisions affecting the long term are more frequent and the importance of current data is overshadowed by the need to speculate about the future. Sensing (S) types were found to be more effective than N types in participative, or group, problem solving exercises due to their willingness to gather more data and to communicate these data to

others. In addition, it was found that SJs and SPs have more patience with group decision activities than the other types. Even though the competence of the different types seems to be limited to specific areas, training of Ss and Ns in their weak areas can improve problem-solving and decision-making performance.

## Leadership and Personality Type

Leadership has long been a fascination of mankind and is responsible for more literature than can be summarized in one writing; ". . . the topic of leadership has fascinated scholars throughout history. Plato's Republic and Niccolo Machiavelli's The Prince are only two attempts to account for this phenomenon" (Fiedler & Garcia, 1987, pp. 1-2). After more than four decades of research, the factors which make a leader effective are still a mystery (Fiedler, 1967; Stogdill, 1974). Phenomena surrounding the subject imply its importance, yet leadership is difficult to analyze because of the disagreement of researchers in choosing concrete and easily measurable variables with which research can be conducted. Still, the concept of leadership is important; witness that "Thousands of search committees are being formed every week to seek the best, the most visionary, the most endurable, the 'right one' for a

group or organization that needs a head" (Clark & Clark, 1990, p. 4, 1990). "The need for effective leadership is ubiquitous and so highly valued that some top executives earn more than 100 times the salary of their rank and file subordinates" (Fiedler & Garcia, 1987, p. 3). Leadership is especially important since the world order is changing. Internal business relationships between managers and their subordinates are part of this change; ". . . executives now recognize that 'human relations' for the masses simply does not work if there are 'unhuman relations' among members of the organizational elite" (Knowles & Saxberg, 1970, p. 1). The character of this elite may be changing with the world order.

The changing character of the organizational elite. In lamenting the passing of the "blood and guts era" of High-Tech leadership, Malone (1990) criticizes what he calls "the pussification of the Silicon Valley." By this he means that the free-swinging, high risk-oriented venture capitalist is being replaced by the M.B.A.-degreed yuppie, characterized by health food addiction, regular exercise regimens, ties, and classy clothes. The yuppie manager, in turn, is replacing the let's-go-for-a-couple-of-beers-and-talk-then-go-back-to-work-even-though-it's 3 a.m. rugged High-Tech entrepreneur. The venture capitalists are motivating these changes in the

quest for higher profits. Malone's writing reflects two major issues: the high intensity of the competitive environment which creates constant technology change under high pressure, and the changing economic standards enforced by the venture capitalist. The example of superior profits, such as Microsoft's 1989 40% net profit (Shirley, seminar, March 20, 1991), drive venture capitalists to require higher standards and more efficient administration in order to produce audacious profits. These conditions, which put pressure on researcher/CEOs to produce earlier and more practical results, cause investors to screen for special skills among CEOs and their staffs when deciding on appropriate management teams. Because of the enforcement of these common objectives (i.e., profit and growth), it would appear that similar personality characteristics among High-Tech CEOs would emerge.

Executive character similarities. Stogdill (1974) summarizes executive leadership similarities by saying that:

> Factor analytic studies suggest that the performance of the executive can be described in terms of a limited number of factors....Executives occupying similar positions located in different organizations exhibit greater similarity in work profiles than do executives occupying different positions within the same organization.
> . . . Different samples of business leaders

tend to exhibit highly similar profiles of performance (p. 166).

The belief that discrete factors can be isolated for study lends hope that useful research can be conducted in the leadership area. Research on the results of the effect of intelligence, for instance, is reported by Fiedler and Garcia (1987); "There is evidence of a positive but very low relationship between leader intelligence and performance" (p. 48). Bass (1981) finds that leaders "can be more intelligent than the group but not too much more intelligent" (Clark & Clark, 1989, p. 460). Wagner and Sternberg, (1989) state that "The hallmark of the street smart executive or manager is facile acquisition and use of work-related tacit knowledge about managing oneself, others, and one's tasks" (p. 503).

In addition to intelligence, Fiedler and Garcia (1987) suggest other variables such as power (also Stogdill, 1974), stress, cognitive resources, and critical task requirements; Stogdill suggests that "Aloofness," "Production emphasis," "Disengagement," "Esprit,"and "Intimacy," are variables describing leadership behavior. These variables, however, failed to achieve enough significance to predict leadership success with much reliability. Allport (1968), Kotter (1988), Fiedler (1967, 1987), and Stogdill (1967) believe

that personality is important to leadership and have developed their own lists of constructs. The scope of the variables which measure those constructs may be too limited, however, to develop the generalized predictability needed for such a broad topic as leadership.

For instance, Fiedler's concepts, operationalized by his Least Preferred Coworker (LPC) instrument, apply some of the Myers-Briggs techniques used to operationalize the Jungian theories (i.e., a "forced-choice" made by the subject to reveal a personality preference). The results of the LPC identify a person as task-oriented, or human-relationship oriented. The application of these results is achieved by "fitting" them into a situation characterized by three conditions: leader-member relations, task structure, and leader power. After attempting the "fit," however, the implications are unclear to the practitioner. In contrast, the results of the MBTI provide a flexible and readily adaptable tool for practical use. McCaulley (1988, p.22), in describing the possibilities of type theory, suggested that type theory can help with understanding why individuals see the world differently and make different decisions from the same data. She asserted that "From the type perspective, one would not ask the question, 'What type

is the best leader?'   Rather, one would ask, 'How does each type show leadership?'"   The current research is in agreement with McCaulley's   approach and discusses several skill areas relevant to business leadership in the following sections.

## Leadership, Creativity and the MBTI

Knowles and Saxberg (1988) proposed that change can be categorized as "planned" and "unplanned," and "planned" change is a choice approach.   They postulate that "In order to succeed, some . . . variations from technical bureaucracy may require a change in the organization's values and beliefs and may call for maximum reliance on the creativity of the organization's members" (p. 264).

Barberousse (1965), in establishing relationships between Myers-Briggs personality types and creativity, intelligence, and sociometric reputation found that Ns get higher scores in IQ, creativity, and thinking tests than Ss (Figure 3-5).

> . . . the consistency with which each of several types perform is quite revealing.   For example the extraverted, intuitive, feeling perceiver (ENFP and the extraverted, intuitive, thinking judger (ENTJ) consistently ranked in the upper 1/3 on the intelligence measure as well as on all of the creative thinking measures.   The . . . ENTP ranked in the upper 1/3 on all but three of the scales (p. 4).

| Scores | IQ | Creative Activity | Creative Thinking |
|---|---|---|---|
| Upper 1/3 4:1 | Ns only | Ns/Ss 3:2 | Ns/Ss |
| Middle 1/3 3:3 | Ns/Ss 3:3 | Ns/Ss 4:2 | Ns/Ss |
| Bottom 1/3 4:1 | Ss only | Ss/Ns 4:1 | Ss/Ns |

Figure 3-5. MBTI Score Results on Measures of IQ, Creative Activity, and Creative Thinking (Barberouse, 1965).

The results of her research contradict the assertion of prior research that most successful managers in any business environment are TJs. Her findings do support, however, former findings that Ns are better creative strategizers. Her findings indicated that the INTJs were the most creative of all the types.

In leadership activities Barberousse found that extraverts (E) were more effective than introverts (I). She also found that introverts were less expressive and less competent in "investigative activities," but better at analyzing than extraverts (p.8). These results agree with the results of prior research which found that the better leaders were extraverts (E) and that introverts (I) were better at analyzing (Keirsey & Bates, 1978). She also found that extraverts were valued more positively by their peers than introverts. Extraverted intuitives (EN) were viewed most often as intellectuals

and leaders, and were preferred by their teachers. Extraverted intuitives (EN) were chosen most often for having good creative ideas. Extraverted feelers (EF) were chosen most often as friends and as being most popular. Feeling perceivers (FP) were viewed as being the most popular" (p. 8). Barberousse implies that being popular often does not mean being different.

On being different, creative and innovative. Hanke and Saxberg (1985) found that innovators and creative individuals were often isolated and different from the group. They coined the term "iso-dev" to identify such persons. In addition, Hanke (1987) found "that personal characteristics are important in explaining innovation" (p. i). She proposed that innovation is creativity manifested. Using Kirton's (1976) variables, she found that innovation scores tended to rise with age and that "internal locus of control" scores predicted innovation (p. 138). She expanded on this by saying, "Those identified as innovators tend to perceive the outcomes of their actions as under their own control rather than determined by others, by luck, or by fate" (p. 138). She also states that:

> . . . exclusive marginality was a predictor of
> innovation. Innovators identified with no
> subgroup, consistent with Rogers' (1959)
> 'creative loner' concept . . . . Innovators
> marked as unimportant at significant levels of
> probability: work ethic, potential membership

group, professional organization, religious organization, outside reference group. These items become significant predictors of innovation because innovators rejected them (pp. 138-140).

"Innovation" and "adaption" were two variables used by Hanke and are polar points on a scale invented by Kirton (1976). Kirton found that adaption correlated highly with sensing (S) and innovation correlated highly with intuition (N) (Kirton, 1976). Hanke's research supports the concepts that Ns innovate new businesses and Ss run businesses. These findings also correlate highly with the finding of significant independence of the INTJ and INTP types (Myers-McCaulley, 1980), and with Forester's description of the High-Tech individual (1987, pp. 54-55) as job-hopping, and highly individualistic. Most of the professionals in High-Tech occupations are graduate engineers and independence is one of their common traits (Forester, 1987). Hanke illustrates this self-centered trait of independence by quoting Humphrey's description of engineers and scientists. Humphrey quoted Charles Eames, the designer of beautifully functional products, who said "We need to design for ourselves, but deeply for ourselves. Then we're likely to discover that the result satisfies other people" (Humphrey, 1987, p. 31). Most professionals, Humphrey goes on to say, intuitively understand their own talents and seek work which best suits them and they usually reside at the

self-actualization level of Maslow's hierarchy; where ".
. .loyalties extend beyond the confines of . . . job and
organization" (Humphrey, 1987, pp 33-35). Hanke's work
also supports Humphrey's claim that innovators are
intuitive (N) creators. Because these types are more
often "iso-devs," they do not succeed well in structured
environments. Assumptions made in the current research
are that the environments of newly founded High-Tech
businesses are not structured, and that those of older
firms become structured. Therefore, it would appear
appropriate to assume that intuitive (N) types, "iso-
devs," would be the predominant type founding new High-
Tech firms, and that sensing (S) types would predominate
in older businesses.

## Summary of Personality Type and Leadership

The elements of leadership have been the same for
centuries, however, there is little agreement on which
elements are truly predictive of leadership success. A
similarity of characteristics between leaders, however,
exists and researchers have tried to identify these
similarities. Some of the characteristics (factors),
which appear to be common among all leaders are:
intelligence, esprit, aloofness, flexibility, locus of
power, ability to communicate, creativity, emotional

balance, and conformance (Stogdill, 1974, p. 96). Most of these factors have been measured using the MBTI.

Some success has been obtained measuring creativity and innovativeness. In this area it was found that intuitives (N) do better than sensing (S) types; the INTJ was found to be the most creative of all types. Creative people, innovators, were found to be more isolated and deviant from their groups than the less creative individuals. In terms of leadership activities requiring high communication skills, it was found that the extraverted intuitives (EN) seem to do better because they are perceived by others to be intellectuals. In terms of problem-solving and decision-making it was found that there is a greater frequency of thinking-judging (TJ) personality types in business roles requiring these activities than other types. Recent research, however, finds that perceptive types (P) are becoming more numerous among business decision-makers and problem-solvers.

Lastly, it was found that the personality type of a leader is related to the structure of his or her environment. Sensing types (S), for instance, are found as leaders more often in highly structured environments, while intuitive (N) types are more often found as leaders in dynamic environments. Throughout all of the leadership

research, but most strongly emphasized by Fiedler, there is reference to the contingency nature of reported results. In other words, results may hinge significantly on the environment in which the research was conducted, thus preventing unequivocal causative conclusions. The uncertainty of research results, therefore, seems to confirm the correctness of McCaulley's question: "How does each type show leadership" (1988, p. 22)?

## Relationship to Other Measures

Richter and Winter (1966) made a positive comparison between the MBTI and the Holtzman Inkblot Technique, identifying persons with creative potential. Corporate performance has been tested based on Type A and Type B behavior by Boyd (1984) revealing that firms run by Type As show a higher return on investment and greater five-year growth in sales revenue than firms run by Type Bs. Martin and Bartol (1986), and Dillon and Weissman (1987) showed a significant correlation between the MBTI and the Eysenck Personality Questionnaire in identifying Extraversion and Introversion. Dillon and Weissman (1987) report success in combining the results of the MBTI with the Strong Campbell II in helping individuals identify their work preferences.

John Ross (1966) correlated the MBTI and fifteen

standard ability tests, seven interest tests, and ten

personality scales and found some variation based on sex

and personal interests.

> Considered as a set, the Indicator variables are linked to ability, interest and personality variables. Considered individually, the E-I scale seems to behave as other extraversion scales do and not to relate to interest as it should; the S-N scale seems more to reflect ability and interest than perceptual style; the T-F scale reveals very little of itself; and, lastly, the J-P scale seems to show a sex difference, reflecting planfulness in males and both planfulness and spontaineity in females. The scales seem to have merit but more because they measure an interesting variety of surface characteristics than because they reflect deep-seated typological differences. Considered typologically, however, the scales in combination seem to manifest relationships which are not apparent at the individual level.

> On the evidence, one should not reject the hypothesis that the scales do reflect typological differences, or at any rate that patterns of scores on all scales carry information in addition to the scores considered singly, but it would seem that the scales also refect interpretable surface characteristics and that typological information, if present, may be lost amid more powerful surface signals (Ross, 1966, p.15).

## The Process of Founding Businesses

Conditions surrounding the start-up of businesses

require founders to behave differently from the average

person. A great deal of research has investigated these

differences and has resulted in similar conclusions. For

example, using the Kuder Occupational Interest Survey

(Kuder, 1970); Gordon's Survey of Interpersonal Values (SIV) (Gordon, 1960); and the Edwards Personal Preference Scale (Edwards, 1959) Baumback and Mancuso (1975) found that entrepreneurs (used in the sense of founders) were significantly differentiated on scales of achievement, support, independence and leadership from the entrepreneurs in standardized groups taking those tests. The respondents rated themselves significantly above average on need for achievement, self-reliance, competitiveness, initiative, confidence, versatility, perseverance, resilience, innovation and physical health. The entrepreneurs rated "willingness-to-work-hard," perseverance, "singleness-of- purpose," and "ability-to-work-with-people" as qualities necessary for success. In addition, Baumback and Mancuso found that the average length of time in business [of their respondents] was 13 years, and that the divorce rate among the founders was lower than the population average. Other characteristics of founder/entrepreneurs, recorded by Baumback and Mancuso (1975) were that they: were usually first-born in their families; gave credit to their fathers for inspiring motivation; were usually between 30 and 45 years of age when they started their first business, and their entrepreneurism got its start in their early teens. In addition, these respondents

averaged 16 years of schooling; they looked to outside professionals for advice; and they usually took their chairs with them when they left the firm.

Entrepreneurs with these characteristics usually are successful in dealing with the conditions accompanying start-ups. Delano, Johnson, and Woodworth (1966) and Haug (1990), provided statistics on the conditions accompanying the start-up of businesses in the State of Washington. They found that:

1. Ideas for founding businesses generally originated with one person.

2. Founders (entrepreneurs) could be classified into three groups: traditional, employment seeking, and "by-chance." The traditional types were most important in terms of success.

3. Businesses were founded by residents of the counties studied, with very little "in-migration" of the founders.

4. Very little assistance was supplied by formal organizations established to help founders of new ventures.

5. Bankers, lawyers, and accountants assisted in formation of new businesses.

6. The founders usually had substantial work experience in or skills applicable to the businesses they formed.

7. Founders funded the ventures with their own money using very little institutional funds.

8. The level of education was significantly and positively related to the number of firms which survived, volume of sales, and the generation of employment. Approximately 45% of their sample had 8-12 years of education, while about 17% had 16 years of education. Business was

the most frequent area of college concentration.

9. Ages of the founders ranged between 30 and 63.

10. About 60% of their respondents had been founders, owners, or partners in one or more businesses.

11. The majority of founders took less than two months to organize their businesses, but a small percentage took from one to five years.

12. Fifty-nine percent stated that they had achieved their objectives.

13. Reasons given for business discontinuances were as follows: 26.5% business failed; 26.5% business sold; 14.7% dissolved, but not failed; 11.7% other; 20.6% terminated, no reason given.

14. Over 90% evidenced interest in forming a new business.

15. Only 15% said that a new product would be provided as the result of forming the new business.

16. The three most prevalent activities of the founders were: financial aspects (51.8%), marketing (43.3%), and management and technical assistance (33.7%).

Baumback and Mancuso's list of characteristics and Delano, Johnson, and Woodworth's conditions, together, provide a complete description of the business start-up climate in which the founder's personality operates. The three elements together (i.e., characteristics, conditions, and personality types) provide powerful predictive insights.

Business Survival

The research done by Phillips and Kirchhoff (1988) not only corrects erroneously held assumptions about business failure rates, but also provides some clues about business survival. Their recent research confirms the agglomeration and geographical concentration phenomena of High-Tech businesses. It finds that very few High-Tech firms are founded in relation to non-High-Tech firms, and suggests that non-High-Tech geographical areas "settle for short run policies that focus on low tech start-ups. It is not likely that one region can lure an existing highly innovative firm away from another region, especially if the clustering effect dominates location decisions" (Kirchoff & Phillips, 1989, p. 16).

The results of their research show that 16.2 percent of all High-Tech firms are in the high growth decile which means

> . . . that 11.2 percent of all surviving high growth firms are high technology firms while high tech firms as a group only represent 6.9 percent of all surviving firms, have a disproportionately large share of the high growth decile (includes all firms) (11.2 percent) and a disproportionately small share of the low growth decile (6.2 percent). In other words, high tech firms show greater growth (p. 10).

These data suggest that high levels of continuous innovation do affect firms' rates of growth (p.12).

During two periods, 1976-80 and 1980-84, High-Tech births remained constant at about 64% of the population. Deaths were constant at about 44% (Dennis & Phillips, 1990, p.4). Perhaps the most spectacular results of this line of research are that

> . . . most firms do not grow in the first four years. On average, only ten percent of firms show growth in the first four years. By the sixth year, however, 34.3 percent of the firms show growth and over fifty percent show growth within eight years (Phillips & Kirchoff, 1989, p. 65).

Additional results show that if a new entry firm grows even as little as adding one employee, its survival rate more than doubles to 65.0 percent. If the growth rate increases, the survival rate increases ". . . ultimately reaching 77.5 percent for high growth firms" (p. 69). Further, the initial size of the firm impacts survival rates heavily. Survival rates for larger firms is 72.4 percent; for tiny firms it is 65.0 percent. Additionally, age, when correlated with growth, produces significantly higher survival rates. Figure 3-6 summarizes the growth related to survival data. Achieving even low growth in startup companies is difficult. Small firm founders are beset with a bewildering, demanding panoply of urgent problems which make their lives a race against time. Planning helps, but if there is only one person to do it all, "conscious

anything" is an accident.

| Employment growth | Percentage surviving to: | | |
|---|---|---|---|
| | Two Years 1978-80 | Four Years 1980-82 | Six Years 1982-84 |
| Zero Growth | 70.5% | 37.5% | @7.5% |
| Low Growth (1 to 4) | 92.0% | 80.9% | 66.3% |

Figure 3-6. Percentage of small firms surviving, classified by number of jobs created firms born 1976-1978, surviving to 1984-1986 (Phillips & Kirchoff, 1989, p. 71).

## Implications For High-Tech Business Founders

The implications for founders of High-Tech firms advanced by the above research are that great efforts must be made to increase the size of their firms as rapidly as possible. This means more sales and more employees. That, in turn, means the need for management, marketing, capital, and financial sophistication. It means there is a great need for superior leadership skills and time management skills. If the founder of a new High-Tech business is primarily oriented towards technology, there will be a need for partners who can supply the other management skills.

# CHAPTER 4

## METHODOLOGY

### Overview

Specifically this research postulates that the frequencies of Myers-Briggs personalty types will differ between founders and non-founders of businesses, between founders of High-Tech and non-High-Tech businesses, and between successful and unsuccessful founders. The overall purpose of the research is to discover whether personality type is a predictor of High-Tech business founding and successful operation. Some of the questions which this study provides answers to are: Do some personality types start (found) businesses while others do not? Do some personality types start High-Tech businesses while other types start non-High-Tech businesses? Are some personality types more successful in operating High-Tech businesses as Chief Executive Officer (CEO) than others?

The purpose of this chapter is to describe the procedures used in the research design and analysis. The research design, the independent and dependent variables, the subjects, setting, data, and data collection methods are described, after which the research hypotheses and the statistical analysis methods are discussed.

## The Field Study Design

Field studies may be divided into two broad types: exploratory and hypothesis testing (Kerlinger, 1973, p. 406). "An example of this work is that done by the factor analyst who is preoccupied with the discovery, isolation, specification, and measurememt of underlying dimensions of achievement, intelligence, aptitudes, attitudes, situations, and personality traits" (p. 406). This work involves primarily hypothesis testing, but also seeks to explore relationships between the variables.

> Field studies are ex post facto inquiries aimed at discovering the relations and interactions among sociological, psychological, and educational variables in real social structures. . . any scientific studies, large or small, that systematically pursue relations and test hypotheses, that are ex post facto, and that are done in life situations like communities, schools, factories, organizations, and institutions will be considered field studies (Kerlinger, 1964, p. 405).

Field studies are strong in realism, significance, theory orientation, and heuristic quality. Their most obvious weakness is their ex post facto character. Generally their statements are weaker than those of experimental research, and may often have too many variables. Therefore, field studies may not have the precision of measurement achieved in experimental research. Feasibility, cost, sampling, and time are additional potential weaknesses (p. 407-408). What distinguishes this

research is the presence of all of these strengths, and the
lack of most of the weaknesses. A problem in generating a
large sample of failed founders may be its major weakness.

## Survey Defined

> Survey research studies large and small
> populations (or universes) by selecting and
> studying samples chosen from the populations to
> discover the relative incidence, distribution, and
> interrelations of sociological and psychological
> variables (Kerlinger, 1964, p. 410).

The conditions necessary for survey research to be
successful are satisfied by this field study in the
following ways:

A. The information needed is relevant to the
objectives of the project,

B. The questionnaire survey technique is the best
method available for the project,

C. The characteristics of the universe are known,
such as the geographical area and the types of
persons or cases in which the researcher is
interested, and,

D. The instruments are the most appropriate -- the MBTI
and the specially designed questionnaire (Clover &
Balsley, 1984).

This research used the Myers-Briggs Type Indicator
(MBTI) Form G, a survey questionnaire, to determine the
personality types of 907 male subjects in Washington State.

It also used a questionnaire especially designed to retrieve demographic data about the environments within which the High-Tech founders in our sample conducted their businesses.

"Survey researchers use a flow plan to outline the design and implementation of a survey" (Kerlinger, 1964, pp. 414-415). The steps in the flow plan for this research are: statement of the objectives; development of a sampling plan and the measurement instrument, construction of an interview schedule; collection of data; coding and tabulation of the data; analyzing the data (collating, assimilating, and interpreting); and reporting the results of the analyses (pp. 416-417). All of these conditions and steps are addressed in this chapter.

Prediction Versus Explanation Discussed

The purpose of most scientific inquiries is either to predict or explain phenomena. While not mutually exclusive, most research can be classified as mainly one or the other, however, the line of demarcation is not clear. "The customary distinction between explanation and prediction rests mainly on a pragmatic difference between the two" (Pedhazur, 1973, p. 135). In explanation, the outcomes of an event are known and the reasons have to be sought. Contrarily, in the case of prediction, the reverse is true: ". . . the initial conditions are given, and their 'effect' -- which, in the typical case, has not yet taken

place -- is to be determined" (p. 135). Explanation directly involves the establishment and use of theory, whereas prediction can be accomplished without the involvement of theory. Prediction, however, can be more effective with an explanatory base (Kerlinger, 1965; Pedhazur, 1973). "It remains true that if we can predict successfully on the basis of certain explanations we have good reason, and perhaps the best sort of reason, for accepting the explanation" (Kaplan, 1964, pp. 349-350).

Jungian-Myers-Briggs theory forms a rich explanatory base from which career sector predictions can be made. This research uses that base to determine whether the phenomena of High-Tech business founding and operation can be predicted.

## Objectives of The Research

While addressed variously in other parts of this dissertation, the objectives of this research are operationally restated here.

1. To determine if the personality types of founders of businesses are different than non-founders of businesses.

2. To determine if the personality types of founders of high-tech businesses are different than founders of non-high-tech businesses.

3. To determine if the personality types of

successful founders of high-tech businesses are
different than unsuccessful founders of high-tech
businesses.

4.  To determine the context (demographics) of the
    environment in      which the founders of high-
    tech businesses operate.

5.  To construct  profiles of the successful  and
    unsuccessful high-tech business founder
    functioning as Chief Executive Officer of the firm
    he founded by combining personality and
    demographic data.   These profiles include typical
    personality types, average ages, schooling,
    personal interests, attitudes about leadership,
    duties, finance, and founders' perceptions about
    what went right or wrong during their tenure as
    Chief Executive Officer.

The first three of these objectives are operationally
stated in the hypotheses which appear later in the chapter.

## The Variables

In laboratory experiments, where pre-tests and post-
tests are administered to record changes resulting from
interventions, independent variables are manipulated.
Kerlinger (1964, p. 405) states, however, that independent
variables are normally not manipulated in field studies;
which is the case in this study.   Here, the independent

variables are used to explain the dependent variables.

The independent variables. The independent variables used in this research are eight, three-place Myers-Briggs personality type indicators (i.e., STJ, NTJ, NTP, STP, NFJ, NFP, SFJ, and SFP). Traditionally, four-place indicators and sixteen archetypes are used, however, since extraversion (E) and introversion (I), are distributed equally in the general population (Myers & McCaulley, 1985), they were eliminated as non-relevant for this research.

These three-place indicators were used as independent variables because, while not easily manipulable in the experimental sense, they can be used meaningfully to explain the dependent variables in a logistic regression analysis and are consistent with the objectives of the research. The indicators are highly validated, longitudinally reliable descriptions of a person's personality and can be used operationally as categorical or dummy variables (Cohen, Cohen, & Cross, 1981; Loomes & Singer, 1980; Richek, 1969; Thompson & Borello, 1986; Tzeng, 1981; Ware & Yokomoto, 1985; Webb, 1964). Furthermore, it is customary for researchers investigating personality types and career sectors to employ frequency distributions of the sixteen types to construct career sector profiles (See appendix B, CAPT Atlas Career Profiles). The employment of MBTI

frequency distributions as independent variables is analogous to the career sector technique.

The dependent variables. Included as dependent variables are the six categories of founders of businesses: (1) founders of High-Tech businesses, (2) founders of non-High-Tech businesses, (3) founder/CEOs of successful High-Tech businesses more than two years old, (4) non-founders of businesses, (5) founders of all types of businesses, and (6) founder/CEO's of failed High-Tech businesses who liquidated their firms, went bankrupt, or were replaced as CEOs. These categories were used as dependent variables because they are efficient, clearly categorical, and appropriate for logistic regression analysis. They are efficient descriptions of the categories of subjects investigated in this research, and are customarily used for career sector analysis by other personality type researchers (Myers & McCaulley, 1985). Figure 4-1 lists the independent and dependent variables.

### Variables

| Independent | Dependent |
|---|---|
| **3-place Myers-Briggs Types** <br> STJ, NTJ, NTP, STP,NFJ, <br> NGP, SFJ, SFP. | **Founder Classifications** <br> Founders of High-Tech, <br> Founders non-High-Tech, <br> Successful High-Tech <br> Founders, Founders of <br> All Types of Businesses <br> and High-Tech Failed <br> Founders |

Figure 4-1. Independent and Dependent Variables.

## The Setting, Subjects, and Sampling Methods

In this section of the chapter the setting is discussed separately, but the subjects and sampling methods are combined. The combination is necessary in order to fully understand the nature of the categories of founders.

### The Setting

This research involved male subjects and was conducted in the State of Washington with the cooperation of the Small Business Administration (SBA), The University of Washington (UW), and the Washington State Department of Revenue (DOR). Washington is regarded as a leading, advanced technology state. In 1986 it was ranked by the U.S. Department of Commerce as fourteenth in the nation, mainly due to Boeing and Microsoft. The average firm is small. About 721 of the High-Tech firms listed in the Advanced Technology in Washington State 1990 Directory (Directory), employ from one to ten persons and, although they dominate the industry, they provide only 11% of the jobs. Most of the firms in the State are concentrated in the Standard Industrial Classification (SIC) 73, computer services and software (Directory, 1990).

### The Subjects and Sampling Methods

Appendix B is a flow chart describing the use of each category of founder in the analysis of MBTI frequency distribution differences. While the research could have

been confined to the High-Tech categories solely, a fuller understanding of the relationships in the universe of business founders makes the explanatory results richer and more practically useful.

Briefly, samples of the MBTI types of founders and non-founders of businesses are collected and then compared to see if these two categories have significantly different distributions. A similar process is followed for founders of non-High-Tech and High-Tech, and for successful and unsuccessful founders. The following describes the subjects in each of the samples, which sum to a total n of 907, and how they were aggregated.

<u>Non-founders of businesses (n = 312)</u>. Non-founders of businesses were subjects who were not CEOs or owners of businesses and who had never started a business. Non-founders of businesses were randomly aggregated from the personal files of the author and were screened so that only male non-founders were included. The sources of these data were: employees of businesses, and university faculty and students. The personality type distribution of this sample of 312 subjects was then compared with a composite sample of male college graduates from the files of the Center for the Application of Psychological Type (CAPT) as compiled by Myers and McCaulley (1985 p. 46). The purpose of this procedure was to establish the reliability of the current

sample.    When    compared,    there    were    no    significant differences  showing  that  this  sample  is  similar  to  other samples of non-founders.

Founders of businesses of all types (n = 252). This is a  general  category  which  is  an  undifferentiated  sample  of founders  of  all  types  of  businesses,  and  is  the  sum  of  the non-High-Tech  and  High-Tech  samples.    These        samples contain  founders  of  both  operating  businesses  of  all  ages and newly registered businesses. In order to obtain subjects who  were  founders  of    newly  registered  businesses,  seminars jointly sponsored by the SBA and UW were held at which these founders  were  tested  with  the  MBTI,  given  feedback  on  the results  of  their  tests,  introduced  to  the  concept  of personality  type  and  how  that  knowledge  could  benefit  them, and  presented  with  three  key  business  concepts  which  would help them operate their businesses. These subjects were not administered    the    specially    designed    demographic questionnaire.

Founders of Non-High-Tech Businesses (n = 116).    This sample  was  derived  from  139  respondents  to  a  mailer advertising  a  seminar  for  new  business  founders.  Six thousand  fliers  were  mailed  to  new  business  registrants randomly  selected    by  the  Washington  State  Department  of Revenue.    Fifty-eight    males    remained    after    female respondents  were  screened  out.    In  addition,  58  male

founders of non-high-tech businesses from the author's files were randomly selected and added to the above sample for a total sample size of 116.

The data collected from this sample were confined to the Myers-Briggs personality type of each respondent and were obtained from the MBTI, Form G. While other data are available from the MBTIs, they were not used. These respondents were not administered the special demographic questionnaire.

Founders of High-Tech Businesses (n = 136). By selecting the first and third companies on each page of the Advanced Technology Directory for the State of Washington (1990), a random sample of 104 founders of High-Tech businesses was obtained. In addition, 32 founders of new businesses were obtained from respondents to the fliers described in the preceeding section. The total sample size was 136 males.

Data collection methods for the 104 High-Tech founders are detailed in the next section. The only data collected from the 32 High-Tech founders were the Myers-Briggs personality types obtained from the MBTI, Form G.

Successful Founders of high-tech businesses more than two years old (n = 104). Founders who have been operating their firms successfully for two or more years are founders who not only started their businesses but continue to

operate them as CEOs. They were selected randomly from the Directory, telephoned to obtain their cooperation and, if cooperation was offered, mailed the MBTI and the special questionnaire with a return, self-addressed, stamped envelope. 138 potential subjects were contacted, 104 cooperated, providing a response rate of 75.36%.

Unsuccessful Founders of High-Tech businesses (n = 20). Founders of failed high-tech businesses are founders whose businesses were bankrupted, who have liquidated their businesses, or who have been removed from the leadership of their firms. Founder removal may have occurred as the result of investor or Board actions, or through a forced sale with terms which excluded the founder's services. Founders of firms which have failed do not enjoy being identified or interviewed. They wish to put their past record behind them, and to hide from scrutiny. In order to locate and test these individuals, it was necessary to ask venture capitalists, other founders of High-Tech firms, attorneys, and CPA's for referrals. The failed founders who had been identified were personally asked for interviews. During the interviews the subjects were administered the MBTI and the special questionnaire, adapted to obtain information about the dissolution of their businesses. While this sample is small, the response rate was 100%. All subjects who were contacted agreed to participate. Figure

4-2 summarizes the sample categories and sizes.

| Founder & Non-Founder<br>Sample Categories | Sample Sizes |
|---|---|
| Non-Founders of Businesses | 312 |
| Founders of Businesses | 252 |
| Founders of non-High-Tech Businesses | 116 |
| Founders of High-Tech businesses | 136 |
| Successful Founders | 100 |
| Failed Founders | 20 |
| Total | 936 |

Figure 4-2.  Sample Categories and Sizes.

Data Collected

In order to achieve the research objectives it was necessary to collect the following data on two survey instruments:

A.   The Myers-Briggs personality types of all founder/non-founder subjects, collected by administering the MBTI, Form G.

B.   Demographic data including those provided by the MBTI plus those provided by a special questionnaire (Appendix A) developed specifically for this study (data listed below in the questionnaire section).

The MBTI questionnaire. In order to obtain the personality types of each category of subjects the Myers-

Briggs Type Indicator (MBTI) Form G was administered to non-founders of businesses, founders, founders of high-tech firms, founders of non-high-tech firms, and successful and unsuccessful founders of high-tech firms. The MBTI provides an individual's personality profile by classifying the respondent into one of sixteen archetypes identified by a four-letter acronym (ESTJ, ISTJ, INTJ, ENFP, etc.). This acronym, or indicator, is interpreted to predict a range of behaviors characteristic of each archetype. For instance, by reading the acronym, it is possible to tell whether the individual is extraverted or introverted, whether the individual perceives the facts about his world by a sensation process or through intuitive processes, whether the individual makes decisions using objective or subjective logic, and whether the individual is closure oriented or prefers remaining open-ended and flexible. The MBTI also provides certain demographic data: age, years of schooling, job title, special interests (e.g., music, science, etc.), and whether the respondent likes his/her job.

The demographic questionnaire. A special questionnaire was designed to survey the founders of high-tech businesses in order to investigate the context within which they conducted business. The data retrieved from this questionnaire were combined with the MBTI data to construct profiles of successful and unsucessful founders of High-Tech

firms. This questionnaire can be reviewed in Appendix C, and was designed to collect the following data:

>Name of firm
>Founder's name, age, and sex
>Years firm in business
>Respondent's title
>Firm's products
>Respondent's list of his personal leadership
>  skills
>Respondent's perception of his major duties
>Respondent's ranking of his major areas of
>  responsibility
>Whether the respondent has started another
>  business, and if so, its name and products

An addendum to the special questionnaire collected the following data from all founders of firms which had failed:

>Whether the former founder/CEO still owns stock
>in the failed business
>Manner in which his services were discontinued
>(i.e., sold business, retired, resigned, or
>other)
>Whether the business was profitable at the time
>  founder left?
>Things which were "going for" business when the
>  respondent left
>Things which were problems at the time respondent
>left.

## Data Analysis Methods

The achievement of two types of analytical objectives was sought in this research. The first was to determine if personality type distributions differed between categories of founders. The second was to determine the odds by which the independent variables (Myers-Briggs personality types) predict the dependent variables (founder categories). In

order to achieve both of these objectives, the subjects in each founder category were randomly split into two equal (50%-50%) sub-samples labeled "calibration" and "validation" samples, a technique known as cross-validation.

## Cross-Validation, Two Sub-Samples and Regression Analysis

This procedure of randomly splitting samples into sub-samples and analyzing one while reserving the other for later testing is called cross-validation. Cross-validation is commonly used in "prediction" research employing multiple regression analyses. It is a practical method for testing the strength of the variables and the regression formula. In this process, the first sub-sample is called a "screening" sample and the reserved, or second, sample is referred to as the "calibration" sample (Lord & Novick, 1968, p. 285; Pedhazur, 1982, pp. 149-150).

In multiple regression analyses, after the regression run is completed and $R^2$ is computed, adjustments are made in the variables, their weights, and the formulae and the reserved sample is run using the new model. On completion of this second run, the $R^2$'s of the two samples are compared. If the difference between the two $R^2$'s is insignificant, it is considered safe to use the model to test other similar problems in the same research arena. In this research cross-validation is used for the same generic purposes (i.e., as a validation of the original variables

and formulae), but with the added objective of testing the normality of the samples. Because of the differences between multiple-regression and logistic regression, the difference between the coefficients and Wald statistics is computed using Chi-square instead of a comparison of the $R^2$'s. This procedure will allow greater accuracy in assessing the reliability of the independent variables (Myers-Briggs indicators). Because of the slight change in objectives, we have re-named the two samples to reflect their individual purposes. The first sub-sample is called the calibration sample since the results of its analyses' will be used as a basis from which to compare the results from the second, or validation sample. The results of the validation sample analyses confirm, or disconfirm, those of the calibration sample. We make the assumption that if the second sample results do not significantly differ from the first sample's, the methods and variables of the calibration sample will be validated and the normality of the samples will be confirmed.

Logistic Regression

In order to determine the odds with which the IV's (three-place Myers-Briggs indicators) would predict the DV's (founder categories) in this research, the validation sample was set aside and the logistic regression program (Norusis, 1990) of the Statistical Package for the Social Sciences

(SPSS) was used to analyze the calibration MBTI sample data. Figure 4-3 illustrates the 8 x 1 factorial used to conceptualize this objective.

**X's**
**Personality Types**
**Independent Variables**

| | STJs | NTJs | NTPs | STPs | SFJs | SFPs | NFJs | NFPs |
|---|---|---|---|---|---|---|---|---|

**Y's**
**Founders**
**Categories**
**Dependent**      Beta Coefficients
**Variables**
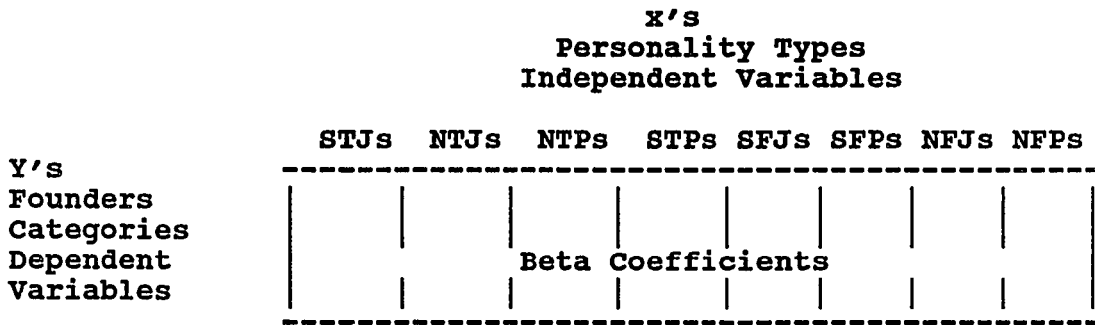
Figure 4-3. Conceptualization Model For Determining the Odds With Which Personality Types Predict Founder Categories.

The elementary linear regression formula, or a simple time series, describing a trend line, is $Y = a + bx$, where the dependent variable(s) is represented by Y and the independent variables as X's with "Beta" coefficients. The "a" represents the place at which the trend line intercepts the Y axis of a times series graph and is a constant. Multiple linear regression expands this formula to include many independent variables (X's) and their interrelationships. In either case, the interpretation of the Beta coefficients is straightforward. The Betas tell the amount of change in the dependent variable occurring for a one unit change in an independent variable.

Logistic regression coefficients, on the other hand, tell you the odds of an event occurring. "The odds of an

event occurring are [formally] defined as the ratio of the probability that it will occur to the probability that it will not occur" (Norusis, 1990, p. 49). Logistic regression is different from multiple linear regression because it is not concerned with the interrelationships of the variables. Because of this it lends itself well to both categorical and continuous variables. The SPSS logistic regression model provides several statistical assessments. Among these assessments are goodness of fit of the model and all of the variables and a test of the "hypotheses about the coefficients" (p. 49). This latter test uses the Wald statistic, alternatively known as the "runs test," which has a chi-square distribution. The Wald statistic assumes that the samples are independent and random, that the level of measurement is at least ordinal, and that the sample(s) have been drawn from populations having the same continuous distributions. "In the case of the runs test [Wald] we are hypothesizing that the two populations have exactly the same form and hence can be thought of as identical [normal]. We do not have to specify the nature of this form, however. It might be normal or it might not" (Blalock, 1979, p. 254).

By way of comparison, in a difference of means test we are focused on differences in central tendency rather than differences in dispersion or form. The Wald test tests for all of these possible differences simultaneously. "With

ordinal scales, it is of course meaningless to think in terms of means and standard deviations" (p. 254). The Wald statistic is the square of the ratio of the coefficients to their standard errors. As long as the coefficients are small, the Wald statistic allows direct interpretation of the coefficients without further testing. If, however, the coefficients are large, the standard error will be too large and the Wald statistic will be too small which leads to the chance that the null hypothesis will be inaccurately rejected. In cases where this inaccuracy is suspected, often the case where all variables are categorical, as in this analysis, it is necessary to build a model with and without each independent variable. The hypothesis check should then be based on the difference between the two likelihood-ratio chi-squares (p. 48).

This research first ran the logistic regression formula including the entire set of all independent variables. The results of this run produced suspect coefficients, so the regression was rerun, withholding each IV in a step-wise manner. The procedure produced smaller coefficients and more conservative results. This program was used rather than multiple regression or discriminant analysis because it predicts binary dependent variables more accurately (Norusis, 1990, p. 45). Figure 4-4 illustrates the data matrices prepared for this type of analysis.

| Founder Classes | 3-Place MBTI Indicators | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| $Y_1$ $Y_2$ $Y_3$ $Y_4$ $Y_5$ $Y_6$ | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP |
| 1  0  1  0  1  0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0  1  0  0  0  0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1  0  1  0  0  1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |

Figure 4-4.  Data Matrix For Logistic Regression Computation.

For each Y, the following regression formula was computed.

$$Y(0,1) = f(\text{personality types})$$

$$Y_1 = \text{founders}$$

$$Y_2 = \text{non-founders}$$

$$Y_3 = \text{founders, high-tech}$$

$$Y_4 = \text{founders, non-high-tech}$$

$$Y_5 = \text{founders, high-tech successful}$$

$$Y_6 = \text{founders, high-tech failed}$$

$$Y_{1,2,3,4,5,6} = a + STJ(0,1) + NTJ(0,1) + NTP(0,1) + STP(0,1) + SFJ(0,1) + SFP(0,1) + NFJ(0,1) + NFP(0,1)$$

Because it was suspected that the Wald statistic was too large, the regression formula was re-run withholding each IV in turn for each DV. The following is an example of this series of runs for $Y_1$, founders, where the first run does not withhold any IV's and each subsequent run withholds one IV:

$$Y_1 = STJ + NTJ + NTP + STP + SFJ + SFP + NFJ + NFP$$

$$Y_1 = \qquad\quad NTJ + NTP + STP + SFJ + SFP + NFJ + NFP$$
$$Y_1 = STJ \qquad\quad + NTP + STP + SFJ + SFP + NFJ + NFP$$
$$Y_1 = STJ + NTJ \qquad\quad + STP + SFJ + SFP + NFJ + NFP$$
$$Y_1 = STJ + NTJ + NTP \qquad\quad + SFJ + SFP + NFJ + NFP$$
$$Y_1 = STJ + NTJ + NTP \; + STP \qquad\quad + SFP + NFJ + NFP$$
$$Y_1 = STJ + NTJ + NTP \; + STP + SFJ \qquad\quad + NFJ + NFP$$
$$Y_1 = STJ + NTJ + NTP \; + STP + SFJ + SFP \qquad\quad + NFP$$
$$Y_1 = STJ + NTJ + NTP \; + STP + SFJ + SFP + NFJ$$

The coefficients computed by these formulae establish the odds, in relation to the withheld IV's, with which each independent variable (Myers-Briggs types) will predict each dependent variable (founders, founders of High-Tech, etc.). These analyses were performed independently, first on the calibration sample and then on the validation sample.

## Cross-Validation, Two Sub-Samples and Chi-square Analyses

While cross-validation is normally used in conjunction with multiple regression analyses, part of the process can be successfully employed to test differences in chi-square analyses. Splitting of the sample and performing chi-square analyses to test frequency differences was used in this research. Chi-square analysis was performed first on the calibration sample and then on the validation sample and then the two sets of results were compared as a method of confirming the relationships established in the calibration sample.

After the calibration sample run, the results were

noted and the data were reviewed for duplication and errors in recording as well as appropriateness of the regression formula. A decision to rerun the data in order to obtain larger beta coefficients was made after the first run. The rerun withheld each independent variable separately in order to yield more accurate Wald statistics. After rerunning the data, the results of both samples were compiled in tablular form and compared for differences using $X^2$.

In addition to the logistic regression analyses, the calibration sample's personality type distributions for each category of founders/non-founders were compared using chi-square analysis. Figure 4-5 shows an example of the 8 x 2 contingency table designed for the purpose of comparing the MBTI frequency distributions of founders and non-founders.

| Dependent Variables | Independent Variables | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP | n |
| Founders | 31 | 51 | 46 | 8 | 3 | 0 | 9 | 8 | 156 |
| Non-founders | 88 | 52 | 40 | 23 | 24 | 12 | 13 | 9 | 261 |
| Totals | 119 | 103 | 86 | 31 | 27 | 12 | 22 | 18 | 417 |

Figure 4-5. MBTI Frequency Contingency Table For Comparing the MBTI Personality Types of Founders and Non-Founders.

## Chi Square Computations

Chi-square ($x^2$) is a statistical measure used to

determine the significance of differences between observed and expected frequencies. Chi-square tests for the null hypothesis that there are no differences. If the computed chi-square is larger than the expected value at a given level of significance, it is possible to reject the null hypothesis. In contingency problems a one-tailed test, the upper tail is used; the lower tail which normally generates very small values is not used. ". . . chi square distributions represent a family of curves that always vary from zero to infinity and are skewed to the right, with the degree of skewness diminishing as [the degrees of freedom] increases" Blalock, 1979, p. 280). It performs particularly well when the data are independent and the sample size (N) is large (Blalock, 1979; Kerlinger, 1973). Since this study involves contingency research and the data are independent, $x^2$ is an appropriate, albeit approximate, measure of significance and is used with success in this research. The chi-square approximation used in this research is given by the formula

$$x^2 = \sum \frac{(f^o - f_e)^2}{f_e}$$

where $f_o$ and $f_e$ refer respectively to the observed and expected frequencies for each cell.

> . . . chi square is obtained by first taking the square of the difference between the observed and

expected frequencies in each cell. We divide this
figure by the _expected_ number of cases in each
cell in order to standardize it so that the
biggest contributions do not always come from the
largest cells. The sum of these nonnegative
quantities for all cells is the value of chi
square (Blalock, 1979, p. 281).

The assumptions made in computing chi square were:
the level of measurement used nominal scales, the model was
composed of random samples, and there were no differences
between the categories of founders.

The MBTI frequency distributions for each of the
classifications of founders were compared using the chi-
square method. Four sets of chi-square analyses using 8 x 2
contingency tables consisting of eight personality types and
two categories of founders were made to compare the
personality type frequencies of each category of founders.
Figure 4-6, shows the 8 x 2 factorial design for comparing
the MBTI frequencies of non-founders and founders of
businesses, from which a contingency table similar to the
one in Figure 4-3 was constructed.

**Personality Types**

| | STJs | NTJs | NTPs | STPs | SFJs | SFPs | NFJs | NFPs |
|---|---|---|---|---|---|---|---|---|

Founders

Frequency of Founders

Non-Founders

Frequency of non-Founders

Figure 4-6. Factorial Design For The Comparison of The Personality Types of Non-Founders of Businesses With Those of Founders of Businesses.

Figure 4-7 demonstrates the 8 x 2 factorial design for comparing the MBTI frequencies of founders of High-Tech with those of founders of non-High-Tech businesses.

**Personality Types**

| | STJs | NTJs | NTPs | STPs | SFJs | SFPs | NFJs | NFPs |
|---|---|---|---|---|---|---|---|---|

High-Tech
Founders

Frequency of High-Tech Founders

non-
High-Tech
Founders

Frequency of non-High-Tech Founders

Figure 4-7. Factorial Design For The Comparison of The Personality Types of Founders of High-Tech Businesses With Those of Founders of non-High-Tech Businesses.

Figure 4-8 demonstrates the 8 x 2 factorial design for comparing the MBTI frequencies of founder/CEOs of successful High-Tech businesses with those of failed High-Tech

businesses.

## Personality Types

| | STJs | NTJs | NTPs | STPs | SFJs | SFPs | NFJs | NFPs |
|---|---|---|---|---|---|---|---|---|
| Successful High-Tech Founders | | | Frequency of Successful High-Tech Founders | | | | | |
| Failed High-Tech Founders | | | Frequency of Failed High-Tech Founders | | | | | |

Figure 4-8. Factorial Design For The Comparison of The Personality Types of Founders of Successful High-Tech Businesses With Those of Founders of Failed High-Tech Businesses.

In addition to these comparisons of MBTI frequency distributions between founders/non-founders, chi-square was used to compare the calibration sample results with the validation sample results. Figure 4-9 illustrates the 8 x 2 contingency table designed to compare the two sub-samples.

### MBTI FREQUENCY DISTRIBUTION OF HI-TECH FOUNDERS

| Samples | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP | n |
|---|---|---|---|---|---|---|---|---|---|
| Calibration | 14 | 27 | 20 | 2 | 1 | 0 | 2 | 2 | 67 |
| Validation | 11 | 20 | 22 | 7 | 1 | 0 | 2 | 6 | 69 |
| Totals | 25 | 47 | 42 | 9 | 2 | 0 | 4 | 8 | 136 |

Figure 4-9. Contingency Table For Comparing the Calibration and Validation Samples of the MBTI Frequencies of Hi-Tech Founders' Myers-Briggs Types.

Questionnaire analysis.  The special questionnaires administered  to the successful and failed  high-tech founders  were coded by common themes found in the records of the interviews, summarized quantitatively, and reported in histograms, tables, and narrative.

Tables of the results were constructed and conclusions written (Appendix C).  On completion of these analyses of the calibration sample, the validation sample was analyzed in the same manner (Appendix D) and the results were compared with those of the calibration sample using Chi-square.

## The Experimental Hypotheses

The following hypotheses were tested in this research:

Hypothesis I:  there is a greater frequency of Myers-Briggs personality types STJ, NTJ and NTP than STP, SFJ, SFP, NFJ and NFP types among those who found their own businesses.

Hypothesis 2:  there is a greater frequency of Myers-Briggs STJ, STP, SFJ, SFP, NFJ and NFP types than of NTJs and NTPs among people who are non-founders of businesses.

Hypothesis 3:  there is a greater frequency of Myers-Briggs personality types NTJ and NTP than of STJ, STP, SFJ, SFP, NFJ, and NFP types among founders of Hi-Tech businesses.

Hypothesis 4: there is a greater frequency of Myers-Briggs personality types STJ and NTJ than of NTP, STP, SFJ, SFP, NFJ, and NFP types among founders of non-High-Tech businesses.

Hypothesis 5: there is a greater frequency of Myers-Briggs personality types STJ, NTJ, and NTP among founders running successful High-Tech businesses than of the STP, SFJ, SFP, NFJ, and NFP types;

Hypothesis 6: there is a greater frequency of the STP, SFJ, SFP, NFJ, and NFP Myers-Briggs personality types of Hi-Tech firms who have unsuccessfully operated their firms than of the STJ, NTP, and NTJ types.

## Summary of Research Methods

The Myers-Briggs personality types of founders and non-founders of businesses were identified and their frequencies were reported in founder/non-founder categories. The total MBTI data were randomly split into two 50% samples labeled "calibration" and "validation" samples for the purpose of cross-validation, and the "validation" sample was set aside while statistical analyses were conducted on the "calibration" sample. Logistic regression on the calibration sample was used to determine the odds with which each MBTI type predicts each founder/non-founder category. This same analysis was then performed on the validation

sample, after which the results from the two sub-samples were compared using $X^2$.

The MBTI frequency distributions of each founder category were compared using the chi-square method. This was to determine whether there is a difference in the distributions between each classification. Qualitative and demographic data obtained from special questionnaires and through interviews with the successful and failed High-Tech founders were summarized and are reported in Chapter 5 as demographic and personal management proclivities using histograms, tables and narrative.

# CHAPTER 5

## RESEARCH RESULTS AND ANALYSIS

### Overview

This chapter presents the results of the analyses of the research hypotheses. The independent variables in all of the analyses are eight, 3-place Myers-Briggs personality type indicators: STJ, NTJ, NTP, STP, SFJ, SFP, NFJ, NFP. The dependent variables are six categories of founders of businesses: founders $(Y_1)$, non-founders $(Y_2)$, founders of High-Tech firms $(Y_3)$, founders of non-High-Tech firms $(Y_4)$, founders of successful High-Tech firms $(Y_5)$, and founders of failed High-Tech firms $(Y_6)$.

Four types of analyses were conducted: frequency distributions of the Myers-Briggs personality types; t-tests of these distributions; logistic regression analysis of the data for each category of founders; and chi-square tests on the personality type frequency distributions between categories of founders. First the results of these analyses are reported for the calibration sample, and then for the validation sample; each of these sections is summarized separately. Then the results from the two samples are compared. The chapter ends with a discussion of demographic data retrieved from the High-Tech founders and a general

summary of all the results.

## Myers-Briggs Frequency Distribution Analysis

There are two parts to the frequency analysis. First a
1 X 8 table is constructed to distribute the type frequencies
for a category of founder such as Figure 5-1.

Dependent
Variable                    Independent Variables

| | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| Founders | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 000 |

Figure 5-1.    Calibration Sample MBTI Frequencies
For Founders of Businesses.

Second, the groups of frequencies implied by the
hypothesis are tested for significance using a t-test.
Because the hypotheses were stated so that the sums of groups
of frequencies could be compared, a t-test is used to test the
significance of differences between these groups, thereby
confirming or disconfirming the hypotheses. For instance,
Hypothesis I states that "There will be a greater frequency of
Myers-Briggs personality types STJ, NTJ, and NTP than STP,
SFJ, SFP, NFJ, and NFP types among those who found their own
businesses." A t-test is used to compare the sum of the
frequencies for the group STJ, NTJ, and NTP, and the sum of
the frequencies for types STP, SFJ, SFP, NFJ, and NFP.

## Logistic Regression Analysis

The research hypotheses' statements imply that the independent variables, (i.e., the Myers-Briggs personality types), predict the dependent variables (i.e., founder categories). Therefore, tests of the research hypotheses are made using the logistic regression program of the Statistical Package for the Social Sciences, Release 4 (SPSS). The logistic regression program will determine the odds with which the independent variables predict the dependent variables. The tests for each dependent variable include seven regression runs, each withholding one variable. Normally the withheld variables appear as unimportant variables in the other runs. Because the results produced by this method are in relation to the withheld variable, more reliable beta coefficients and Wald statistic significance levels are obtained. The two runs with the highest positive coefficients and highest Wald statistic significance levels are selected for reporting and tables displaying these results are included in the discussion.

Logistic regression coefficients. "In logistic regression you directly estimate the probability of an event occurring. . . . The logistic model can be rewritten in terms of the odds of an event occurring" (Norusis, 1990, p. 49). A column labelled "Exp (B)" (exponents of beta) is provided in each table of logistic regression results. This column

provides the computational factor by which the beta coefficients are increased from 0 to form the odds. If B is positive, this factor will be 1 or more. If B is negative, the factor will be less than 1.

> For large samples, the test that a coefficient is 0 can be based on the Wald-statistic, which has a chi-square distribution. When a variable has a single degree of freedom, the Wald statistic is just the square of the ratio of the coefficient to its standard error.

> Unfortunately, the Wald statistic has a very undesirable property. When the absolute value of the regression coefficient becomes large, the estimated standard error is too large. This produces a Wald statistic that is too small, leading you to fail to reject the null hypothesis that the coefficient is 0, when in fact you should. Therefore, whenever you have a large coefficient, you should build a model with and without that variable and base your hypothesis test on the difference between the two likelihood-ratio chi-squares (p. 48).

In this research, most samples are large enough so that the coefficients and their standard errors are not too large. However, to be conservative, especially with the samples of less than 100, seven runs of the regression formula are made withholding a different variable for each run. This method produced enough coefficients with significant Wald statistics to successfully test the implications of the hypotheses. The two runs producing the best Wald statistic significance levels are selected for reporting.

The R statistic measures correlation and is included in

the logistic regression results tables for each hypothesis. This statistic can range from -1 to +1. A positive value of R indicates an increase in the odds that an event will occur. If R is negative, the reverse is true. In the reported runs, R is positive for the variables reported as predictors of the hypothesis.

Five additional statistics are included in the tables reporting the results of each regression run: -2 Log Likelihood, Model Chi-square, Improvement, Goodness of Fit, and Overall Prediction Accuracy (as a percent). These statistics measure the goodness of fit of the model. A large chi-square and significance level for the "-2 Log Likelihood" statistic indicates that the model (regression formula) used does not differ significantly from a "perfect model" (p. 52) when only the constant and not the variables are included in the formula. In most cases the significance of this statistic is high and, while it is included in the tables for each hypothesis, no comment about it is made in the text unless the value is high and the significance level is low. The "Model Chi-square" statistic measures the difference between the -2LL (-2 Log Likelihood) statistic for the model with only a constant and that of the current model with all the variables included. This statistic tests the null hypothesis that the coefficients for all of the terms in the current model, except the constant, are 0. A high significance level

causes one to reject the null hypothesis. The "Improvement" statistic is the change in -2 LL between successive steps of building a model. It tests the null hypothesis that the coefficients for the variables added at the last step are 0. In these analyses only one model is considered; the model with the constant and the seven independent variables included. For this reason, the model chi-square and the improvement chi-square values are always the same (p. 53). "Goodness of Fit" measures how well the model classifies the observed data and demonstrates how well the logistic model performs. Large significance values indicate that one does not reject the hypothesis that the model fits. The last statistic provided by the regression run results tables, "Overall Prediction Accuracy," is the measure of how well the ordinal data are classified. It compares, in percentages, how well the classification of the observed data fit the predicted classification of the data. For instance, if 93 founders were predicted to occur in a sample and 51 were observed to occur, the prediction accuracy percentage would be 64.58%. In the same set, if 92 were predicted not to occur and 63 actually did not occur, the prediction accuracy percentage would be 59.35%. To get the overall prediction accuracy, then, the two percentages would be averaged, in this case equalling 61.87%.

## Comparison of MBTI Frequency Distributions Between Categories of Founders

Frequency distributions between categories of founders

were compared using Chi square. Figure 5-2 demonstrates an example of the 2 X 8 matrix employed for this comparison.

|            | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP | TOTAL |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| Founders   | 00  | 00  | 00  | 00  | 00  | 00  | 00  | 00  | 000   |
| non-Founders | 00 | 00 | 00  | 00  | 00  | 00  | 00  | 00  | 000   |

Figure 5-2.  Frequency Distribution Comparison of Two
Categories of Founders.

Figure 5-3 illustrates the matrix used to report the results of the chi square computations used to test the significance of the comparison differences.

| Categories of Founders | $x^2$ Required | $x^2$ obtained | Sig. p = |
|------------------------|----------------|----------------|----------|
| Founders vs Non-Founders | 00.00 | 000.00 | <.000 |
| Founders non-High-Tech vs Founders High-Tech | 00.00 | 00.00 | <.000 |
| Founders, Successful vs Founders, Failed | 00.00 | 00.00 | <.000 |

Figure 5-3.  Chi Square Test Results For Calibration
Sample Comparisons of MBTI Frequency
distributions for categories of founders.

The purpose of making these comparisons is to determine if the MBTI frequencies are different for founders versus for non-founders, for founders of non-High-Tech versus for High-Tech businesses, and for successful versus for failed founders.

Calibration Sample
Experimental Hypotheses Test Results

All of the data collected from each category of respondents were randomly divided, 50%-50%, into two samples. The two sets of data were labelled calibration and validation samples, and analyses were performed on the calibration sample while the validation sample was set aside to be analyzed after the tests of the calibration sample had been completed. Calibration sample test results for each of the hypotheses are reported below.

Hypothesis I:  There will be a greater frequency of Myers-Briggs personality types STJ, NTJ and NTP than STP, SFJ, SFP, NFJ and NFP types among those who found their own businesses.

Figure 5-4 displays the MBTI frequency distribution for founders of businesses in the calibration sample. A t-test result supports the hypothesis by showing that the sum of the frequencies for STJs, NTJs, and NTPs (139) is significantly greater (p <.001) than the sum of the STPs, SFJs, SFPs, NFJs, and NFPs (29). Hypothesis I is thus confirmed.

| | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| Founders | 39 | 56 | 44 | 8 | 3 | 0 | 11 | 7 | 168 |

Figure 5-4.   Calibration Sample MBTI Frequencies
For Founders of Businesses.

Logistic regression analysis partially supports the implications of this hypothesis. The two best regression runs were with the SFJs and NFPs withheld. Tables 2 and 3 display the statistical results of the two best logistic regression runs. With the SFJ's withheld the beta coefficients predict NTJs (p <.0216), and the NTPs (p <.001) with the highest odds of becoming founders. When NFPs are withheld, the beta coefficients of the NTJs (p <.0892), NTPs (p < .0431) predict these types with the highest odds of becoming founders. The prediction accuracy with which the model classifies the data is 61.87%, and the Goodness of Fit statistic indicates that the model is close to "perfect." The logistic regression results support the implications of Hypothesis I for the NTJ and NTP types, but do not support the implications for STJ types. The summary of these results is shown in Table 1.

Table 1

Summary of Results of Hypothesis I
Analyses

| Hyp # | High Group | Freq | t-Test Comparison | Wald Stat. p = | Accuracy % | Fit |
|-------|-----------|------|-------------------|----------------|-----------|-----|
| I | STJ | 39 | n = 168 | -- | 61.87% | Yes |
| | NTJ | 56 | other =29 | <.0216 | | |
| | NTP | 44 | 139 > 29 | | | |
| | | | p = <.001 | | | |

Table 2

Hypothesis I, Logistic Regression Analysis
SFJ WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|---|---|---|---|---|---|---|---|
| STJ | 1.0158 | 0.6822 | 2.2176 | 1 | 0.1364 | 0.0229 | 2.7617 |
| NTJ | 1.5763 | 0.6862 | 5.2768 | 1 | 0.0216 | 0.0890 | 4.8373 |
| NTP | 1.8064 | 0.7010 | 6.6409 | 1 | 0.0100 | 0.1059 | 6.0885 |
| STP | 0.1835 | 0.8045 | 0.0520 | 1 | 0.8196 | 0.0000 | 1.2014 |
| SFP | -5.9196 | 13.8704 | 0.1821 | 1 | 0.6695 | 0.0000 | 0.0027 |
| NFJ | 1.6876 | 0.9174 | 3.3837 | 1 | 0.0658 | 0.0578 | 5.4064 |
| NFP | 0.7225 | 0.9043 | 0.6383 | 1 | 0.4243 | 0.0000 | 2.0596 |
| Constant | -1.2821 | 0.6519 | 3.8680 | 1 | 0.0492 | | |

| STATISTICS | Chi-Square | df | Sig. |
|---|---|---|---|
| -2 Log Likelihood | 385.2570 | 291.0000 | 0.0002 |
| Model Chi-Square | 28.8400 | 7.0000 | 0.0002 |
| Improvement | 28.8400 | 7.0000 | 0.0002 |
| Goodness of Fit | 291.9050 | 291.0000 | 0.4740 |

Overall Prediction

% Accuracy          61.87%

Table 3

Hypothesis I, Logistic Regression Analysis
NFP   WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|---|---|---|---|---|---|---|---|
| STJ | 0.5288 | 0.6338 | 0.6962 | 1 | 0.4040 | 0.0000 | 1.6969 |
| NTJ | 1.0856 | 0.6387 | 2.8870 | 1 | 0.0892 | 0.0463 | 2.9612 |
| NTP | 1.3218 | 0.6536 | 4.0896 | 1 | 0.0431 | 0.0710 | 3.7503 |
| STP | -0.3073 | 0.7644 | 0.1616 | 1 | 0.6877 | 0.0000 | 0.7355 |
| SFJ | -0.3073 | 0.8980 | 0.1171 | 1 | 0.7322 | 0.0000 | 0.7355 |
| SFP | -6.4104 | 13.8681 | 0.2137 | 1 | 0.6439 | 0.0000 | 0.0016 |
| NFJ | 1.1968 | 0.8824 | 1.8394 | 1 | 0.1750 | 0.0000 | 3.3095 |
| Constant | -0.7913 | 0.6017 | 1.7297 | 1 | 0.1884 | | |

| STATISTICS | Chi-Square | df | Sig. |
|---|---|---|---|
| -2 Log Likelihood | 385.786 | 291 | 0.0002 |
| Model Chi-Square | 28.311 | 7 | 0.0002 |
| Improvement | 28.311 | 7 | 0.0002 |
| Goodness of Fit | 291.953 | 291 | 0.4733 |

Overall Prediction

% Accuracy          61.87%

<u>Hypothesis II</u>:  There will be a greater frequency of Myers-
Briggs STJ, STP, SFJ, SFP, NFJ and NFP types
than of NTJ and NTP types among people who
are non-founders of businesses.

This hypothesis is supported as shown by the frequency
distribution displayed in Figure 5-5. A t-test shows that
the sum of the STJs, STPs, SFJs, SFPs, NFJs, and NFPs (100)
was signicantly greater (p <.001) than the sum of the NTJs and
NTPs (56). Hypothesis II is supported by the frequency
distribution and the t-test analysis.

| | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| Non-Founders | 50 | 36 | 20 | 18 | 11 | 7 | 4 | 10 | 156 |

Figure 5-5.    Calibration Sample MBTI Frequencies
For Non-Founders of Businesses.

Logistic regresssion analyses also partially support the
implications of this hypothesis. The two best regression runs
are with the NTJs and NTPs withheld. Tables 5 and 6 report the
statistical results of these two best   logistic regression
runs.  With the NTJs withheld, the beta coefficients of the
STPs (p <.0092), SFJs (p <.0545), and STJs (p <.0955) predict
non-founders with the highest odds.  When   NTPs are withheld
the beta coefficients of the STPs   (p <.0041), SFJs (p <
.0300) and STJs (p <.0394) predict non-founders with the
highest odds.  Hypothesis I predicts the STJs as founders and
Hypothesis II predicts the STJs as non-founders.  This was

done to reflect the fact that the STJs are the most frequent types in the general population, as well as the most frequent types occurring in business management thereby spawning the assumption that they would be found significantly in both the founder and non-founder categories. The prediction accuracy with which the model classifies the data is 61.20%, and the Goodness of fit statistics indicate that the model is close to "perfect." The logistic regression results support the implications of Hypothesis II that the STP, SFJ and STJ types predict non-founders of businesses with the highest odds. The summary of these results is reported in Table 4.

Table 4

Summary of Results of Hypothesis II
Analyses

| Hyp # | High Group | Freq | t-Test Comparison | Wald Stat. p = | Accuracy % | Fit |
|---|---|---|---|---|---|---|
| II | STJ | 50 | n = 156 | < .0394 | 61.20% | Yes |
| | STP | 18 | other = 100 | < .0041 | | |
| | SFJ | 11 | 100 > 56 | < .0300 | | |
| | SFP | 17 | p = < .001 | -- | | |
| | NFJ | 4 | | -- | | |
| | NFP | 10 | | -- | | |
| | = 100 | | | | | |

225

Table 5

Hypothesis II, Logistic Regression Analysis
NTJ WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp(B) |
|---|---|---|---|---|---|---|---|
| STJ | 0.4981 | 0.2988 | 2.7786 | 1 | 0.0955 | 0.0434 | 1.6456 |
| NTP | -0.3019 | 0.3442 | 0.7693 | 1 | 0.3804 | 0.0000 | 0.7394 |
| STP | 1.3448 | 0.5166 | 6.7775 | 1 | 0.0092 | 0.1074 | 3.8376 |
| SFJ | 1.3448 | 0.6993 | 3.698 | 1 | 0.0545 | 0.0640 | 3.8376 |
| SFP | 7.448 | 13.8566 | 0.2889 | 1 | 0.5909 | 0.0000 | 1716.346 |
| NFJ | -0.1592 | 0.6792 | 0.055 | 1 | 0.8146 | 0.0000 | 0.8528 |
| NFP | 0.8059 | 0.6614 | 1.4844 | 1 | 0.2231 | 0.0000 | 2.2386 |
| Constant | -0.2462 | 0.2113 | 1.3585 | 1 | 0.2438 | | |

| STATISTICS | Chi-Square | df | Sig. |
|---|---|---|---|
| -2 Log Likelihood | 387.365 | 291 | 0.0001 |
| Model Chi-Square | 26.732 | 7 | 0.0004 |
| Improvement | 26.732 | 7 | 0.0004 |
| Goodness of Fit | 292.027 | 291 | 0.4720 |

Overall Prediction

% Accuracy        61.54%

Table 6

Hypothesis II, Logistic Regression Analysis
NTP WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|---|---|---|---|---|---|---|---|
| STJ | 0.7128 | 0.3459 | 4.2454 | 1 | 0.0394 | 0.0736 | 2.0396 |
| MTJ | 0.1701 | 0.3463 | 0.2411 | 1 | 0.6234 | 0.0000 | 1.1854 |
| STP | 1.5629 | 0.5443 | 8.2455 | 1 | 0.0041 | 0.1228 | 4.7727 |
| SFJ | 1.5629 | 0.7200 | 4.7114 | 1 | 0.0300 | 0.0809 | 4.7727 |
| SFP | 7.6660 | 13.8577 | 0.3060 | 1 | 0.5801 | 0.0000 | 2134.573 |
| NFJ | 0.0588 | 0.7005 | 0.0071 | 1 | 0.9331 | 0.0000 | 1.0606 |
| NFP | 1.0239 | 0.6833 | 2.2456 | 1 | 0.1340 | 0.0244 | 2.7841 |
| Constant | -0.4643 | 0.2721 | 2.9122 | 1 | 0.0879 | | |

| STATISTICS | Chi-Square | df | Sig. |
|---|---|---|---|
| -2 Log Likelihood | 387.899 | 291 | 0.0001 |
| Model Chi-Square | 26.199 | 7 | 0.0005 |
| Improvement | 26.199 | 7 | 0.0005 |
| Goodness of Fit | 292.005 | 291 | 0.4724 |

Overall Prediction
% Accuracy        61.20%

<u>Hypothesis III</u>;    There will be a greater frequency of Myers-
               Briggs personality types NTJ and NTP than
               of STJ, STP, SFJ, SFP, NFJ, and NFP types
               among founders of High-Tech businesses.

Figure 5-6 displays the MBTI frequency distribution for

Hypothesis III of the calibration sample. T-test    results

support   the   hypothesis   by   showing   that   the   sum   of   the

frequencies for NTJs and NTPs (74) is significantly greater (p

<.001) than the sum of the frequencies of the STJs, STPs,

SFJs, SFPs, NFJs, and the NFPs (32).         Hypothesis III is

thus   confirmed   by   the   frequency   distribution   and   t-test

analysis.


|                        | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP | TOTAL |
|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| High-Tech Founders     | 20  | 39  | 35  | 4   | 3   | 0   | 3   | 2   | 106   |

Figure 5-6.    Calibration Sample MBTI Frequencies
               For Founders of High-Tech Businesses.


Logistic regression analysis supports the implications of

this hypothesis.   The two best regression runs were with the

STJs   and   STPs   withheld.     Tables   8   and   9   display   the

statistical results of the two best logistic regression runs.

With the STJs withheld the beta coefficients of the NTPs (p

<.0004)   and   NTJs   (p   <.009)     predict   High-Tech   business

founders with the highest odds.   With STPs withheld, the beta

coefficients   of   the   NTPs   (p   <.0020),   and   NTJs   (p   <.0063)

predict founders of High-Tech firms with the highest odds.

The prediction accuracy with which the model classifies the data is 66.22%, and the Goodness of Fit statistics indicate that the model is close to "perfect." The logistic regression results support the implications of Hypothesis III that the NTJ and NTP types predict founders of High-Tech firms with the highest odds. The summary of these results is shown in Table 7.

Table 7

Summary of Hypothesis III
Analyses Results

| Hyp # | High Group | Freq | t-Test Comparison | Wald Stat. p = | Accuracy % | Fit |
|---|---|---|---|---|---|---|
| III | NTJ | 39 | n = 106 | < .0063 | 66.22% | Yes |
| | NTP | 35 | other = 32 | < .004 | | |
| | | = 74 | 74 > 32 | | | |
| | | | p = < .001 | | | |

Table 8

Hypothesis III, Logistic Regression Analysis
STJ WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|----------|------|------|------|----|-----|---|---------|
| NTJ | 1.0174 | 0.3279 | 9.6237 | 1 | 0.0019 | 0.1405 | 2.7659 |
| NTP | 1.2803 | 0.3643 | 12.3538 | 1 | 0.0004 | 0.1637 | 3.5979 |
| STP | -0.4345 | 0.6019 | 0.5209 | 1 | 0.4704 | 0.0000 | 0.6476 |
| SFJ | 0.0764 | 0.7119 | 0.0115 | 1 | 0.9146 | 0.0000 | 1.0794 |
| SFP | -6.0267 | 13.8573 | 0.1892 | 1 | 0.6636 | 0.0000 | 0.0024 |
| NFJ | 0.7695 | 0.6921 | 1.2363 | 1 | 0.2662 | 0.0000 | 2.1587 |
| NFP | -1.1276 | 1.0781 | 1.0939 | 1 | 0.2956 | 0.0244 | 0.3238 |
| Constant | -1.1750 | 0.2496 | 22.1515 | 1 | 0.0000 | | |

| STATISTICS | Chi-Square | df | Sig. |
|------------|-----------|----|----- |
| -2 Log Likelihood | 354.2400 | 291 | 0.0066 |
| Model Chi-Square | 32.1220 | 7 | 0.0000 |
| Improvement | 32.1220 | 7 | 0.0000 |
| Goodness of Fit | 292.0050 | 291 | 0.4724 |

Overall Prediction

% Accuracy 66.22%

Table   9

Hypothesis III, Logistic Regression Analysis
STP   WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|---|---|---|---|---|---|---|---|
| STJ | 0.6197 | 0.5933 | 1.0911 | 1 | 0.2962 | 0.0000 | 1.8584 |
| NTJ | 1.6018 | 0.5865 | 7.4581 | 1 | 0.0063 | 0.1189 | 4.9621 |
| NTP | 1.8544 | 0.6002 | 9.547 | 1 | 0.002 | 0.1398 | 6.3881 |
| SFJ | 0.6609 | 0.8621 | 0.5876 | 1 | 0.4434 | 0.0000 | 1.9364 |
| SFP | -5.4423 | 13.8658 | 0.1541 | 1 | 0.6947 | 0.0000 | 0.0043 |
| NFJ | 1.3540 | 0.8459 | 2.5623 | 1 | 0.1094 | 0.0382 | 3.8729 |
| NFP | -0.5431 | 1.1827 | 0.2109 | 1 | 0.6461 | 0.0000 | 0.5809 |
| Constant | -1.7595 | 0.5466 | 10.36 | 1 | 0.0013 | | |

| STATISTICS | Chi-Square | df | Sig. |
|---|---|---|---|
| -2 Log Likelihood | 353.6000 | 291 | 0.0070 |
| Model Chi-Square | 32.7630 | 7 | 0.0000 |
| Improvement | 32.7630 | 7 | 0.0000 |
| Goodness of Fit | 292.4870 | 291 | 0.4645 |

Overall Prediction

| % Accuracy | 66.22% |
|---|---|

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<u>Hypothesis IV</u>: There will be a greater frequency of Myers-Briggs personality types STJ and NTJ than of NTP, STP, SFJ, SFP, NFJ, and NFP types among founders of non-High-Tech businesses.

Figure 5-7 displays the MBTI frequency distribution for founders of non-High-Tech businesses in the calibration sample. The ranking of types is: (1) STJ, (2) NTJ, (3) NTP, (4) NFP, (5) STP, (6) NFJ, (7) SFJ, (8) SFP. A t-test shows that the sum of the STJ and NTJ (27) frequencies are significantly greater than the sum of all the others (13) at the .001 level. Hypothesis IV is therefore confirmed by the frequency and t-test analysis.

| | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| Non-High-Tech Founders | 17 | 10 | 6 | 2 | 0 | 0 | 2 | 3 | 40 |

Figure 5-7. Calibration Sample MBTI Frequencies
For Founders of Non-High-Tech Businesses.

The results of the logistic regression computation are mixed and do not totally agree with the frequency distribution. The two best regression runs are with the SFJs and NTJs withheld. Tables 11 and 12 display the statistical results of the two best logistic regression runs. With the SFJs withheld the beta coefficients of the NFPs (p <.0909), STJs (p <.1264), and NFJs (p <.1771) predict founders of non-High-Tech firms at higher odds than the other types; the Wald statistics, however, are not significant. The -2 Log

Likelihood of this run is not significant at p <.9982, but the Rs for the STJs and NFPs indicate that these types have a higher chance of occurring than the other types. The beta coefficients for the STJs, NTJs, NTPs, NFJs, and NFPs are all over 1.0 with high Exp B factors, which means that the odds are high that these types would be founders of non-High-Tech businesses. The Goodness of Fit significance indicates that the model is near "perfect," and the overall prediction is 86.62%, which is very high. Even though the significance levels of the Wald statistics in this run are not significant, the other measures suggest that the run supports the hypothesis. With the NTJs withheld the beta coefficients of the STJs (p <.1452) and NFPs (p <.1521) predict founders of non-High-Tech firms with higher odds than the other types. However, only the NFPs have a beta coefficient over 1.0. The R for the STJs again indicates that this type has a higher likelihood of occurring than any of the other types. The STJs, NFJs, and NFPs have high Exp B factors, which means that the odds are increased substantially. The -2 Log Likelihood statistic is not significant for this run, but the Goodness of Fit statistic indicates that the model is near "perfect." The overall prediction percentage is high at 86.62%. The Wald statistic significance levels of these runs do not support the implications of Hypothesis IV, however the aggregation of the other statistics suggests that the hypothesis not be rejected

casually.  Because of these statistics the conclusion is made that the logistic regression analyses support the implications of Hypothesis IV that STJs  found non-High-Tech businesses and that NFJs and NFPs also form non-High-Tech firms.  Insofar as the STJs are concerned, these results are congruent with those of the frequency distribution analysis.  The summary of these results is shown in Table 10.

Table 10

Summary of Results of Hypothesis IV
Analyses

| Hyp # | High Group | Freq | t-Test Comparison | Wald Stat. p = | Accuracy % | Fit |
|-------|-----------|------|-------------------|----------------|------------|-----|
| IV | STJ | 17 | n = 40 | < .1284 | 86.62% | Yes |
|    | NTJ | 10 | other = 13 | NTJ ----> | High Rs & | |
|    |     | = 27 | 27 > 13 | NFJ | Exp(B) | |
|    |     |      | p = <.001 | NFP | | |

Table 11

Hypothesis IV, Logistic Regression Analysis
SFJ WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|---|---|---|---|---|---|---|---|
| STJ | 1.9168 | 1.254 | 2.3364 | 1 | 0.1264 | 0.0378 | 6.7991 |
| NTJ | 1.3110 | 1.2902 | 1.0325 | 1 | 0.3096 | 0.0000 | 3.7098 |
| NTP | 1.1749 | 1.2662 | 0.8609 | 1 | 0.3535 | 0.0000 | 3.2377 |
| STP | 0.9799 | 1.4482 | 0.4578 | 1 | 0.4986 | 0.0000 | 2.6643 |
| SFP | -3.8239 | 13.9109 | 0.0756 | 1 | 0.7834 | 0.0000 | 0.0218 |
| NFJ | 1.9915 | 1.4755 | 1.8219 | 1 | 0.1771 | 0.0000 | 7.3268 |
| NFP | 2.3970 | 1.4178 | 2.8581 | 1 | 0.0909 | 0.0604 | 10.9903 |
| Constant | -3.3778 | 1.2458 | 7.3519 | 1 | 0.0067 | | |

| STATISTICS | Chi-Square | df | Sig. |
|---|---|---|---|
| -2 Log Likelihood | 225.7900 | 291 | 0.9982 |
| Model Chi-Square | 9.5280 | 7 | 0.2169 |
| Improvement | 9.5280 | 7 | 0.2169 |
| Goodness of Fit | 284.7850 | 291 | 0.5917 |

Overall Prediction

% Accuracy   86.62%

Table 12

Hypothesis IV, Logistic Regression Analysis
NTJ WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|---|---|---|---|---|---|---|---|
| STJ | 0.6173 | 0.4238 | 2.1215 | 1 | 0.1452 | 0.0227 | 1.8538 |
| NTP | -0.0941 | 0.5383 | 0.0305 | 1 | 0.8613 | 0.0000 | 0.9102 |
| STP | 0.3382 | 0.8090 | 0.1748 | 1 | 0.6759 | 0.0000 | 0.713 |
| SFJ | -6.1428 | 17.4481 | 0.1239 | 1 | 0.7248 | 0.0000 | 0.0021 |
| SFP | -6.1428 | 22.8432 | 0.0723 | 1 | 0.7880 | 0.0000 | 0.0021 |
| NFJ | 0.6734 | 0.8568 | 0.6177 | 1 | 0.4319 | 0.0000 | 1.9609 |
| NFP | 1.0788 | 0.7533 | 2.0512 | 1 | 0.1521 | 0.0148 | 2.9413 |
| Constant | -2.0597 | 0.3303 | 38.8868 | 1 | 0.0000 | | |

| STATISTICS | Chi-Square | df | Sig. |
|---|---|---|---|
| -2 Log Likelihood | 224.3860 | 291 | 0.9985 |
| Model Chi-Square | 10.9320 | 7 | 0.1416 |
| Improvement | 10.9320 | 7 | 0.1416 |
| Goodness of Fit | 280.0670 | 291 | 0.6669 |

Overall Prediction

% Accuracy          86.62%

Hypothesis V:   There will be a greater frequency of Myers-
Briggs personality types STJ, NTJ, and NTP
running successful High-Tech businesses than
there will be of STP, SFJ, SFP, NFJ, and NFP
types.

Figure 5-8 displays the MBTI frequency distribution for

successful founders of High-Tech businesses.   T-test results

support the hypothesis by showing that the sum of the STJ,

NTJ, and NTP (43) frequencies are significantly greater    (p

< .001) than the sum of the others (7), therefore Hypothesis V

is  confirmed by the frequency distribution data.

| | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| Successful High-Tech Founders | 10 | 18 | 15 | 2 | 1 | 0 | 2 | 2 | 50 |

Figure 5-8.   Calibration Sample MBTI Frequencies
For Founders of Successful High-Tech
Businesses.

The logistic regression analyses partially support the

implications of this hypothesis. The two best runs are with

the SFJs and STPs withheld. Tables 14 and 15 display the

statistical results of these two best regression runs. With

the SFJs withheld, the Wald statistic significance levels of

the beta coefficients of the NTJs        (p < .1285), NTPs (p

<.0702), and NFJs (p <.1997) do not significantly predict

founders of successful High-Tech firms.   The Rs for the STJs

and NTJs are high, and the coefficients and Exp(B) factors are

high, therefore indicating high odds for these types.   The -2

Log Likelihood statistic for this run is not significant, and the Goodness of Fit statistic is low suggesting that the model may be flawed. The fact that the overall prediction of accuracy is very high may be misleading. With the STPs withheld only the beta coefficient and Exp (B) statistic of the NTPs (p <.0348) predict successful founders of High-Tech businesses. While the -2 Log Likelihood statistic is not significant, the Goodness of Fit statistic is higher than the other runs giving confidence that the overall prediction of accuracy at 83.95% is acceptable. Both runs support the implication of Hypothesis V that NTPs run successful High-Tech businesses, but do not support the implication that the STJs successfully run High-Tech firms. The summary of these results is shown in Table 13.

Table 13
Summary of Results of Hypothesis V
Analyses

| Hyp # | High Group | Freq | t-Test Comparison | Wald Stat. p = | Accuracy % | Fit |
|-------|------------|------|-------------------|----------------|------------|------|
| V | STJ | 10 | n = 50 | -- | 83.95 | Poor |
| | NTJ | 18 | other = 7 | -- | | |
| | NTP | 15 | 43 > 7 | < .0348 | | |
| | | = 43 | p = <.001 | | | |

Table 14

Hypothesis V, Logistic Regression Analysis
SFJ WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|---|---|---|---|---|---|---|---|
| STJ | 1.0878 | 1.1897 | 0.8359 | 1 | 0.3605 | 0.0000 | 2.9677 |
| NTJ | 1.8283 | 1.2027 | 2.3110 | 1 | 0.1285 | 0.0344 | 6.2234 |
| NTP | 2.1483 | 1.1864 | 3.2785 | 1 | 0.0702 | 0.0697 | 8.5699 |
| STP | 0.8027 | 1.3865 | 0.3352 | 1 | 0.5626 | 0.0000 | 2.2316 |
| SFP | -4.0011 | 13.9046 | 0.0828 | 1 | 0.7735 | 0.0000 | 0.0183 |
| NFJ | 1.8143 | 1.4148 | 1.6444 | 1 | 0.1997 | 0.0000 | 6.1370 |
| NFP | 0.8980 | 1.5738 | 0.3256 | 1 | 0.5683 | 0.0000 | 2.4548 |
| Constant | -3.2006 | 1.1734 | 7.4405 | 1 | 0.0064 | | |

| STATISTICS | Chi-Square | df | Sig. |
|---|---|---|---|
| -2 Log Likelihood | 250.024 | 291.0000 | 0.9606 |
| Model Chi-Square | 13.428 | 7.0000 | 0.0623 |
| Improvement | 13.428 | 7.0000 | 0.0623 |
| Goodness of Fit | 298.768 | 291.0000 | 0.3644 |

Overall Prediction

    % Accuracy                84.28%

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Table 15

Hypothesis V, Logistic Regression Analysis
STP WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|---|---|---|---|---|---|---|---|
| STJ | 0.7097 | 0.8471 | 0.7020 | 1 | 0.4021 | 0.0000 | 2.0334 |
| NTJ | 1.4395 | 0.8410 | 2.9297 | 1 | 0.0870 | 0.0594 | 4.2186 |
| NTP | 1.768 | 0.8375 | 4.4568 | 1 | 0.0348 | 0.0966 | 5.8588 |
| SFJ | 0.4139 | 1.3147 | 0.0991 | 1 | 0.7529 | 0.0000 | 1.5127 |
| SFP | -4.3899 | 13.8780 | 0.1001 | 1 | 0.7518 | 0.0000 | 0.0124 |
| NFJ | 1.4255 | 1.1237 | 1.6094 | 1 | 0.2046 | 0.0000 | 4.1600 |
| NFP | 0.5092 | 1.3182 | 0.1492 | 1 | 0.6993 | 0.0000 | 1.6640 |
| Constant | -2.8118 | 0.7985 | 12.3989 | 1 | 0.0004 | | |

| STATISTICS | Chi-Square | df | Sig. |
|---|---|---|---|
| -2 Log Likelihood | 250.284 | 291.0000 | 0.9596 |
| Model Chi-Square | 13.169 | 7.0000 | 0.0681 |
| Improvement | 13.169 | 7.0000 | 0.0681 |
| Goodness of Fit | 295.917 | 291.0000 | 0.4089 |

Overall Prediction

| % Accuracy | 83.95% |
|---|---|

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Hypothesis VI:   There will be a greater frequency of
                 STP, SFJ, SFP, NFJ, and NFP Myers-Briggs
                 personality types of founders of High-Tech
                 firms who have been unsuccessful as CEOs
                 than there will be of STJ, NTP, and NTJ
                 types.

This hypothesis is not supported by the frequency distribution shown in Figure 5-9. In fact, the frequency distribution establishes the reverse of the hypothesis. A t-test indicates that the sum of the frequencies of the NTJs and NTPs (7) is significantly greater than the sum of the frequencies of all of the other types (3). This reversal of the hypothesis is important. Further investigation reveals that while there were more ENTJs who founded businesses, there were also more of the same type who failed. Adding the calibration and validation sample data together to form a larger sample produces five ENTJs who failed and only one INTJ who failed. The results of this frequency analysis, then, do not support the hypothesis and indicate that the exact opposite is true.

| | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| Failed High-Tech Founders | 2 | 4 | 3 | 0 | 1 | 0 | 0 | 0 | 10 |

Figure 5-9.   Calibration Sample MBTI Frequencies
              For Founders of Failed    High-Tech
              Businesses.

Logistic regression analysis does not support the implications of this hypothesis either. The two best regression runs were with the STPs and NFPs withheld. Tables 16 and 17 display the statistical results of these two best runs. With the STPs withheld (Table 16) the beta coefficients of the SFJs (p <.2206), NTPs (p <.2660), and NTJs (p <.3095) do not establish enough significance to quality them as predictors of failed founders. This run is especially interesting because of the large Exp (B) multipliers it develops. For instance, the beta coefficients of the NTJs (2.4867) and NTPs (2.5945), when multiplied by the Exp (B) factors of 12.0221 and 13.3892, respectively, produce very high odds of prediction. The R values for these types support the high odds. The goodness of Fit (.9820) and the overall prediction accuracy percentage (96.66%) statistics suggest that the reverse implications of the hypothesis not be casually rejected. Therefore it is concluded that the logistic regression analyses of this run partially confirm the reverse implications of Hypothesis VI.

Table 16

Hypothesis VI, Logistic Regression Analysis
STP WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|---|---|---|---|---|---|---|---|
| STJ | 1.2326 | 1.9353 | 0.4056 | 1 | 0.5242 | 0.0000 | 3.4301 |
| NTJ | 2.0199 | 1.9878 | 1.0326 | 1 | 0.3095 | 0.0000 | 7.5379 |
| NTP | 2.1486 | 1.9317 | 1.2372 | 1 | 0.5660 | 0.0000 | 8.5730 |
| STP | 2.6784 | 2.1864 | 4.5007 | 1 | 0.2206 | 0.0000 | 14.5619 |
| SFJ | -5.1265 | 62.1144 | 0.0068 | 1 | 0.9342 | 0.0000 | 0.0059 |
| SFP | -5.1265 | 51.9793 | 0.0097 | 1 | 0.9214 | 0.0000 | 0.0059 |
| NTJ | -5.1265 | 49.5637 | 0.0107 | 1 | 0.9176 | 0.0000 | 0.0059 |
| Constant | -5.0763 | 1.9208 | 6.9843 | 1 | 0.0082 | | |

| STATISTICS | Chi-Square | df | Sig. |
|---|---|---|---|
| -2 Log Likelihood | 82.68 | 291.0000 | 1.0000 |
| Model Chi-Square | 4.939 | 7.0000 | 0.6674 |
| Improvement | 4.939 | 7.0000 | 0.6674 |
| Goodness of Fit | 255.47 | 291.0000 | 0.9344 |

Overall Prediction

% Accuracy        96.66%

With the NFPs withheld (Table 17) the beta coefficients of the SFJs  (p <.8511), NTPs (p <.6174), and NTJs (p <.4810) again do not produce enough significance to qualify them as predictors.  Again, the Goodness of Fit and Overall Prediction Accuracy (96.66%) statistics are very good.  The Rs are not significant, but the Exp (B) multiplier factors develop  high odds for the NTPs (5.7627), NTJs (4.9876), and SFJs (9.6350). While the direction of the statistics of this run is the same as the previous run, the results are not convincing enough to suggest acceptance of the reverse of Hypothesis VI.

Table 17

Hypothesis VI, Logistic Regression Analysis
NFP    WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|---|---|---|---|---|---|---|---|
| STJ | 0.8437 | 2.2310 | 0.1428 | 1 | 0.7055 | 0.0000 | 2.3235 |
| NTJ | 1.60699 | 2.2806 | 0.4965 | 1 | 0.4810 | 0.0000 | 4.9876 |
| NTP | 1.7514 | 2.2290 | 0.6174 | 1 | 0.4320 | 0.0000 | 5.7627 |
| STP | -5.5395 | 33.6032 | 0.0272 | 1 | 0.8691 | 0.0000 | 0.0039 |
| SFJ | 2.2654 | 2.4557 | 0.8511 | 1 | 0.3563 | 0.0000 | 9.6350 |
| SFP | -5.5395 | 62.1245 | 0.0080 | 1 | 0.9289 | 0.0000 | 0.0039 |
| NFJ | -5.5395 | 51.9913 | 0.0114 | 1 | 0.9151 | 0.0000 | 0.0039 |
| Constant | -4.6633 | 2.2225 | 4.0270 | 1 | 0.0359 | | |

| STATISTICS | Chi-Square | df | Sig. |
|---|---|---|---|
| -2 Log Likelihood | 82.486 | 291 | 1 |
| Model Chi-Square | 5.133 | 7 | 0.6437 |
| Improvement | 5.133 | 7 | 0.6437 |
| Goodness of Fit | 252.412 | 291 | 0.9504 |

Overall Prediction

    % Accuracy                96.66%

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The summary of results for these two logistic regression analyses is included below as Table 18.

Table 18

Summary of Results of Hypothesis VI
Analyses

| Hyp # | High Group | Freq | t-Test Comparison | Wald Stat. p = | Accuracy % | Fit |
|---|---|---|---|---|---|---|
| VI | **Opposite** | | n = 10 | **Opposite** | 96.66% | Yes |
| | NTJ | 4 | | NTP \|----> | High Rs & | |
| | NTP | 3 | | NTJ \|----> | Exp(B) | |
| | = | 7 | | | | |

Because of the small sample size (10) and low variance, the same analysis was done on a larger sample (20) obtained by adding the calibration and validation sample data together. The best regression run was with the STPs withheld. This analysis produced essentially the same results as the runs on the small sample which predicted that the NTPs and NTJs have the highest odds of being unsuccessful founders of High-Tech businesses. The larger sample produced better Wald statistic significance levels. With the STPs withheld the beta coefficients of the NTPs (p <.1027), NTJs (p < .1257), and SFJs (p <.2477) predict unsuccessful founders with higher significance levels than the other types. In this run, the beta coefficients were substantial even though the Wald

statistic significance levels were low. The Exp (B) factors were high, thereby producing high odds. The small values of the Rs indicate that the variables have small partial contributions to the model. The high -2 Log Likelihood significance level indicates that the null hypothesis that the model fits can not be rejected. Withholding other IV's produced the same ranking order, but with weaker Wald statistic significance levels. This suggests that the problem with lower levels of significance is directly related to the sample size. A problem with logistic regression analysis with such small samples (in this case 20 divided into two samples of 10 each), frequencies of "1" will appear in one and not the other distribution thereby forcing slightly different beta coefficients. The summary of these results is shown in Table 19.

Table 19

Hypothesis VI, Logistic Regression Analysis
Large Sample
With STP Withheld

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|---|---|---|---|---|---|---|---|
| STJ | 1.6944 | 1.5934 | 1.1308 | 1 | 0.2876 | 0.0000 | 5.4433 |
| NTJ | 2.4867 | 1.6221 | 2.3501 | 1 | 0.1253 | 0.0447 | 12.0221 |
| NTP | 2.5945 | 1.5899 | 2.6629 | 1 | 0.1027 | 0.0614 | 13.3892 |
| SFJ | 2.1741 | 2.8807 | 1.3363 | 1 | 0.2477 | 0.0000 | 8.7940 |
| SFP | -3.7328 | 26.6743 | 0.0196 | 1 | 0.8887 | 0.0000 | 0.0239 |
| NFJ | -3.7328 | 21.3001 | 0.0307 | 1 | 0.8609 | 0.0000 | 0.0239 |
| NFP | 1.8063 | 1.8770 | 0.9255 | 1 | 0.3360 | 0.0000 | 6.0881 |
| Constant | -5.4699 | 1.5811 | 11.9679 | 1 | 0.0005 | | |

| STATISTICS | Chi-Square | df | Sig. |
|---|---|---|---|
| -2 Log Likelihood | 167.298 | 595 | 1.0000 |
| Model Chi-Square | 8.279 | 7 | 0.3087 |
| Improvement | 8.279 | 7 | 0.3087 |
| Goodness of Fit | 524.937 | 595 | 0.982 |

Overall Prediction

  % Accuracy          96.68%

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## Frequency Comparisons Between Categories of Founders

The purpose of comparing the frequency of personality types between each category of founders is to determine if founders have different personality types than non-founders, if founders of non-High-Tech firms have different personality types than founders of High-Tech firms, and if successful founders have different personality types than founders who have failed. Figure 5-10 shows the results of these comparisons for the calibration sample. The computations of chi-square for these comparisons are included as Appendix D.

| Categories of Founders | $x^2$ Required | $x^2$ obtained | Sig. p = |
|---|---|---|---|
| Founders vs Non-Founders | 24.32 | 194.74 | <.001 |
| Founders non-High-Tech vs Founders High-Tech | 24.32 | 126.27 | <.001 |
| Founders, Successful vs Founders, Failed | 16.622 | 17.24 | <.02 |

Figure 5-10. Calibration Sample Comparisons of MBTI Frequency Distributions For Categories of Founders.

A better comparison of successful and failed founders is obtained by comparing the calibration sample of the successful founders to the total sample (calibration plus validation samples) of the failed founders (Figure 5-11). It is apparent that the lower significance of the comparison shown in Figure 5-9, using only the calibration sample of the failed founders, is due to the lower variance of the smaller sample.

| Categories of Founders | $x^2$ Required | $x^2$ obtained | Sig. p = |
|---|---|---|---|
| Founders, Successful vs Founders, Failed Calib. + Valid. Samples | 24.32 | 27.14 | <.001 |

FIgure 5-11. Chi-square results comparison of MBTI frequency comparisons using the calibration sample of successful founders compared with the total sample of failed founders.

## Calibration Sample Tests Summary

Three types of tests were conducted on the research data of this sample: frequency analysis with the t-tests to confirm or disconfirm the statements of the hypotheses, logistic regression analyses to determine the odds with which the IVs predict the DVs, and chi-square analysis to determine whether there were differences between the categories of founders.

Summary of the frequency and logistic regression analyses. Statistical tests for Hypothesis I support it by confirming that the personality type frequency distribution of the STJs, NTJs, and NTPs is greater than the distribution for the STPs, SFJs, SFPs, NFJs, and NFPs. This hypothesis is also supported by the logistic regression analyses. Hypothesis II was supported by both the frequency and regression analyses, finding that there was a greater frequency of STJ, STP, SFJ, SFP, NFJ, and NFP types than of

NTJ and NTP types as non-founders of businesses, and that these type significantly predicted non-founder status. Frequency distribution and logistic regression analyses supported Hypothesis III, showing that there was a greater frequency of NTJs and NTPs as founders of High-Tech firms than of the other types, and that these types (NTJs and NTPs) significantly predicted founders of High-Tech businesses. Hypothesis IV was supported by the frequency distribution and partially supported by the logistic regression tests. Frequency analysis showed that the frequencies of the STJs and NTJs were higher than the other types, but also included the NTPs in the higher frequency range. The logistic regression analyses of this hypothesis confirmed STJs as predictors for founders of non-High-Tech businesses, but failed to confirm NTJs, instead identifying the NFPs and NFJs as highly significant predictors of the founders of non-High-Tech businesses. The results for Hypothesis V were mixed. The hypothesis was supported by the frequency distribution showing greater numbers of STJs, NTJs, and NTPs operating successful High-Tech firms; but the logistic regression analyses confirmed only the NTPs as founders operating successful businesses. A surprise finding was that, in addition to the NTJs and NTPs, the regression statistics identified the NFJs as predictors of this category of founders.

Because of small sample sizes, the results of the

analyses for Hypothesis VI are suspect. The frequency distribution of types did not confirm STPs, SFJs, SFPs, NFJs, and NFPs as founders who had lost their businesses. Instead, the frequency analysis identified the NTJs and NTPs as losers, and the regression analyses identified the NTPs, NTJs, and SFJs as best predictors of losers. By adding the calibration and validation sample frequencies together to form a total sample, the statistics improved, but results remained substantially the same: Hypothesis VI results were the opposite of those predicted.

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Table 20

Summary of Calibration Sample
Analyses Results

| Hyp # | High Group | Freq | f-Test Comparison[1] | Wald Stat, p =[2] | Accuracy %[2] | Fit[3] |
|---|---|---|---|---|---|---|
| I | STJ | 39 | n = 168 | -- | 61.87% | Yes |
|  | NTJ | 56 | other =29 | <.0216 |  |  |
|  | NTP | 44 | 139 > 29 |  |  |  |
|  | = | 139 | p = <.001 |  |  |  |
| II | STJ | 50 | n = 156 | < .0394 | 61.20% | Yes |
|  | STP | 18 | other = 100 | < .0041 |  |  |
|  | SFJ | 11 | 100 > 56 | < .0300 |  |  |
|  | SFP | 17 | p = < .001 | -- |  |  |
|  | NFJ | 4 |  | - |  |  |
|  | NFP | 10 |  | -- |  |  |
|  | = 100 |  |  |  |  |  |
| III | NTJ | 39 | n = 106 | < .0063 | 66.22% | Yes |
|  | NTP | 35 | other = 32 | < .004 |  |  |
|  | = 74 |  | 74 > 32 |  |  |  |
|  |  |  | p = < .001 |  |  |  |
| IV | STJ | 17 | n = 40 | < .1284 | 86.62% | Yes |
|  | NTJ | 10 | other = 13 | NTJ \|----> | High Rs & |  |
|  | = 27 |  | 27 > 13 | NFJ \| | Exp(B) |  |
|  |  |  | p = <.001 | NFP \| |  |  |
| V | STJ | 10 | n = 50 | -- | 83.95 | Poor |
|  | NTJ | 18 | other = 7 | -- |  |  |
|  | NTP | 15 | 43 > 7 | < .0348 |  |  |
|  | = 43 |  | p = <.001 |  |  |  |
| VI | Opposite |  | n = 10 |  | 96.66% | Yes |
|  |  |  |  | NTP \|----> | High Rs & |  |
|  |  |  |  | NTJ \|----> | Exp(B) |  |

Notes: [1] This column contains the ingredients for the t-test used to determine the significance of the difference between the high and low frequency groups. [2] This column contains the Wald statistic significance values if they were better than .05, or poorer but augmented by other statistics. It also contains types not in the high group of the frequency analysis. \|---> points to the reasons for listing these types. [3] This column contains the results of the Goodness of Fit test. "Yes" means the model is near "perfect," "Poor" means the fit is questionable.

Summary of the chi-square tests of differences between categories of founders. Chi-square comparisons of the personality type frequency distributions of each of the categories of founders showed that there were significant differences in the personality type distributions for each category: Founders are different from non-founders; founders of non-High-Tech businesses are different from founders of High-Tech businesses; and successful founders are different from founders who have failed.

## Validation Sample

### Experimental Hypotheses Test Results

The tests of the research hypotheses for the validation sample follow the same format as those for the calibration sample reported above. Again the tests include the use of frequency distributions and their t-tests. They also include the use of the logistic regression program of the Statistical Package for the Social Sciences, Release 4 (SPSS) with which seven regression runs, each withholding one variable, are made for each dependent variable. The two runs with the highest positive coefficients and highest Wald-statistic significance are selected for reporting. The independent variables are eight, 3-place Myers-Briggs personality indicators (STJ, NTJ, NTP, STP, SFJ, SFP, NFJ, NFP) and the dependent variables are six classes of founders of businesses (founders ($Y_1$), non-

founders ($Y_2$), founders of High-Tech firms ($Y_3$), founders of non-High-Tech firms ($Y_4$), founders of successful High-Tech firms ($Y_5$) , and founders of failed High-Tech firms ($Y_6$). T-tests for significance of the differences between the sums of the predicted high and low frequencies are also reported in this section.

Hypothesis I:   There will be a greater frequency of Myers-
                Briggs personality types STJ, NTJ and NTP
                than STP, SFJ, SFP, NFJ and NFP types among
                those who found their own businesses.

Figure 5-12 displays the MBTI frequency distribution for founders of businesses in the validation sample. A t-test supports the hypothesis by showing that the sum of the frequencies for STJs, NTJs, and NTPs (133) is greater        (p <.001) than the sum of the  STPs, SFJs, SFPs, NFJs, and NFPs (35).    Hypothesis I is thus confirmed by the frequency distribution and t-test analysis.

| | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| Founders | 35 | 53 | 45 | 15 | 2 | 0 | 9 | 9 | 168 |

Figure 5-12.   Validation Sample MBTI Frequencies
               For Founders of Businesses.

Logistic regression analysis partially supports the implications of this hypothesis. The two best runs were with the SFJs and NFPs withheld. Tables 21 and 22 display the statistical results of these two best logistic regression

Table 21

Hypothesis I, Logistic Regression Analysis
Validation Sample
SFJ  WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|---|---|---|---|---|---|---|---|
| STJ | 1.0589 | 0.5971 | 3.1450 | 1 | 0.0762 | 0.0522 | 2.8833 |
| NTJ | 1.9295 | 0.6044 | 10.1921 | 1 | 0.0014 | 0.1395 | 6.8864 |
| NTP | 2.3835 | 0.6359 | 14.0484 | 1 | 0.0002 | 0.1692 | 10.8424 |
| STP | 1.3013 | 0.6614 | 3.8716 | 1 | 0.0491 | 0.0667 | 3.6742 |
| SFP | -5.7211 | 13.8662 | 0.1702 | 1 | 0.6799 | 0.0000 | 0.0033 |
| NFJ | 1.1441 | 0.8084 | 2.0029 | 1 | 0.1570 | 0.0026 | 3.1397 |
| NFP | 0.6821 | 0.6869 | 0.9861 | 1 | 0.3207 | 0.0000 | 1.9780 |
| Constant | -1.4806 | 0.5574 | 7.0558 | 1 | 0.0079 | | |

| STATISTICS | Chi-Square | df | Sig. |
|---|---|---|---|
| -2 Log Likelihood | 381.357 | 296 | 0.0006 |
| Model Chi-Square | 39.603 | 7 | 0.0000 |
| Improvement | 39.603 | 7 | 0.0000 |
| Goodness of Fit | 297.282 | 296 | 0.4681 |

Overall Prediction

% Accuracy            65.13%

Table 22

Hypothesis I, Logistic Regression Analysis
Validation Sample
NFP WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|---|---|---|---|---|---|---|---|
| STJ | 0.3424 | 0.4286 | 0.6382 | 1 | 0.4244 | 0.0000 | 1.4084 |
| NTJ | 1.2046 | 0.4353 | 7.6561 | 1 | 0.0057 | 0.1159 | 3.3354 |
| NTP | 1.6585 | 0.4781 | 12.0320 | 1 | 0.0005 | 0.1544 | 5.2514 |
| STP | 0.6003 | 0.5190 | 1.3375 | 1 | 0.2475 | 0.0000 | 1.8226 |
| SFJ | -1.1903 | 0.8404 | 2.0058 | 1 | 0.1567 | -0.0037 | 0.3041 |
| NFJ | -6.4461 | 13.8599 | 0.2163 | 1 | 0.6419 | 0.0000 | 0.0016 |
| NFP | 0.4192 | 0.6912 | 0.3677 | 1 | 0.5442 | 0.0000 | 1.5207 |
| Constant | -0.7556 | 0.3673 | 4.2321 | 1 | 0.0397 | | |

| STATISTICS | Chi-Square | df | Sig. |
|---|---|---|---|
| -2 Log Likelihood | 380.022 | 296 | 0.0007 |
| Model Chi-Square | 40.938 | 7 | 0.0000 |
| Improvement | 40.938 | 7 | 0.0000 |
| Goodness of Fit | 297.06 | 296 | 0.4717 |

Overall Prediction

% Accuracy          65.13%

runs.    With the SFJ's withheld the beta coefficients of the

NTPs (p <.0002), NTJs (p <.0014),    and NFJs (p    <.1570)

predict founders with the    highest odds.    When NFPs are

withheld the beta coefficients of the    NTPs    (p <.0005), NTJs

(p <.0057),    and SFJs (p <.1570) predict founders with the

highest odds.    The overall prediction accuracy with which

the model classifies the data is 65.13%, and the Goodness of

Fit statistic indicates that the model is close to "perfect."

These logistic regression results    support the implications of

Hypothesis I for the NTJ and    NTP personality types but not

for the STJs.    Table 23 summarizes the data for Hypothisis I.

Table 23

Summary of Results of Hypothesis I
Analyses

| Hyp # | High Group | Freq | t-Test Comparison | Wald Stat. p = | Accuracy % | Fit |
|---|---|---|---|---|---|---|
| I | STJ | 35 | n = 168 | -- | 65.13%% | Yes |
|  | NTJ | 53 | other =35 | < .0014 |  |  |
|  | NTP | 45 | 133 > 35 | < .0002 |  |  |
|  |  | = 133 | p = <.001 |  |  |  |

<u>Hypothesis II</u>:    There will be a greater frequency of Myers-
Briggs STJ, STP, SFJ, SFP, NFJ and NFP types
than of NTJ and NTP types among people who
are non-founders of businesses.

This    hypothesis    is    supported    by    the    frequency

distribution displayed in Figure 5-13.    A t-test shows that

the sum of the STJs, STPs, SFJs, SFPs, NFJs, and NFPs (105)

was significantly greater (p <.001) than the sum of the NTJs and NTPs (51). Hypothesis II is supported by the frequency distribution and the t-test data.

| | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| Non-Founders | 48 | 33 | 18 | 15 | 14 | 7 | 7 | 14 | 156 |

Figure 5-13.    Validation Sample MBTI Frequencies
For Non-Founders of businesses.

Logistic regression analysis partially supports the implications of this hypothesis. The two best regression runs were with the NTJs and NTPs withheld. Tables 24 and 25 report the statistical results of these two best runs. With the NTJs withheld, the statistics indicate that the beta coefficients of the NFPs (p <.00992), SFJs (p <.0031), and STJs (p <.0134) predict non-founders with the highest odds. With the NTPs withheld the beta coefficients of the STPs (p <.0644), SFJs (p <.0008) and STJs (p <.0014) predict non-founders with the highest odds. The accuracy with which the model classifies the data is 64.80% and the Goodness of Fit indicates that the model is near "perfect." In both runs, the Exp (B) factors are extremely high for the SFP type (> 1980.589) and very high for the SFJ type (> 10.333) which means that the odds that these types predict non-founders is unusually high. The typical value for this multiplier ranges between < 1 to 4. As in the calibration sample, the

Table 24

Hypothesis  II, Logistic Regression Analysis
Validation Sample
NTJ    WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|---|---|---|---|---|---|---|---|
| STJ | 0.7890 | 0.3191 | 6.1117 | 1 | 0.0134 | 0.0988 | 2.2012 |
| NTP | -0.5134 | 0.3801 | 1.8248 | 1 | 0.1767 | 0.0000 | 0.5984 |
| STP | 0.5063 | 0.4383 | 1.3340 | 1 | 0.2481 | 0.0000 | 1.6591 |
| SFJ | 2.3353 | 0.7888 | 8.7655 | 1 | 0.0031 | 0.1268 | 10.333 |
| SFP | 7.5911 | 13.8569 | 0.3001 | 1 | 0.5838 | 0.0000 | 1980.589 |
| NFJ | 0.7259 | 0.6274 | 1.3387 | 1 | 0.2473 | 0.0000 | 2.0666 |
| NFP | 1.1879 | 0.4603 | 6.6605 | 1 | 0.0099 | 0.1052 | 3.2803 |
| Constant | -0.3894 | 0.2253 | 2.9874 | 1 | 0.0839 | | |

| STATISTICS | Chi-Square | df | Sig. |
|---|---|---|---|
| -2 Log Likelihood | 381.012 | 296 | 0.0006 |
| Model Chi-Square | 39.948 | 7 | 0.0000 |
| Improvement | 39.948 | 7 | 0.0000 |
| Goodness of  Fit | 297.159 | 296 | 0.4701 |

Overall Prediction

%  Accuracy                64.80%

Table 25

Hypothesis II, Logistic Regression Analysis
Validation Sample
NTP WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|---|---|---|---|---|---|---|---|
| STJ | 1.1612 | 0.3634 | 10.2099 | 1 | 0.0014 | 0.1397 | 3.1938 |
| NTJ | 0.3163 | 0.3687 | 0.7361 | 1 | 0.3809 | 0.0000 | 1.372 |
| STP | 0.8720 | 0.4714 | 3.4209 | 1 | 0.0644 | 0.0581 | 2.3916 |
| SFJ | 2.7112 | 0.8079 | 11.2611 | 1 | 0.0008 | 0.1483 | 15.0468 |
| SFP | 7.9670 | 13.8580 | 0.3305 | 1 | 0.5654 | 0.0000 | 2884.102 |
| NFJ | 1.1017 | 0.6513 | 2.8617 | 1 | 0.0907 | 0.0452 | 3.0094 |
| NFP | 1.5638 | 0.4923 | 10.0878 | 1 | 0.0015 | 0.1386 | 4.7768 |
| Constant | -0.7653 | 0.2851 | 7.2034 | 1 | 0.0073 | | |

| STATISTICS | Chi-Square | df | Sig. |
|---|---|---|---|
| -2 Log Likelihood | 382.136 | 296 | 0.0005 |
| Model Chi-Square | 38.824 | 7 | 0.0000 |
| Improvement | 38.824 | 7 | 0.0000 |
| Goodness of Fit | 297.443 | 296 | 0.4655 |

Overall Prediction

% Accuracy          64.80%

STJs are included in the non-founder predictor category as well as in the founder category. The logistic regression results support the implications of Hypothesis II that the STP, SFJ, and STJ types predict non-founders of businesses with the highest odds. Table 26 summarizes the data for Hypothesis II.

Table 26
Summary of Results of Hypothesis II
Analyses

| Hyp # | High Group | Freq | t-Test Comparison | Wald Stat. p = | Accuracy % | Fit |
|-------|-----------|------|-------------------|----------------|------------|-----|
| II | STJ | 48 | n = 156 | < .0014 | 64.80% | Yes |
| | STP | 15 | other = 51 | < .0644 | | |
| | SFJ | 14 | 105 > 51 | < .0008 | | |
| | SFP | 7 | p = < .001 | -- | | |
| | NFJ | 7 | | -- | | |
| | NFP | 14 | | -- | | |
| | = 105 | | | | | |

Hypothesis III; There will be a greater frequency of Myers-Briggs personality types NTJ and NTP than of STJ, STP, SFJ, SFP, NFJ, and NFP types among founders of High-Tech businesses.

Figure 5-14 displays the MBTI frequency distribution for Hypothesis III of the validation sample. A t-test supports the hypothesis by showing that the sum of the frequencies for the NTJs and NTPs (66) is significantly greater (p <.001) than the sum of the frequencies of the STJs, STPs, SFJs, SFPs, NFJs, and the NFPs (39). Hypothesis III is thus confirmed by

the frequency distribution data.

| | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| High-Tech Founders | 18 | 34 | 32 | 9 | 1 | 0 | 4 | 7 | 105 |

Figure 5-14. Validation Sample MBTI Frequencies
For Founders of High-Tech Businesses.

Logistic regression analysis supports the implications of this hypothesis. The two best regression runs were with the STJs and STPs withheld. Tables 27 and 28 display the statistical results of these two best logistic regression runs. With the STJs withheld the beta coefficients of the NTPs (p <.0000) and NTJs (p <.0028) predict High-Tech business founders with the highest odds. With STPs withheld the beta coefficients of the NTPs (p <.0052), and NTJs (p <.1497) predict High-Tech founders with the highest odds. The accuracy with which the model classifies the data is 69.14%, and the Goodness of Fit indicates that the model is near "perfect." The logistic regression results support the implications of Hypothesis III that the NTJ and NTP types predict founders of High-Tech businesses with the highest odds. Table 29 summarizes the data for Hypothesis III.

Table 27

Hypothesis III, Logistic Regression Analysis
Validation Sample
STJ WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|---|---|---|---|---|---|---|---|
| NTJ | 1.0492 | 0.3516 | 8.9053 | 1 | 0.0028 | 0.1327 | 2.8553 |
| NTP | 1.7540 | 0.3901 | 20.2154 | 1 | 0.0000 | 0.2158 | 5.7778 |
| STP | 0.5368 | 0.4844 | 1.2279 | 1 | 0.2678 | 0.0000 | 1.7105 |
| SFJ | -1.4240 | 1.0666 | 1.7826 | 1 | 0.1818 | 0.0000 | 0.2407 |
| SFP | -5.9177 | 13.8576 | 0.1824 | 1 | 0.6694 | 0.0000 | 0.0027 |
| NFJ | 0.5909 | 0.6678 | 0.7829 | 1 | 0.3763 | 0.0000 | 1.8056 |
| NFP | 0.1389 | 0.5092 | 23.2407 | 1 | 0.7850 | 0.0000 | 1.1490 |
| Constant | -1.2840 | 0.2663 | 10.1396 | 1 | 0.0000 | | |

| STATISTICS | Chi-Square | df | Sig. |
|---|---|---|---|
| -2 Log Likelihood | 351.774 | 296 | 0.0143 |
| Model Chi-Square | 40.111 | 7 | 0.0000 |
| Improvement | 40.111 | 7 | 0.0000 |
| Goodness of Fit | 297.005 | 296 | 0.4726 |

Overall Prediction

% Accuracy 69.41%

263

Table 28

Hypothesis III, Logistic Regression Analysis
Validation Sample
STP    WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|----------|-----|------|------|-----|-----|-----|---------|
| STJ | -0.3429 | 0.4778 | 0.5153 | 1 | 0.4729 | 0.0000 | 0.7097 |
| NTJ | 0.6950 | 0.4574 | 2.0754 | 1 | 0.1497 | 0.0139 | 1.9328 |
| NTP | 1.3638 | 0.4877 | 7.8121 | 1 | 0.0052 | 0.1219 | 3.9111 |
| SFJ | -1.8142 | 1.1060 | 2.6908 | 1 | 0.1009 | -0.0420 | 0.1630 |
| SFP | -6.3079 | 13.8607 | 0.2071 | 1 | 0.6490 | 0.0000 | 0.0018 |
| NFJ | 0.2007 | 0.7291 | 0.0758 | 1 | 0.7831 | 0.0000 | 1.2222 |
| NFP | -0.2513 | 0.5873 | 0.1831 | 1 | 0.6687 | 0.0000 | 0.7778 |
| Constant | -0.8938 | 0.3957 | 5.1027 | 1 | 0.0239 | | |

| STATISTICS | Chi-Square | df | Sig. |
|------------|-----------|-----|------|
| -2 Log Likelihood | 352.463 | 296 | 0.0134 |
| Model Chi-Square | 39.422 | 7 | 0.0000 |
| Improvement | 39.422 | 7 | 0.0000 |
| Goodness of Fit | 297.005 | 296 | 0.4726 |

Overall Prediction

  % Accuracy          69.41%

264

Table 29
Summary of Results of Hypothesis III
Analyses

| Hyp # | High Group | Freq | t-Test Comparison | Wald Stat. p = | Accuracy % | Fit |
|-------|-----------|------|-------------------|----------------|------------|-----|
| III | NTJ | 34 | n = 105 | < .0028 | 69.14% | Yes |
| | NTP | 32 | other = 39 | < .0000 | | |
| | | = 66 | 66 > 39 | | | |
| | | | p = < .001 | | | |

Hypothesis IV:  There will be a greater frequency of Myers-Briggs personality types STJ and NTJ than of NTP, STP, SFJ, SFP, NFJ, and NFP types among founders of non-High-Tech businesses.

Figure 5-15 displays the MBTI frequency distribution for founders of non-High-Tech businesses in the validation sample. The ranking of types is:   (1) STJ,  (2) NTJ,  (3) NTP,  (4) STP, (5) NFP,  (6) SFJ,  (7) NFJ,  (8) SFP.  A t-test indicates that the sum of the STJ and NTJ (27) frequencies is significantly greater (p <.001) than the sum of all the others (13). Hypothesis IV is therefore confirmed by the frequency analysis.

| | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP | TOTAL |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| non-high-Tech Founders | 14 | 13 | 5 | 4 | 1 | 0 | 1 | 2 | 40 |

Figure 5-15.  Validation Sample MBTI Frequencies
For Founders of Non-High-Tech Businesses.

The results of the logistic regression computation are mixed and do not totally agree wih the frequency distribution. The best regression run was with the SFJs withheld. Table 30 displays the statistical results of this best logistic regression run. With the SFJs withheld the beta coefficients of the NTJs (p <.5148), STJs (p <.4736), and STPs (p <.7515) predict founders of non-High-Tech firms with higher odds than the other types, but without high Wald statistic significance. The -2 Log Likelihood of this run is not significant at p <.9966. All beta coefficients are less than 1, and all of the Exp (B) multipliers are low. The Goodness of Fit indicates that the model is near "perfect," however. The overall prediction of accuracy is high at 86.51%. The results of this run do not support the implications of Hypothesis IV, and no other run is reported because of the poor statistics. Table 31 summarizes the data for Hypothesis IV.

Table 30

Hypothesis IV, Logistic Regression Analysis
Validation Sample
SFJ    WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|---|---|---|---|---|---|---|---|
| STJ | 0.5281 | 0.7370 | 0.5135 | 1 | 0.4736 | 0.0000 | 1.6957 |
| NTJ | 0.4884 | 0.7497 | 0.4244 | 1 | 0.5148 | 0.0000 | 1.6297 |
| NTP | -0.1584 | 0.8311 | 0.0363 | 1 | 0.8489 | 0.0000 | 0.8535 |
| STP | 0.2681 | 0.8468 | 0.1002 | 1 | 0.7515 | 0.0000 | 1.3075 |
| SFP | -5.1194 | 13.8720 | 0.1362 | 1 | 0.7121 | 0.0000 | 0.0060 |
| NFJ | -0.3156 | 1.2492 | 0.0638 | 1 | 0.8006 | 0.0000 | 0.7294 |
| NFP | -0.5204 | 1.0033 | 0.2690 | 1 | 0.6040 | 0.0000 | 0.5943 |
| Constant | -2.0823 | 0.6852 | 9.2352 | 1 | 0.0024 | | |

| STATISTICS | Chi-Square | df | Sig. |
|---|---|---|---|
| -2 Log Likelihood | 234.286 | 296 | 0.9966 |
| Model Chi-Square | 6.201 | 7 | 0.5165 |
| Improvement | 6.201 | 7 | 0.5165 |
| Goodness of Fit | 297.591 | 296 | 0.4631 |

Overall Prediction

% Accuracy            86.51%

267

Table 31
Summary of Results of Hypothesis IV
Analyses

| Hyp # | High Group | Freq | t-Test Comparison | Wald Stat. p = | Accuracy % | Fit |
|---|---|---|---|---|---|---|
| IV | STJ | 14 | n = 40 | | 86.51% | Yes |
| | NTJ | 13 | other = 13 | | | |
| | | = 27 | 27 > 13 | None significant | | |
| | | | p = <.001 | | | |

Hypothesis V:  There will be a greater frequency of Myers-
Briggs personality types STJ, NTJ, and NTP
running successful High-Tech businesses than
there will be of STP, SFJ, SFP, NFJ, and NFP
types.

Figure 5-16 displays the MBTI frequency distribution for
successful founders of High-Tech businesses.  The results
support the hypothesis by showing that the sum of the STJ,
NTJ, and NTP (38) frequencies is significantly greater
(p >.001) than the sum of the others (12), therefore
Hypothesis V is confirmed by the frequency distribution data.

| | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| Successful High-Tech Founders | 8 | 15 | 15 | 6 | 0 | 0 | 3 | 3 | 50 |

Figure 5-16.  Validation Sample MBTI Frequencies
For Founders of Successful High-Tech
Businesses.

The logistic regression analyses partially support the
implications of this hypothesis. The two best runs are with
the STJs and SFJs withheld.   Tables 32 and 33 display the

statistics for these runs. With the STJs withheld the beta coefficients of the NTPs (p <.0056), NTJs (p <.0816), and STPs (p <.1128) predict successful founders with higher odds than the other types. The overall prediction accuracy is high at 83.55%. In addition, the Exp (B) multipliers for the NTJs, NTPs, STPs, and NFJs are higher than usual and are supported by high R values for the same types. Because of these statistics the conclusion is made that the implications of Hypothesis V regarding the NTJs, and NTPs are supported. With the SFJs withheld the beta coefficients of the NTJs (p <.2447), NTPs (p <.0655), and STPs (p <.0587) do not significantly predict successful founders. The -2 Log Likelihood value is not significant even though the Goodness of Fit statistic indicates near "perfect" fit. The overall prediction of accuracy is 83.22% for this run. The Exp (B) multipliers for the STJs, NTJs, and NTPs are very high. The multiplier for the NTPs (15.5841) creates very high odds for a coefficient of 2.7463. The multiplier for the NTJs is also high (9.3002) creating very high odds for a coefficient of 2.2300. While Wald statistic significance levels discourage support for the hypothesis, these latter statistics suggest that the hypothesis not be rejected and that the implications of Hypothesis V concerning the NTPs and NTJs are supported by the regression analysis data. Table 34 summarizes the analysis data for Hypothesis V.

Table 32

Hypothesis V, Logistic Regression Analysis
Validation Sample
STJ  WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|----------|-----|------|------|-----|-----|-----|---------|
| NTJ | 0.8190 | 0.4702 | 3.0331 | 1 | 0.0816 | 0.0617 | 2.2681 |
| NTP | 1.3352 | 0.4817 | 7.6832 | 1 | 0.0056 | 0.1446 | 3.8007 |
| STP | 0.9388 | 0.5920 | 2.5147 | 1 | 0.1128 | 0.0435 | 2.5568 |
| SFJ | -5.9644 | 15.1124 | 0.1558 | 1 | 0.6931 | 0.0000 | 0.0026 |
| SFP | -5.9644 | 22.8439 | 0.0682 | 1 | 0.7940 | 0.0000 | 0.0026 |
| NFJ | 1.1394 | 0.7634 | 2.2278 | 1 | 0.1355 | 0.0290 | 3.1250 |
| NFP | 0.0786 | 0.7142 | 0.0121 | 1 | 0.9124 | 0.0000 | 1.0817 |
| Constant | -2.2380 | 0.3719 | 36.2086 | 1 | 0 | | |

| STATISTICS | Chi-Square | df | Sig. |
|------------|-----------|-----|------|
| -2 Log Likelihood | 252.949 | 296 | 0.9668 |
| Model Chi-Square | 18.836 | 7 | 0.0087 |
| Improvement | 18.836 | 7 | 0.0087 |
| Goodness of Fit | 281.006 | 296 | 0.7256 |

Overall Prediction

%  Accuracy          83.55%

270

Table 33

Hypothesis V, Logistic Regression Analysis
Validation Sample
SFJ   WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|----------|------|------|------|-----|------|------|---------|
| STJ | 1.3933 | 1.1977 | 1.3532 | 1 | 0.2447 | 0.0000 | 4.028 |
| NTJ | 2.2300 | 1.2110 | 3.3912 | 1 | 0.0655 | 0.0715 | 9.3002 |
| NTP | 2.7463 | 1.2155 | 5.1049 | 1 | 0.0239 | 0.1069 | 15.5841 |
| STP | 2.2841 | 1.2081 | 3.5747 | 1 | 0.0587 | 0.0761 | 9.8178 |
| SFP | -3.5526 | 13.9049 | 0.0653 | 1 | 0.7983 | 0.0000 | 0.0287 |
| NFJ | 2.5505 | 1.3521 | 3.5583 | 1 | 0.0592 | 0.0757 | 12.8136 |
| NFP | 1.4896 | 1.3249 | 1.2641 | 1 | 0.2609 | 0.0000 | 4.4355 |
| Constant | -3.6491 | 1.1763 | 9.6237 | 1 | 0.0019 | | |

| STATISTICS | Chi-Square | df | Sig. |
|------------|-----------|-----|------|
| -2 Log Likelihood | 254.159 | 296 | 0.9625 |
| Model Chi-Square | 17.626 | 7 | 0.0138 |
| Improvement | 17.626 | 7 | 0.0138 |
| Goodness of Fit | 284.196 | 296 | 0.6788 |

Overall Prediction

| % Accuracy | 83.22% |
|------------|--------|

271

Table 34
Summary of Results of Hypothesis V
Analyses

| Hyp # | High Group | Freq | t-Test Comparison | Wald Stat. p = | Accuracy % | Fit |
|---|---|---|---|---|---|---|
| V | STJ | 8 | n = 50 | -- | 83.95% | Poor |
| | NTJ | 15 | other = 12 | < .0816 | | |
| | NTP | 15 | 38 > 12 | < .0052 | | |
| | | = 38 | p = <.001 | STP \|---> | High Rs & Exp | |
| | | | | NFJ \| | (B) | |

Hypothesis VI:   There will be a greater frequency of the
STP, SFJ, SFP, NFJ, and NFP Myers-Briggs
personality types of founders of High-Tech
firms who have been unsuccessful as CEOs
than there will be of STJ, NTP, and NTJ
types.

This hypothesis is not supported by the frequency
distribution shown in Figure 5-17. In fact, the frequency
distribution establishes the reverse of the hypothesis. A t-
test indicates that the sum of the frequencies of the NTJs and
NTPs (7) is significantly greater (p <.001) than the sum of
the frequencies of all the other types (3). This reversal of
the hypothesis is important. Further investigation to clarify
these findings revealed that while there were more ENTJs who
founded businesses there were also more of the same type who
failed. Adding the calibration and validation sample data
together to form a larger sample produces   five ENTJs who
failed and only one INTJ who failed. The results of this
hypothesis, then, do not support the   hypothesis and indicate

that the opposite is true.

| | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| Failed High-Tech Founders | 2 | 4 | 3 | 0 | 0 | 0 | 0 | 1 | 10 |

Figure 5-17. Validation Sample MBTI Frequencies
For Founders of Failed    High-Tech
Businesses.

Logistic regression analysis does not support the implications of this hypothesis. The two best regression runs are with the STPs and NFPs withheld. Tables 35 and 36 display the statistical results of these two best runs. With the STPs withheld, the beta coefficients of the NTPs (p <.8627), NTJ (p <.8645), and STJ (p <.8768), because of the poor Wald statistic significance levels, do not establish enough significance to qualify them as predictors of failed founders. With the NFPs withheld the beta coefficients of the NTPs (p <.5677), NTJs (p <.6217) again do not produce enough Wald statistic significance to qualify them as predictors. The run with the STPs withheld is especially interesting because of the large coefficients and multipliers it develops. For instance, the coefficients for the NTJs and NTPs are 8.2987 and 8.4097, respectively. When multiplied by the Exp (B) factors of 4018.677 and 4490.257, respectively, they produce extremely high odds of prediction. The Goodness of Fit statistic (.9943) and the overall prediction percentage

Table 35

Hypothesis VI, Logistic Regression Analysis
Validation Sample
STP  WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|---|---|---|---|---|---|---|---|
| STJ | 7.5393 | 48.6458 | 0.0240 | 1 | 0.8768 | 0.0000 | 1880.535 |
| NTJ | 8.2987 | 48.6432 | 0.0291 | 1 | 0.8645 | 0.0000 | 4018.677 |
| NTP | 8.4097 | 48.6441 | 0.0299 | 1 | 0.8627 | 0.0000 | 4490.257 |
| SFJ | -6.6E-12 | 83.3655 | 0.0000 | 1 | 1.0000 | 0.0000 | 1.0000 |
| SFP | -6.6E-12 | 113.3289 | 0.0000 | 1 | 1.0000 | 0.0000 | 1.0000 |
| NFJ | 7.8707 | 92.075 | 0.0000 | 1 | 1.0000 | 0.0000 | 1.0000 |
| NFP | -11.2029 | 48.6512 | 0.0262 | 1 | 0.8715 | 0.0000 | 2619.3170 |
| Constant | -1.4806 | 48.6405 | 0.0530 | 1 | 0.8178 | | |

| STATISTICS | Chi-Square | df | Sig. |
|---|---|---|---|
| -2 Log Likelihood | 81.794 | 296 | 1 |
| Model Chi-Square | 6.162 | 7 | 0.5210 |
| Improvement | 6.162 | 7 | 0.5210 |
| Goodness of Fit | 238.001 | 296 | 0.9943 |

Overall Prediction

% Accuracy              96.71%

Table 36

Hypothesis VI, Logistic Regression Analysis
Validation Sample
NFP   WITHHELD

| Variable | B | S.E. | WALD | df | Sig | R | Exp (B) |
|----------|------|------|------|----|-----|---|---------|
| STJ | -0.1849 | 1.2426 | 0.0221 | 1 | 0.8817 | 0.0000 | 0.8312 |
| NTJ | 0.5616 | 1.1379 | 0.2435 | 1 | 0.6217 | 0.0000 | 1.7534 |
| NTP | 0.6725 | 1.1768 | 0.3266 | 1 | 0.5677 | 0.0000 | 1.9592 |
| STP | -6.7309 | 31.0559 | 0.0470 | 1 | 0.8284 | 0.0000 | 0.0012 |
| SFJ | -6.7371 | 41.0777 | 0.0269 | 1 | 0.8697 | 0.0000 | 0.0012 |
| SFP | -6.7371 | 62.093 | 0.0118 | 1 | 0.9136 | 0.0000 | 0.0012 |
| NFJ | -6.7371 | 47.4289 | 0.0202 | 1 | 0.8870 | 0.0000 | 0.0012 |
| Constant | -3.4657 | 1.0155 | 11.6477 | 1 | 0.0006 | | |

| STATISTICS | Chi-Square | df | Sig. |
|------------|------------|-----|--------|
| -2 Log Likelihood | 82.009 | 296 | 1.0000 |
| Model Chi-Square | 5.947 | 7 | 0.5459 |
| Improvement | 5.947 | 7 | 0.5459 |
| Goodness of Fit | 241.002 | 296 | 0.9916 |

Overall Prediction

% Accuracy          96.71%

(96.71%) suggest that the implications of the hypothesis not be casually rejected, therefore it is concluded that the logistic regression analyses confirm the reverse of the implications of Hypothesis VI, and are congruent with the findings of the frequency analysis. Table 37 summarizes the data for Hypothesis VI.

Table 37
Summary of Results of Hypothesis VI
Analyses

| Hyp # | High Group | Freq | t-Test Comparison | Wald Stat. p = | Accuracy % | Fit |
|-------|-----------|------|-------------------|----------------|------------|-----|
| VI | **Expected:** STP, SFJ, SFP, NFJ, NFP. **Actual:** NTJ, NTP | n = 10 | | NTP \|----> NTJ \|----> | 96.66% High Rs & Exp(B) & High Coefficients | Yes |

Frequency Comparisons Between Categories of Founders

The purpose of comparing the frequency of personality types between each category of founders is to determine if founders have different personality types than non-founders, if founders of non-High-Tech firms have different personality types than founders of High-Tech firms, and if successful founders have different personality types than founders who have failed. Table 38 shows the results of these comparisons for the validation sample. The computations of chi-square for these comparisons are included as Appendix E.

Table 38

Validation Sample Frequency
Distribution Comparison
Using Chi square

| Categories of Founders | $x^2$ Required | $x^2$ obtained | Sig. p = |
|---|---|---|---|
| Founders vs Non-Founders | 24.32 | 196.18 | < .001 |
| Founders non-High-Tech vs Founders High-Tech | 24.32 | 115.88 | < .001 |
| Founders, Successful vs Founders, Failed | 16.622 | 18.34 | < .0221 |

A better comparison of successful to failed founders is obtained by comparing the _validation_ sample of the successful founders to the _total_ of both samples (calibration plus validation samples) of the failed founders, Table 39. It is apparent that the lower significance of the comparison using only the validation sample of the failed founders is due to the lower variance of the smaller sample.

Table 39

Successful and Failed Founder Comparison
With Larger Sample of
Failed Founders

| Categories of Founders | $x^2$ Required | $x^2$ obtained | Sig. p = |
|---|---|---|---|
| Founders, Successful vs Founders, Failed Calib. + Valid. Samples | 24.32 | 27.14 | <.001 |

## Validation Sample Tests Summary

Three types of tests were conducted on the research data of this sample: frequency analysis to confirm or disconfirm the hypotheses'statements, logistic regression analyses to determine the odds with which the IVs predict the DVs, and chi-square analysis to determine whether there are differences between the categories of founders.

Summary of the frequency and logistic regression analyses. Statistical tests for Hypothesis I support it by confirming that the personality type frequency distribution of the STJs, NTJs, and NTPs is greater than the distribution for the STPs, SFJs, SFPs, NFJs, and NFPs. This hypothesis is also supported by the logistic regression analyses for the NTJs and NTPs. Hypothesis II is also supported by the frequency distribution showing that there was a greater frequency of STJ, STP, SFJ, SFP, NFJ, and NFP types than of NTJ and NTP types as non-founders of businesses, and that these types significantly predict non-founder status. The regression analysis confirms that the STJ, STP, and SFJ types are predictors of non-founder status. Frequency and logistic regression analyses support Hypothesis III, finding that there is a greater frequency of NTJs and NTPs as founders of High-Tech firms than of the other types, and that these types (NTJs and NTPs) significantly predict founders of High-Tech businesses. Hypothesis IV is supported by the frequency analysis and only partially by the logistic regression

analyses. Frequency analysis shows that the frequencies of the STJs and NTJs are higher than the other types, but also includes the NFJs in the high frequency range. The logistic regression analyses of this hypothesis confirm the STJs as predictors for founders of non-High-Tech businesses, but fail to confirm the NTJs, instead identifying NFPs and NFJs as highly significant predictors of the founders of non-High-Tech businesses. The results for Hypothesis V are mixed. The hypothesis is supported by the frequency distribution showing greater numbers of STJs, NTJs, and NTPs operating successful High-Tech firms; the logistic regression analyses did not confirm STJs as founders operating successful High-Tech businesses. Instead, in addition to the NTJs and NTPs, the regression statistics identifies the STPs and NFJs as predictors of this category of founders.

Because of small sample sizes, the analyses results for Hypothesis VI are suspect. The frequency distribution of types does not confirm STPs, SFJs, SFPs, NFJs, and NFPs as founders who have lost their businesses. Instead, the frequency analysis shows the opposite; the NTJs and NTPs as losers, and the regression analyses identify the NTPs and NTJs as best predictors of losers. By adding the calibration and validation sample frequencies together to form a larger sample, the statistics improve, but results remain substantially the same. Table 40 summarizes the frequency and

logistic   regression   analyses   results   for   the   validation sample.

Table 40
Summary of Results of The Validation Sample
Analyses

| Hyp # | High Group | Freq | t-Test Comparison[1] | Wald Stat. p =[2] | Accuracy %[2] | Fit[3] |
|---|---|---|---|---|---|---|
| I | STJ | 35 | n = 168 | -- | 65.13%% | Yes |
| | NTJ | 53 | other =35 | < .0014 | | |
| | NTP | 45 | 133 > 35 | < .0002 | | |
| | | = 133 | p = <.001 | | | |
| | | | | | | |
| II | STJ | 48 | n = 156 | < .0014 | 64.80% | Yes |
| | STP | 15 | other = 51 | < .0644 | | |
| | SFJ | 14 | 105 > 51 | < .0008 | | |
| | SFP | 7 | p = < .001 | -- | | |
| | NFJ | 7 | | -- | | |
| | NFP | 14 | | -- | | |
| | | = 105 | | | | |
| | | | | | | |
| III | NTJ | 34 | n = 105 | < .0028 | 69.14% | Yes |
| | NTP | 32 | other = 39 | < .0000 | | |
| | | 66 | 66 > 39 | | | |
| | | | p = < .001 | add NFP and NFJ | | |
| | add NFJ | | | | | |
| | | | | | | |
| IV | STJ | 14 | n = 40 | | 86.51% | Yes |
| | NTJ | 13 | other = 13 | | | |
| | | = 27 | 27 > 13 | None significant | | |
| | | | p = <.001 | | | |
| | | | | | | |
| V | STJ | 8 | n = 50 | -- | 83.95% | Poor |
| | NTJ | 15 | other = 12 | < .0816 | | |
| | NTP | 15 | 38 > 12 | < .0052 | | |
| | | = 38 | p = <.001 | STP \|---> High Rs & Exp | | |
| | | | | NFJ \| (B) | | |
| | | | | | | |
| VI | **Opposite** | | n = 10 | | 96.66% | Yes |
| | | | | NTP\|----> High Rs & | | |
| | | | | NTJ\|----> Exp(B) & High | | |
| | | | | Coefficients | | |

Notes:  [1] This column contains the ingredients for the t-test used to determine the significance of the difference between the high and low frequency groups.  [2] This column contains the Wald statistic significance values if they were better than

.05 or poorer but augmented by other statistics. It also contains types not in the high group of the frequency analysis. |---> points to the reasons for listing these types. [3] This column contains the results of the Goodness of Fit test. "Yes" means the model is near "perfect," "Poor" means the fit is questionable.

Summary of the chi-square tests of differences between categories of founders. Chi-square comparisons of the personality type frequency distributions of each of the categories of founders showed that there were significant differences in the personality type distributions for each category: founders are different than non-founders, founders of non-High-Tech businesses are different than founders of High-Tech businesses, and successful founders are different than founders who have failed.

## Calibration and Validation Sample Comparisons

The statistics of the validation sample confirm those of the calibration sample. This has two important implications. First, the MBTI frequency distribution results, because of the random assignment to two subsamples and the similar statistical results, permit the generalization that Myers-Briggs personality types are reliable predictors of categories of founders. Second, the results imply that the analysis techniques appropriately produce reliable results for this type of research. The personality type frequency distributions and logistic regression results are compared

below using the chi-square technique.

## Calibration and Validation Sample MBTI Frequency Distribution Comparisons

MBTI frequency distributions of the calibration and validation samples are compared by founder categories in Table 41. This table confirms that the null hypothesis, that there are no differences between the two samples, should be accepted.

Table 41

Founder Categories' MBTI Frequency Distribution
Comparisons of The Calibration
and Validation samples,
Using Chi-square.

|  | Calibration Sample n | Validation Sample n | $X^2$ Achieved | p = |
|---|---|---|---|---|
| Founders | 168 | 168 | 3.09 | .81 |
| non-Founders | 156 | 156 | 1.30 | .96 |
| Founders High-Tech | 106 | 105 | 6.42 | .58 |
| Founders non High-Tech | 50 | 50 | 2.97 | .93 |
| Founders, Successful | 50 | 50 | 3.89 | .78 |
| Founders, Losers | 10 | 10 | 2.00 | .96 |

The hypotheses were stated so that the sums of groups of frequencies could be compared. The results of these comparisons of sums were stated for each hypothesis in the discussions for the calibration and validation samples. All

sum differences for each hypothesis, for both the calibration and validation samples, were found significant at the .001 level, therefore the null hypothesis that there are no differences can be rejected. Table 42 presents the comparison of results for each of these samples. The table shows the hypothesized high frequency groupings; the Myers-Briggs indicators not shown in the table are the hypothesized low frequency groupings. Calibration and validation sample frequency distributions supported all the hypotheses.

## Table 42

### Frequency Distribution Comparisons

| Hypothesis No. | Hypothesis Forecast | | Calibration Sample Results (a) | | Validation Sample Results (a) | |
|---|---|---|---|---|---|---|
| I | STJ, NTJ, NTP | | STJ, NTJ, NTP | | STJ, NTJ, NTP | |
| II | STJ, STP SFJ, NFJ NFJ, NFP | | STJ, STP SFJ, NFJ NFJ, NFP | | STJ, STP SFJ, NFJ NFJ, NFP | |
| III | NTJ, NTP | | NTJ, NTP | | NTJ, NTP | |
| IV | STJ, NTJ | | STJ, NTJ | | STJ, NTJ | |
| V | STJ, NTJ, NTP | | STJ, NTJ, NTP | | STJ, NTJ, NTP | |
| VI | STP, SFJ, SFP, NFJ, NFP | | NTJ, NTP (b) | | NTJ, NTP (b | |

NOTES: (a) The sums of the frequencies are compared.

(b) Ranked in order of greatest frequency first.

## Calibration and Validation Samples Logistic Regression
## Results Comparison

Table 43 reports the comparisons of the hypothesized outcomes with the actual outcomes of the logistic regression runs of the calibration and validation samples. The best results of two regression runs are summarized. The logistic regression program of SPSS produces several statistics by which decisions can be made. The first statistic is the beta coefficient which, along with the Exp (B) multiplier computes the odds with which the IVs predict the DVs. The second statistic is the Wald-statistic with its significance level which confirms the importance of the beta coefficient. The R correlation statistic varies between -1 and +1 to measure the value the coefficient contributes. The Goodness of Fit, 2 Log Likelihood, and Overall Prediction accuracy percentage help in assessing the effectiveness of the regression model. The results discussed here refer to these statistics as decision criteria.

## Table 43

### LOGISTIC REGRESSION RUN COMPARISONS

| Hypothesis No. | Hypothesis Forecast | Calibration Sample Results (a) | Validation Sample Results (a) |
|---|---|---|---|
| I | STJ, NTJ, NTP | NTJ, NTP, NFJ | NTP, NTJ, NFJ/SFJ |
| II | STJ, STP, SFJ, SFP, NFJ, NFP | STP, SFJ, STJ | STP, SFJ, STJ |
| III | NTJ, NTP | NTP, NTJ | NTP, NTJ |
| IV | STJ, NTJ | NFP, STJ, NFJ (b) | NTJ, STJ, STP (b) |
| V | STJ, NTJ, NTP | NTP (c) | NTP (c) |
| VI | STP, SFJ, SFP, NFJ, NFP | SFJ, NTP, NTJ (b) | NTP, NTJ (b |

NOTES: (a) The best of two regression runs are reported.

(b) Wald-statistics not significant, the ranking of significance levels are reported.

(c) Only type with Wald-statistic significance level better than .05 reported. When two samples are aggregated, same ranking exists.

The salient differences between the hypotheses and runs are summarized below.

Hypothesis I. Both the calibration and validation sample runs suggest that the NTJs and NTPs predict founders of business with higher odds than all the other types.

Hypothesis II. Both sample runs suggest that the odds of the STPs, SFJ, and STJs predicting non-founders of businesses are greater than all the other types. Neither run has high enough Wald-statistic significance levels to make any conclusions about the NFJs, NFPs, and SFPs. The NTJs and NTPs, however, are included in the low odds group as implied by the hypothesis.

Hypothesis III. Both runs suggest, as implied by the hypothesis, that the odds predicting NTJs and NTPs as founders of High-Tech businesses are greater than for all of the other types. The hypothesis does not establish a rank order for these two types, but the regression runs do, putting the NTPs first with the highest Wald-Statistic significance level.

Hypothesis IV. The results of the two regression runs for both samples are in agreement about the implication of the hypothesis that the STJs predict founders of non-High-Tech businesses with the highest odds, but they are not clear about the status of the NTJs. These results are not only characterized by unacceptable Wald-statistic significance

levels, but are also clouded by the fact that one run in each sample withheld the NTJs. Although the significance levels are too low to be conclusive, the NFJs and STPs appear as possible predictors with higher odds than the remaining indicators. It is interesting that the odds of the NTPs founding non-High-Tech businesses were low.

Hypothesis V. Both regression runs predict the NTPs as successful operators of High-Tech firms with high enough Wald-statistic significance levels (p <.0056 and p <.0348) to be important. These results supported the hypothesis for NTPs, but failed to support the implied predictions for NTJs and STJs.

Hypothesis VI. For both samples, this hypothesis is plagued by small samples, however the results for both samples report the opposite of the implications of the hypothesis. While the Wald statistic significance levels are low, R and Exp (B) statistics provide reason to consider this opposite finding important. The NTPs and NTJs, in that order, are identified as having the greatest odds of being failed founders.

Calibration and Validation Sample Founder Category
Comparison

The categories of founders of businesses were compared to discover whether there were differences in personality type frequency distributions. The MBTI frequency distributions of founders were compared with non-founders, founders of non-

High-Tech businesses were compared with founders of High-Tech firms, and successful founder-operators were compared with failed founders of High-Tech firms. Table 44 shows that each of the compared categories was significantly different from each other at the .001 level. Both samples reported the same results.

## Table 44

### Calibration and Validation Sample
### Comparisons of Founder
### Categories

| Founder Category Comparisons | Calibration Sample p = | Validation Sample p = | Variance |
|---|---|---|---|
| Founders vs Non-Founders | < .001 | < .001 | none |
| Founders non-High-Tech vs Founders High-Tech | < .001 | < .001 | none |
| Founders, successful vs Founders, Failed (a) | < .01 | < .0221 | 0.0121 |

Notes:     (a) n = 10 for successful founders and n = 20

for failed founders.

Demographic Survey Results

A demographic survey (Appendix C) accompanied the personality type survey for all of the High-Tech respondents. This survey sampled only the High-Tech founders and the sample size is 136. In addition to the normal demographic information such as the name of the firm and founder, the survey collects information on the respondent's perception of his leadership skills, major areas of responsibility, his major duties, the years the firm has been in business, and the firm's products. Additional information covering the founder's perceptions of the reasons for failure was collected from the unsuccessful founders. The highlights of the results of this survey are briefly summarized below.

Summary of Demographic Survey Results

Figure 5-18 establishes the average age of the High-Tech respondents to be between 31 and 40 years of age. The two largest categories of products were computer software and analysis/consulting (Figure 5-19). The greatest number of respondents who had been in business more than two years had operated their firms for five to seven years (Figure 5-20). Most founder/CEOs called themselves "President" (Figure 5-21).

# FOUNDER/CEO AGE DISTRIBUTION
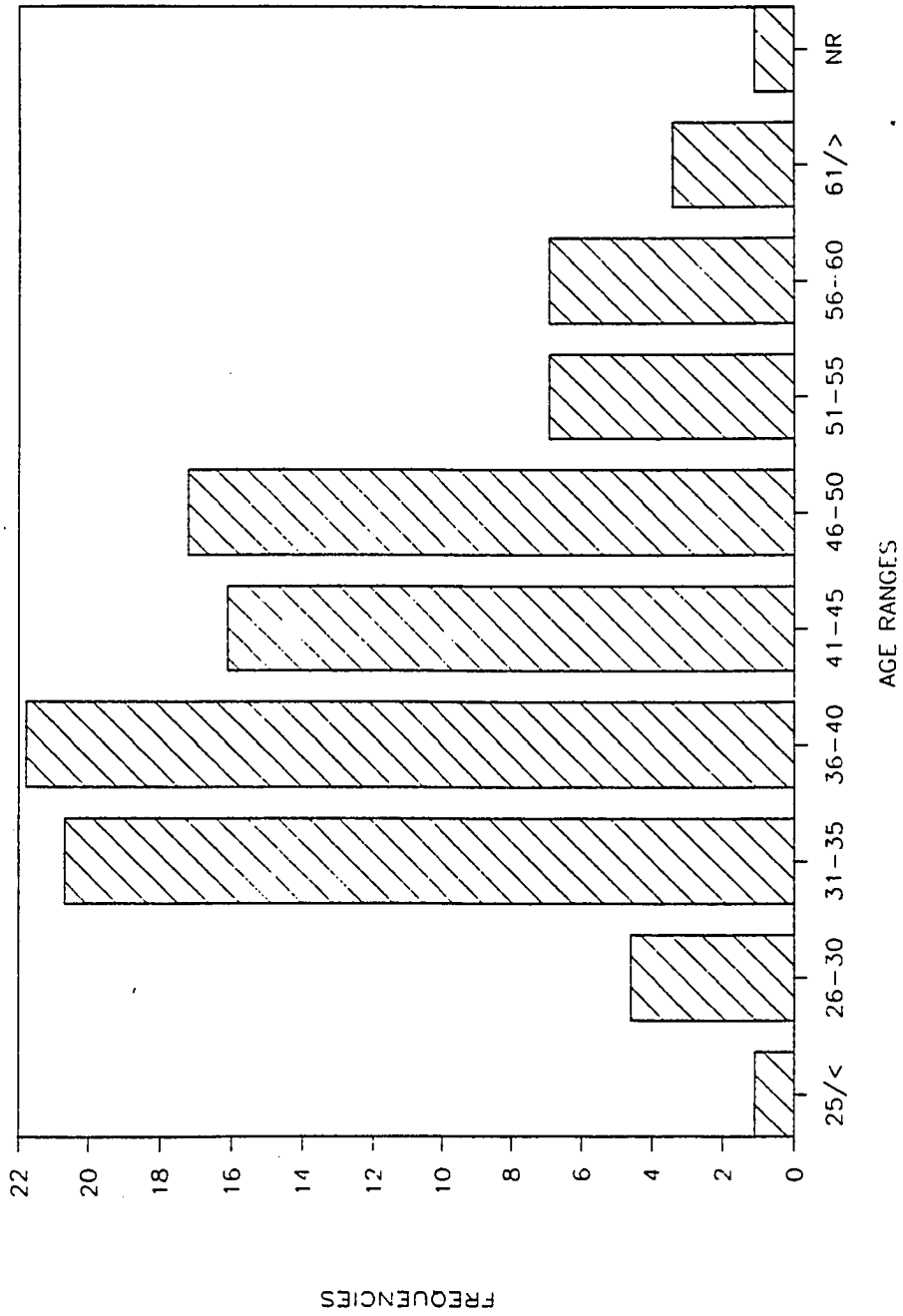


**Figure 5-18. Founder/CEO Age Distribution.**
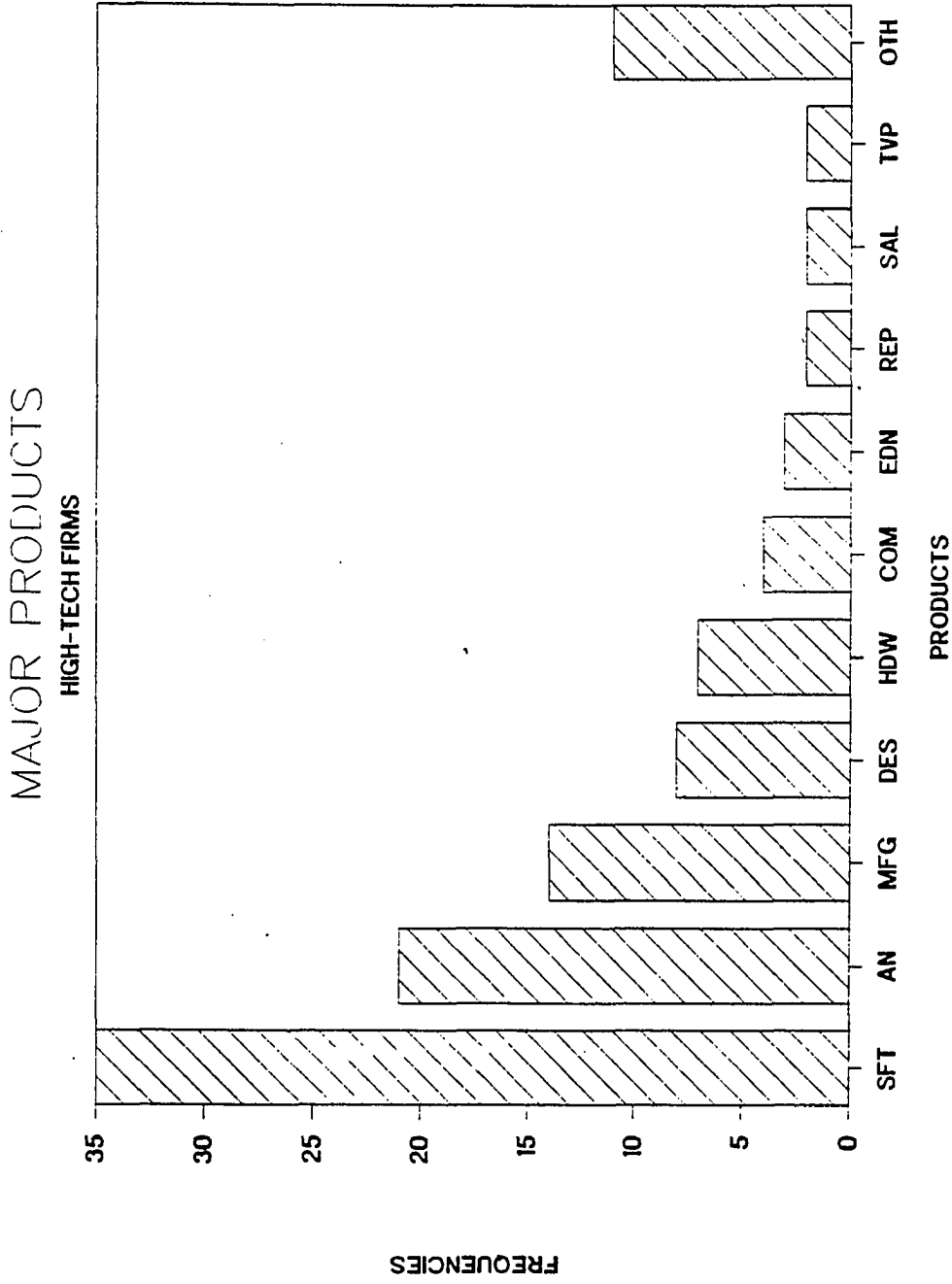
Figure 5-19. Major Products.

LEGEND
Figure 5-19

Major Products

| Product | Symbol |
|---|---|
| Computer Software | SFT |
| Analysis/Consulting | AN |
| Manufacturing | MFG |
| Systems Design | DES |
| Computer Hardware | HDW |
| Communications Services | COM |
| Educational Products | EDN |
| Maintenance/Repair Services | REP |
| Sale of Computerized Systems | SAL |
| Video Production | TVP |
| Other | OTH |

LENGTH OF TIME IN BUSINESS

HIGH—TECH FIRMS
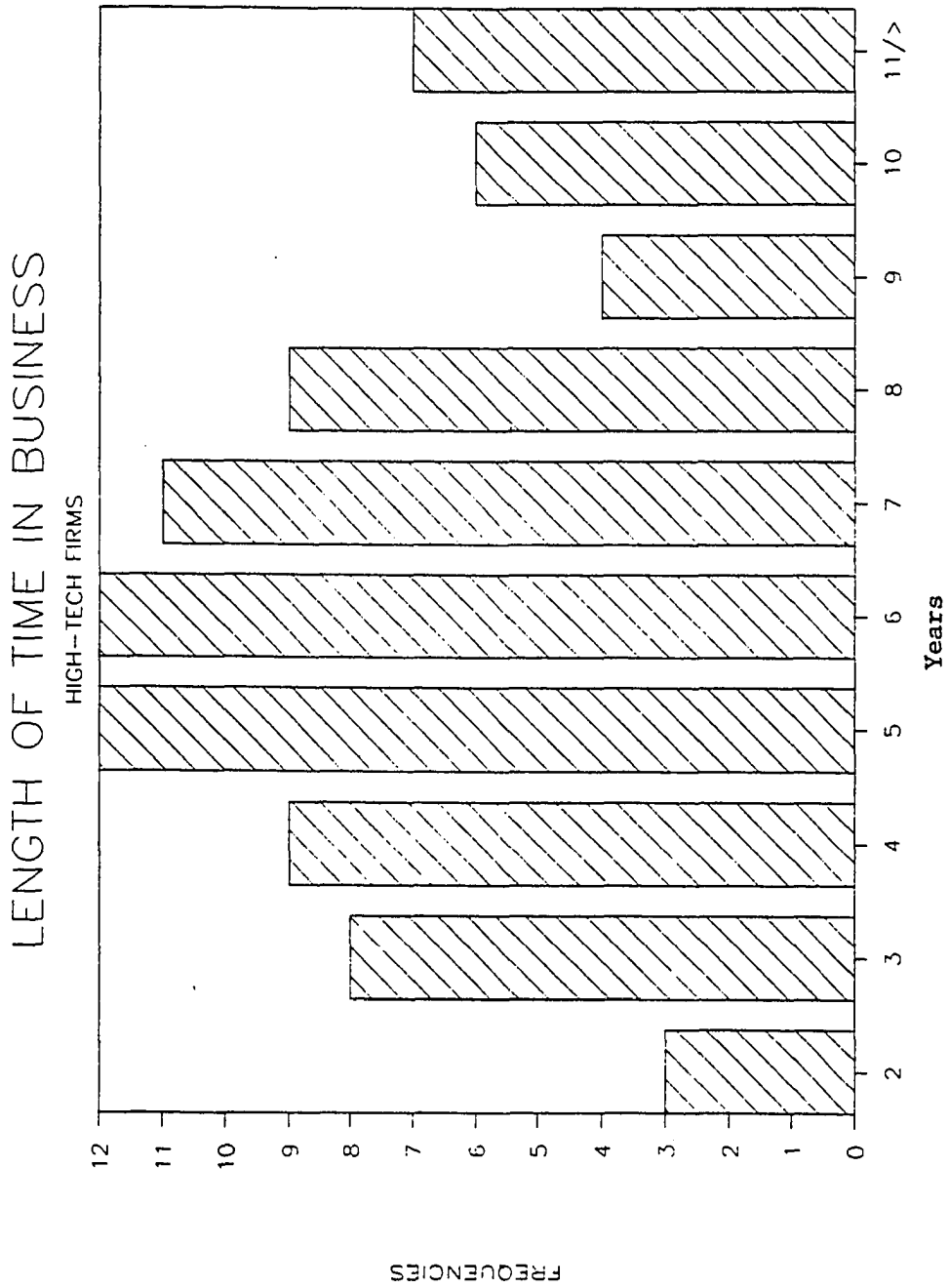
Figure 5-20.  Length of Time in Business.

TITLES CHOSEN BY FOUNDER/CEO
HIGH-TECH FIRMS
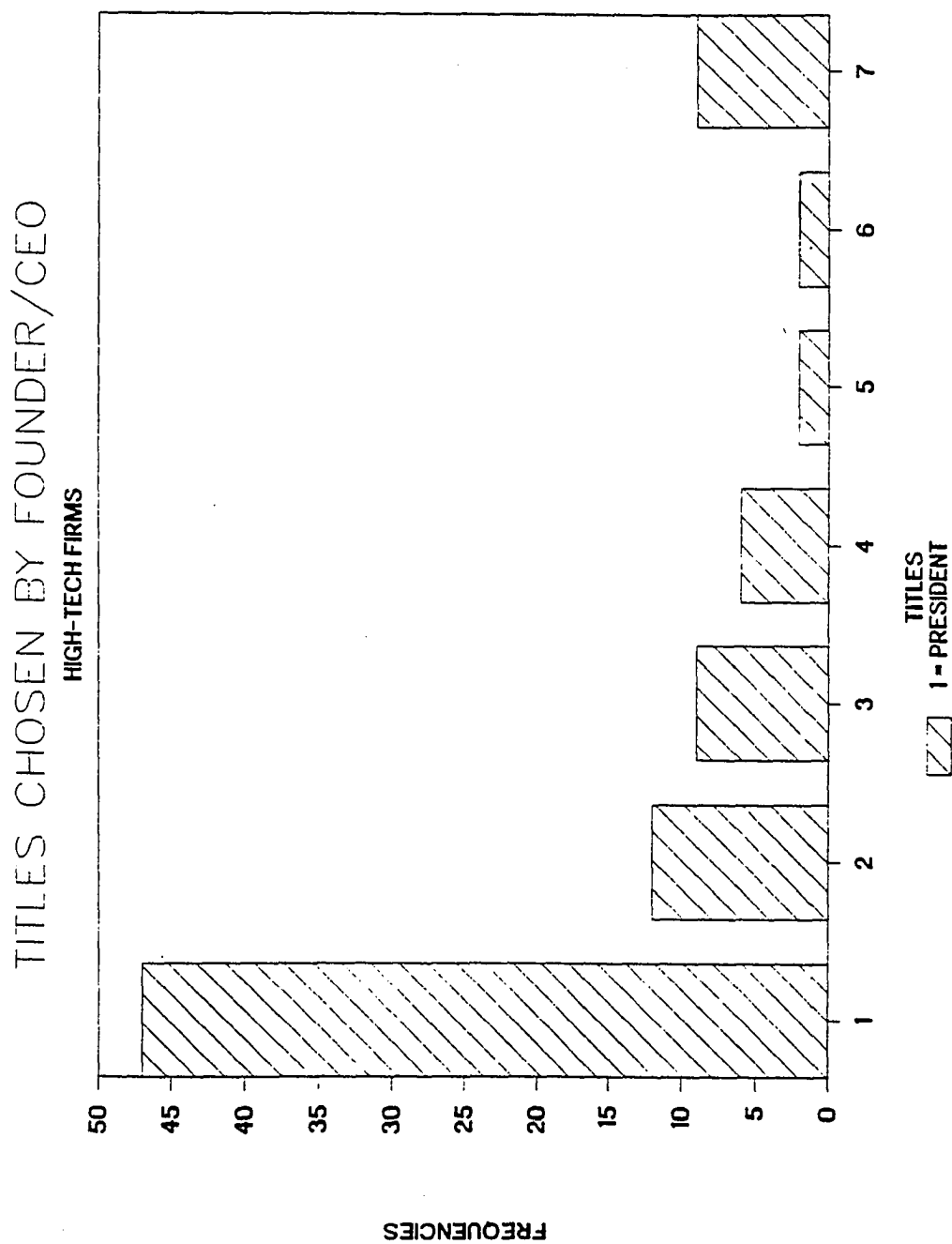
TITLES
1 = PRESIDENT

Figure 5-21. Titles Chosen By Founder/CEO

LEGEND
for
Figure 5-21

| Title Name | Number |
|---|---|
| President . . . . . . . . | 1 |
| Chief Executive Officer (CEO) . . . . | 2 |
| Chief Operating Officer (COO) . . . . | 3 |
| Vice-President . . . . . . | 4 |
| Director . . . . . . . . | 5 |
| CFP . . . . . . . . . | 6 |
| No Answer . . . . . . . . | 7 |

The greatest number of High-Tech founder/CEOs perceived their major duty as marketing (Figure 5-22), and their self-perceived specialty as engineering (Figure 5-23). Almost 45% of the respondents did not respond to this question, however, having considered themselves generalists. When asked what they felt their special leadership skills were, most responded with "people" and a slightly lesser number responded with "vision" or "management" (Figure 5-24).

# SELF-PERCEIVED MAJOR DUTIES

## HIGH-TECH FOUNDERS/CEOs
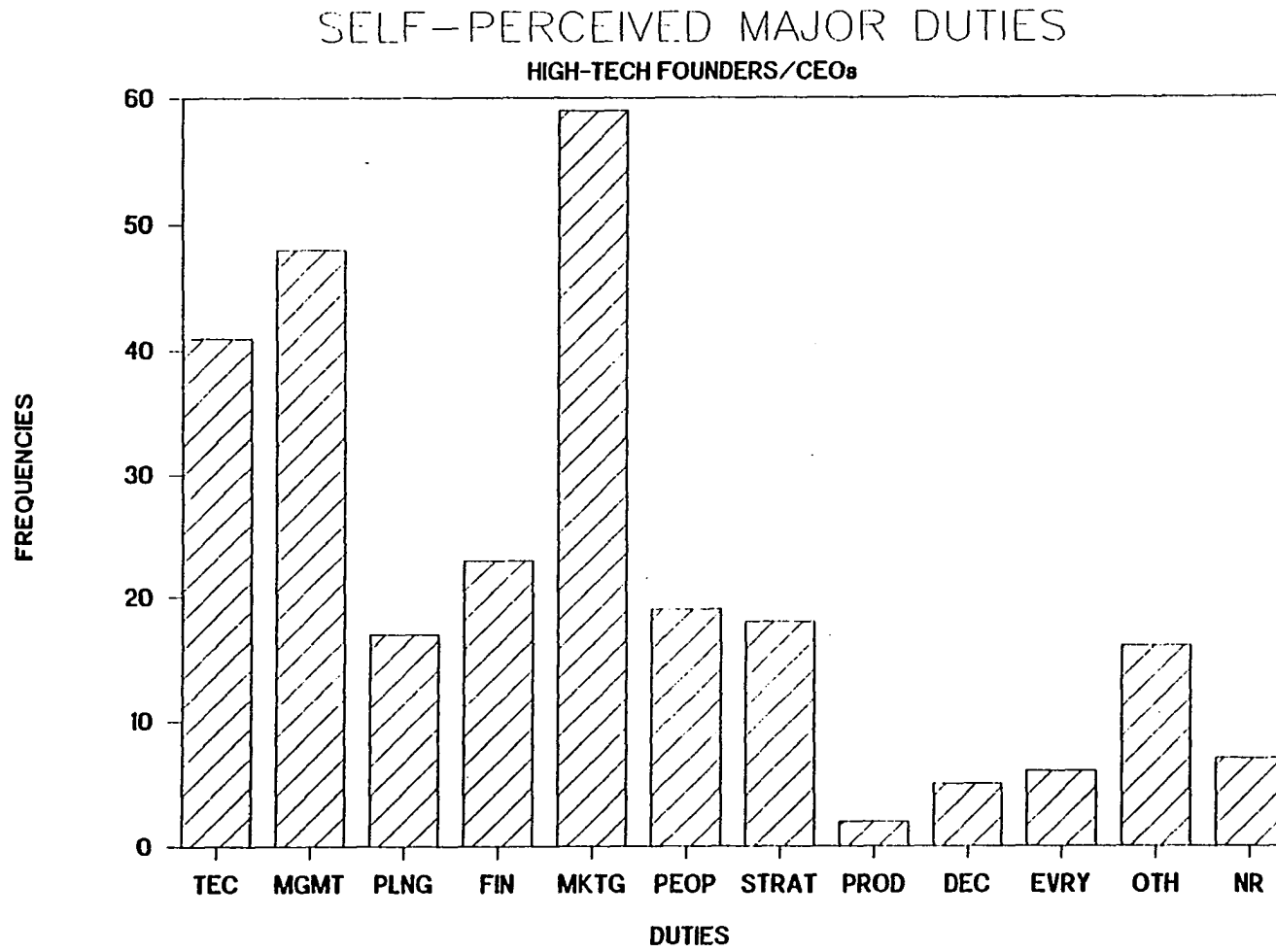


Figure 5-22. Self-Perceived Major Duties.

298

SELF-PERCEIVED SPECIALTIES
OF HIGH-TECH FOUNDERS/CEOs
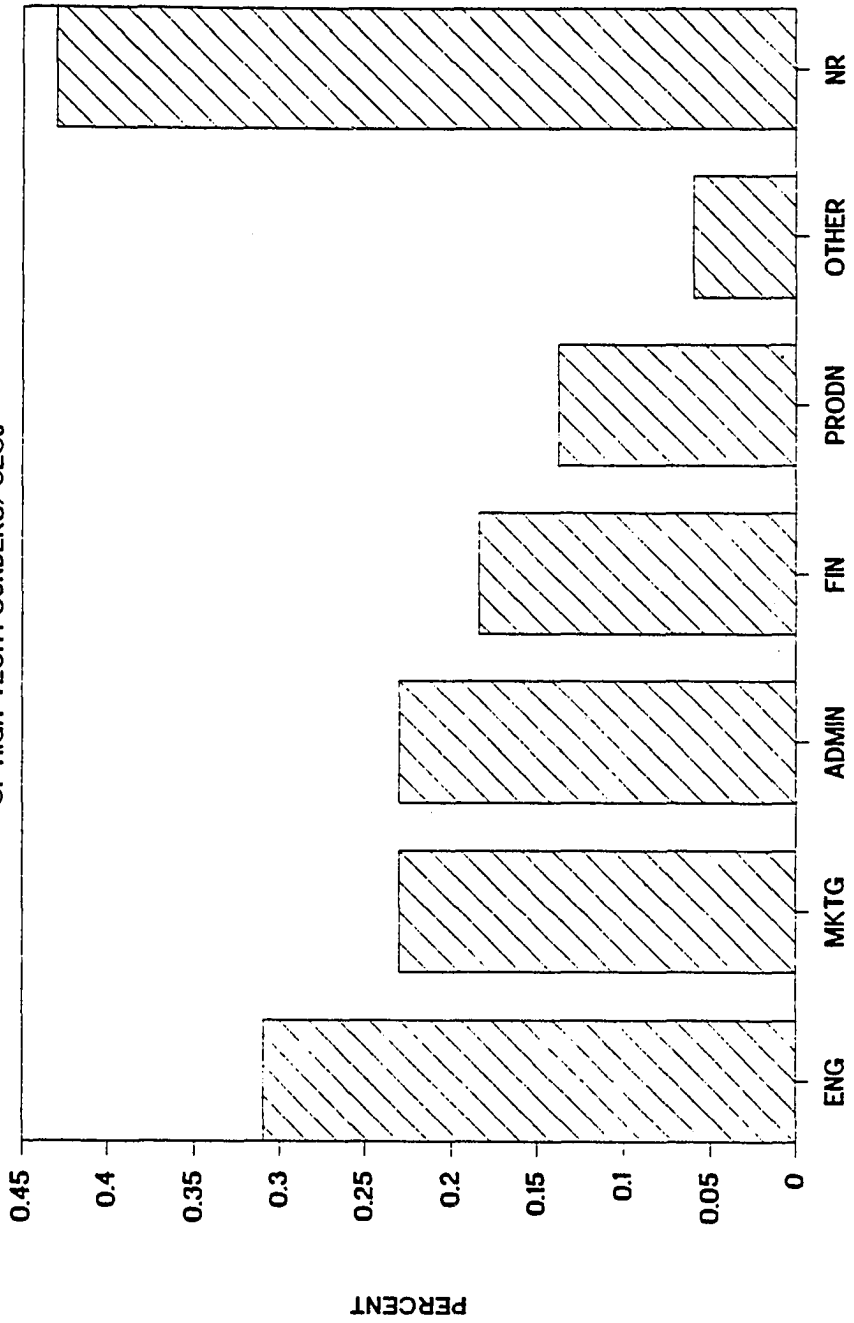
Figure 5-23. Self-Perceived Specialties.

# SELF–STATED LEADERSHIP SKILLS

## HIGH-TECH FOUNDERS/CEOs



Figure 5-24. Self-Stated Leadership Skills.

300
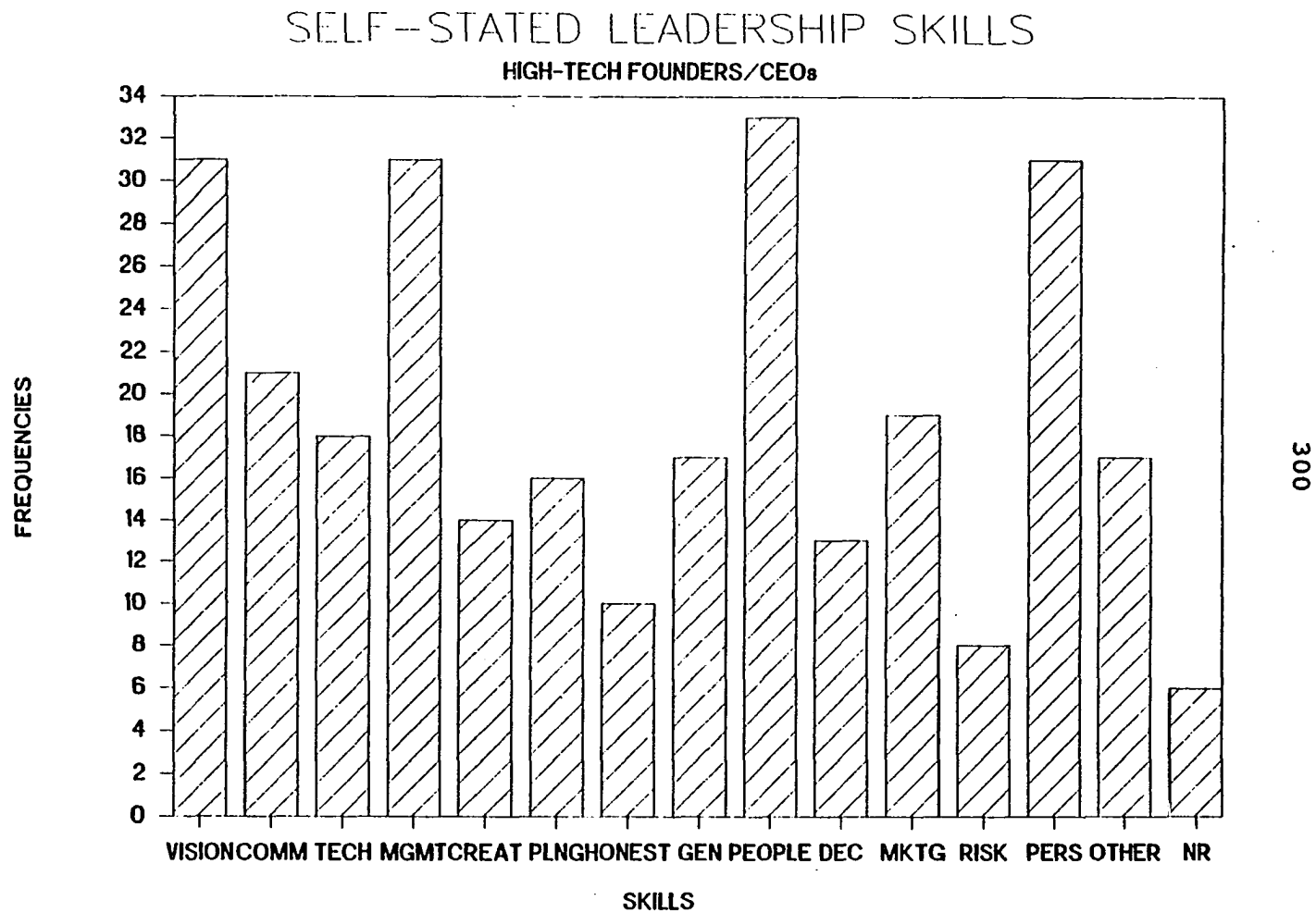
LEGEND
Figure 5-24

Self-Stated Leadership Skills

| Skills | Symbol |
|---|---|
| Vision | VISION |
| Communications | COMM |
| Technical Knowledge | TECH |
| Management | MGMT |
| Creativity | CREAT |
| Planning | PLNG |
| Honesty/Fairness/Integrity | HONEST |
| General Knowledge/Competence | GEN |
| People | PEOPLE |
| Decison/Decisiveness | DEC |
| Marketing | MKTG |
| Willingness to take risks | RISK |
| Perseverance/Patience | PERS |
| Other | OTHER |
| No Response | NR |

Chapter Summary

The Myers-Briggs personality type frequency analyses of
this research confirm most of the statements of all but
Hypothesis VI.  For Hypothesis I it was found that, for
founders of businesses, there was a greater frequency of STJ,
NTJ, and NTP types than of STP, SFJ SFP, NFJ, and NFP types.
For Hypothesis II, for non-founders of businesses, there was a
greater frequency of STJ, STP, SFJ, SFP, NFJ, and NFP types
than of NTJ and NTP types.  For Hypothesis III, frequency
analysis found that  there was a greater frequency of NTJ and
NTP types among founders of Hi-Tech businesses than of the
STJ, STP, SFJ, SFP, NFJ, and NFP types.  For Hypothesis IV it
was found that for founders of non-High-Tech firms there was a
greater frequency of STJ and NTJ types than of NTP, STP, SFJ,
SFP, NFJ, and NFP types.  For Hypothesis V frequency analysis
confirmed that STJ, NTJ, and NTP types were found to have
greater frequencies than the STP, SFJ, SFP, NFJ, and NFP types
among founders operating successful High-Tech businesses.  For
Hypothesis VI however, the frequency analysis found the
reverse, that the highest frequency of failed founder types
are the NTJ and NTP types,  instead of the STJ, STP, SFJ, NFJ,
and NFP types.  The small sample sizes for Hypothesis VI were
found to affect these results adversely.

Logistic regression analysis to establish the odds with

which the various personality types predicted the category of
founder returned mixed results. Regression analysis confirmed
the implication of Hypothesis I finding that the NTJs and NTPs
predicted the founder category with the highest odds, it did
not confirm the STJs however. The implications of Hypothesis
II that the odds would be greater for the STJs, STPs, SFJs,
SFPs, NFJs, and NTPs in predicting the non-founder category
were confirmed for the STPs, SFJs, and STJs. The implications
of Hypothesis III that the NTJ and NTP types would predict the
founder of High-Tech business category with the highest odds
were confirmed. Hypothesis IV implied that the odds of the
STJ and NTJ types predicting founders of non-High-Tech
businesses would be higher than the other types. The results
of the regression analysis confirmed the STJs and provided
provisional support for the NTJs. In this case the only
indication that part of the Hypothesis might be confirmed was
that the STJs were reported with greater odds than the other
types. The implications of Hypothesis V that the STJs, NTJs,
and NTPs would develop high odds of running successful High-
Tech firms were supported only for the NTPs at a Wald-
statistic significance level of .0348. The NTJs developed a
p of <.0870, a little too low to be significant. The reverse
of the implications of Hypothesis VI, that the NTJs and NTPs
would predict failed founders of High-Tech businesses resulted
from the regression analysis. This analysis suffers from

extremely low sample sizes, but suggests that the NTPs fail most often, a different conclusion than produced by the frequency analysis which indicates that the NTJs fail most often. Because of the small sample size these results need further investigation

In addition to the results of the frequency and regression analyses, it was found that the frequency distribution of Myers-Briggs personality types significantly differs for founders of businesses and non-founders, for founders of High-Tech firms and founders of non-High-Tech firms, and for successful founders and unsuccessful founders.

Finally, the results of the demographic survey profile the typical male High-Tech founder between the ages of 31 and 40 with sixteen years of schooling. He started the business either because he was disillusioned with large corporate life and wanted to start his own business, or he had invented a product for which he saw marketing opportunities and for which he could not get his employer's support. He is most often operating either a computer software or analysis-consulting firm, and has been in business from five to seven years. This founder states that his major specialty is engineering. He prefers the title of "President," perceives his major duty either as marketing or data management, and perceives his leadership skills to be concentrated in the team-building and human resource fields. Other leadership

skills founders attribute to themselves are that they establish a record for technical leadership, they sell well, they are inventive, they keep track of lots of details, they have an ability to plan ahead, and they are friendly, compassionate, and visionary.

Successful founders most often attribute their success to their visionary, technical, marketing, or leadership skills. Unsuccessful founders most often attribute their failure to either economic and market conditions, or to the lack of support of their investors.

# CHAPTER 6

# CONCLUSIONS AND IMPLICATIONS

## Introduction

In Chapter I, three research questions governing the direction of this investigation were stated: Does personality type affect the likelihood that a person will found a business? Does personality type affect the kinds of businesses founded? And, does the personality type of founders affect their success or failure in running High-Tech firms over time? The answers to these questions, suggested by the research results, are presented as conclusions and implications in this chapter. The contributions made by the research to the fields of High-Tech management and personality type, the limitations of the study are reviewed, and topics for further research are suggested.

### Does personality type affect the likelihood that a person will found a business?

Research conclusions. The results of this research are conclusive on this question: yes, the persons who found a major proportion of businesses in Washington State are primarily intuitive, thinking, judging (NTJs), and

intuitive, thinking, perceptive (NTPs) personality types. Most of the other Myers-Briggs types (STJ, STP, SFJ, SFP, NFJ, and NFP) found none or fewer numbers of businesses. While STJs do found a relatively large number of businesses, the odds that they will found businesses, as determined by the logistic regression analysis, does not support the hypothesis that they will found a majority of businesses.

Implications for the field of inquiry. The results of this research do not totally agree with prior research that the STJs and NTJs are primary founders of businesses. The inclusion of the NTPs is a new finding. Hypotheses I and II assumed that the STJs, because of their large percentage of the general population, would occur in significant numbers as both founders and non-founders. The fact that they did not occur significantly as founders, as expected, is a surprising finding and eliminates the assumption that, because of their numbers, they would.

The results of this investigation lead to the conclusion that personality type is a reliable, scientific, and operationally quantifiable construct for the purpose of establishing statistically supported, inferential conclusions regarding founding and running businesses. Prior research has depended on narrow and limiting constructs of personality which only explain such fragmentary aspects of personality as flexibility; needs for

achievement, affiliation, and power; locus of control; extraversion, and introversion ( Miller & Toulouse, 1986; Stogdill, 1974). Assembling these personality characteristics into a package of research variables to describe holistic behavior patterns has been clumsy because of the lack of correlation between the variables, and has produced indeterminate results (Miller & Toulouse, 1986). With the Myers-Briggs system, it is possible to efficiently profile a person's "package" of behaviors, thereby allowing conclusions to be made regarding the effect of that person's personality on a specific business situation. Because the Myers-Briggs system works with archetypes, it then becomes possible to generalize the findings of archetypal research to similar problems in the business environment. This research, through the use of calibration and validation samples, has shown how effective and reliable the results of an investigation using the MBTI can be.

Implications for the practice of business. Two of the three primary personality types of business founders, STJs and NTJs, exhibit the traits generally attributed to successful business managers (Myers & McCaulley, 1988): preference for objective and impersonal logic, preference for goal setting and timely decision making; the use of excellent organizational and analytical skills; and an orientation toward achievement and closure. In addition to

these traits, the STJs, in particular, are present-oriented, detail-oriented, and structure-oriented; they are good at creating and maintaining efficiency. Firms headed by Ns need Ss to establish efficiencies by coordinating, consolidating, and systematizing the work of the organization. The NTJs, in particular, are generalists with future orientations, good at creating visions and effective strategic plans, and are fanatic independents who wish to work out solutions for themselves and who push hard for closure. Firms headed by Ss need Ns in the organization to provide future strategic orientation (the development of new products, service and marketing plans, and ongoing creative administrative policies), openness to change and innovation (Hellriegel, Slocum, & Woodman, 1986; Myers & McCaulley, 1988). The results of this research imply that these assertions, made from the documented personality characteristics of the Myers-Briggs archetypes, are well founded.

On the other hand, NTPs, in particular, exhibit the traits of impersonal scientific objectivity and critical acuity, but differ from TJs because they lack a timeliness in decision making caused by their vagrant curiosity and lack of commitment to the achievement of tangible goals. They share the personal independence trait of the NTJs, but have difficulty coming to closure. In addition to needing

the coordinating and consolidating skills provided by Ss in order to achieve efficiency, they also need to be supported by persons providing the goal setting and closure skills of the Js.

Feeling types lacking. There are still some important skills that are totally lacking in these business founding types. In a world which increasingly emphasizes the need for human relations and participation skills in order to achieve success, the feeling (F) personality types are appallingly absent from the founder types.

Predictability of types to provide balance. Myers-Briggs personality types appear to predict an individual's resident skills so well that it might be possible to purposely create a balance of skills by selecting support persons with S, N, P, or J indicators. One of the most valuable insights provided by this research is that, because personality traits and skills can be positively identified by testing in advance of the need for them, the staffing needs of an organization can be predicted and the selection of a well balanced management team can be accomplished relatively proactively.

## Does Personality Type Affect The Kinds of Businesses Founded?

Research conclusions. The results of the research are very clear about High-Tech businesses; the NTJs and NTPs

found High-Tech firms. Usually the NTP has an engineering background and a deeply inquiring mind that is both creative and visionary. Because of their personality propensities (i.e., fanatic independence, curiosity, willingness to study deeply, and patience in working out the intellectual details of topics with which they are fascinated) and because of their ability to understand the world of science they are peculiarly suited to starting High-Tech enterprises. The NTJs, alternately, enjoy the challenge of analysis and inquiry, and fiercely attempt to establish and maintain personal independence. Because of their impatience with bureaucratic organizational systems, they strike out on their own whenever they get the chance. Their analytical skills and their ability to understand science also make them adaptable to High-Tech business, but they also are prime founders of non-High-Tech businesses. It is not unusual to find an individual NTJ who has founded both types of businesses.

STJs and NTJs found non-High-Tech businesses. NTPs, the type with the highest odds of founding High-Tech businesses, also found non-High-Tech businesses, but, in the present research, only one-third as many as founded by STJs and one-half as many as founded by NTJs.

Implications for the field of inquiry. In the past, the scientific study of personality types has been

associated more with careers in teaching, religion, and health than it has with careers in business and leadership (Myers & McCaulley, 1988). There has been an unwillingness to apply personality measurement techniques to business because of a perception that systems available for measurement were imprecise, unreliable, and unadaptable to the business management/leadership area (communications with Terence Mitchell, October, 1985 and telephone conversation with Danny Miller, March, 1991). This research provides reliable statistical evidence that the MBTI is a dependable and powerful measurement instrument for use in the business management/leadership field of inquiry. Even though the academic community has been slow to accept the MBTI as a scientific tool, the practical business community is increasingly using it as not only a prediction tool, but also as an effective organizational development intervention (communication with John Friars, Boeing, May 29, 1991; McCaulley, 1988, pp. 381-418).

Implications for the practice of business. The implications discussed in the section on founders of businesses apply to this question; however, the implications discussed for the NTPs are reinforced as the NTPs have the greatest odds of founding High-Tech firms. As discussed in Chapter 1, timeliness in the founding of businesses, for instance, is an imperative. The need to rapidly organize

the details, rally support, create a team environment, and standardize the technology, all simultaneously, is of paramount importance and is not accomplished as well by the NTP as either the NTJ or the STJ. Because of the preference for the P (perception) attitude, the NTP finds these action-oriented behaviors inimical to his personality preferences. As a result, the NTP finds himself in many unfamiliar territories, potentially not performing well with his lesser skills. The NTP does well in the technology area, is able to provide vision and general strategic direction, but typically bungles the operational aspects of administering the business. His leadership is built on the basis of the excitement of a new project, the thrills associated with a new technology , and the vision of what could be in the future. Consequently the results of his leadership are ephemeral and often lead to major problems as the context of the business evolves and the organizational problems of the present are not dealt with effectively (Chapter 5, pp. 272-273).

Because of this research, it is now possible to review High-Tech start-ups with an enhanced ability to predict the types of decisions founders will prefer to make and the future consequences of these decisions. This is especially important for founders of High-Tech enterprises, because, for those whose personal independence does not get in the

way, it reliably alerts them to the types of advice they might need to prevent many of the early problems they need to avoid in order to insure long term success.

For _investors_ in new enterprises, the results of this research provide confidence that the "personality of the individual" is reliably predictive, and that by using the scientific methods available for assessing personality, instead of hunches, they can improve their probability of investing successfully.

## Does The Personality Type of Founders Affect Their Success or Failure in Running High-Tech Firms.

_Research conclusions_. The conclusions reached from the research results are in general agreement with the hypothesis that the NTJs and NTPs are more successful in operating High-Tech businesses for more than two years than any of the other types. The research results are surprising, however, because the unsuccessful types are the reverse of those stated by the hypothesis. Instead of establishing the STPs, SFPs, SFJs, NFJs, and NFPs as unsuccessful, the results indicate that the NTJs and NTPs are more commonly failures.

Comparison of the personality type frequencies of successful and unsuccessful founders shows that the most frequently successful founder types are the same types as the most frequently unsuccessful founder types. The largest

number of Myers-Briggs types that were unsuccessful founders of High-Tech businesses were the NTJs. The comparative statistics, in percent, are interesting. One conclusion drawn from Figure 6-1, which compares the relationship of the three dominant types among founders of High-Tech businesses with their occurence in the general population, is that the STJs, who occur most frequently in the general population, occur less frequently as founders while the NTJs and NTPs occur as founders more frequently than they do in the general population. Another conclusion reached by digesting this figure is that the types are successful or fail in about the same ratio that they found businesses. The NTJs, then, found more businesses than other types, are more often successful than other types, and also fail more than other types. An unplanned investigation into the role extraversion (E) and introversion (I) may have played in these findings revealed that the Es failed, 5 to 1, over the Is. This may or may not be a generalizable finding; future research will be needed to ferret out the truth.

Types and Percentages

| Categories | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP | Total |
|---|---|---|---|---|---|---|---|---|---|
| As % of Total Population | 15.36% | 20.99% | 11.23% | 5.87% | 8.05% | 3.46% | 7.42% | 10.50% | 100% |
| Founders of Businesses | 22.02% | 32.44% | 26.49% | 6.85% | 1.49% | 0.00% | 5.95% | 4.76% | 100% |
| Founders of non-High-Tech Businesses | 38.75% | 28.75% | 13.75% | 7.50% | 1.25% | 0.00% | 3.75% | 6.25% | 100% |
| Successful Founders of High-Tech Businesses | 18.00% | 33.00% | 30.00% | 8.00% | 1.00% | 0.00% | 5.00% | 5.00% | 100% |
| Unsuccessful Founders of High-Tech Businesses | 20.00% | 40.00% | 30.00% | 0.00% | 5.00% | 0.00% | 0.00% | 5.00% | 100% |

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Figure 6-1.    Comparison in percentages of the
STJs, NTJs, and NTPs of High-Tech
business founders, successful founders
and unsuccessful founders and the total
population.

Because the sample of unsuccessful High-Tech founders is small, small differences may be more important than casual evaluation indicates (Blaylock, 1983). No strong conclusions can be drawn. The results are further obfuscated by the results of the logistic regression analysis which indicates that the NTPs have the greater odds of being failures than the NTJs.

Implications for the field of inquiry. The question of which types are successful and which types are unsuccessful is still an interesting and valid topic for research. The fact that there is slight variance evident from the small samples of this research motivates an interest in further investigation. Larger samples, and longitudinal research are called for. Hopefully in these larger samples more STPs, SFJs, SFPs, NFJs, and NFPs would respond so that the hypothesis could be more rigorously tested.

Implications for the practice of business. Logical reasons can be advanced for failure in the case of each type. For instance, the STJs, with their preoccupation with the present and the standardization of operations, may fail in planning strategically for the future: new product development, creative staffing, innovative marketing techniques, and continual manufacturing technology changes. The NTJs may fail because of their inattention to the same things, as well as their people relationships: impatience

and perceived arrogance (Jung, 1921/1971). The NTPs could be said to fail because of their lack of decision timeliness and distaste for closure. The fact that more Es failed than Is also brings up the question of the extraverted attitude which may preclude much introspective thinking about situations and problems, resulting in surface decision making, or quick expediency in problem solving. At this point it is interesting to note that the results of the demographic survey show that the NTJs often stated that their greatest leadership skill was "people," and yet gave, as their major reasons for failure, their inability to get work harmoniously with their financial investors and their difficulty in dealing with employee loyalty problems.

Contributions Made By The Research

A major contribution of this research is the finding that it appears that the personality types of those who found businesses are significantly different from those who do not found businesses. Another major contribution is the finding that the personality types of those who found High-Tech businesses differ significantly from those who found non-High-Tech businesses. Prior attempts at specifying the effect personality has on business management was limited by narrow concepts of personality and the reliability of measurement techniques. This research reveals that

personality type, as conceived by Carl Jung and Catherine Briggs, is a legitimate, effective, and holistic operational measurement approach to researching management phenomena commonly associated with personality. It also reveals that personality type plays an important role in founding and successfully operating High-Tech enterprises. Further, this research establishes that the MBTI, as a holistic approach to personality, is a useful instrument with which to operationalize the relationship of personality and business management.

## Limitations of The Study

This study was limited by the size of the geographic region it covered, i.e., Washington State as well as its confinement to male subjects. It was also limited by the size of the sample of unsuccessful founders who understandably desired to avoid further identification. The study was also limited by the fact that many unsuccessful founders founded multiple businesses, experiencing failures as well as successes. While the sample of successful founders was aggregated using random techniques, the sampling of unsuccessful founders was not random.

Another limiting factor in this study is the absence of the consideration of any intervening variables which might have affected the results. While the main focus has been to simply investigate the frequencies of the occurence of

personality types in various categories of founders, the question of whether these frequencies may have been affected by such variables as industry, regional residence choice, background culture, and education remains unanswered.

## Further Study Needed

Since this was a study limited to the State of Washington, a similar study should be conducted crossing national regional boundaries. This kind of study should consider larger samples so that not only the statistical results would be more reliable, but certain intervening variables could be investigated. The relationship of cultural background, choice of residence locations, education, and regional infrastructures are some of these intervening variables. The comparison of successful and unsuccessful founders should be expanded to include larger samples, but also the non-High-Tech founders should be studied as closely as the High-Tech founders to determine if there are any differences between running the two types of businesses. Complexity is another issue impacted by personality and is related to business size. It is another concern for which personality studies are well suited. Complexity needs to be defined with more clarity and the manner in which different personality types deal with it needs to be investigated.

Research investigating the relationship of personality types to other variables such as intelligence, cultural background, prior business experience, and sex in the founding and successful operation of businesses should be undertaken. While this research shows that personality type affects founding and success or failure in the operation of High-Tech businesses, the relative importance of personality type to other variables is not well understood.

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## APPENDIX A

## THE 29 HIGH-TECH SECTORS AND THEIR OCCUPATIONAL MIX

| Rank | SIC | Title | (a) Engineering/ engineering technicians/ computer scientists | (b) Life & physical scientists | (c) Mathe- ematics | Total a, b, c |
|------|-----|-------|-------|-------|-------|-------|
| | | | Percentage of total employment | | | |
| | | Total Mfg | 5.51 | 0.26 | 0.05 | 5.82 |
| 1 | 376 | space veh. & guided missiles | 40.90 | 0.21 | 0.08 | 41.19 |
| 2 | 357 | office computing machines | 26.62 | 0.05 | 0.03 | 26.70 |
| 3 | 381 | engineering, laboratory, & scientific instruments | 25.67 | 0.73 | 0.05 | 26.45 |
| 4 | 366 | communications equipment | 21.30 | 0.26 | 0.30 | 21.86 |
| 5 | 383 | optical instruments & lenses | 18.73 | 1.03 | 0.04 | 19.80 |
| 6 | 286 | industrial organic chemicals | 14.51 | 4.85 | 0.24 | 19.60 |
| 7 | 372 | aircraft & parts | 17.95 | 0.24 | 0.34 | 18.53 |
| 8 | 283 | drugs | 8.86 | 8.59 | 0.22 | 17.67 |
| 9 | 291 | petroleum refining | 11.76 | 2.42 | 0.44 | 14.62 |
| 10 | 382 | measuring & controlling | 13.93 | 0.12 | 0.09 | 14.14 |

instruments

| Rank | SIC | Title | (a) Engineering/ engineering technicians/ computer scientists | (b) Life & physical scientists | (c) Mathe- ematics | Total a, b, c |
|------|-----|-------|------|------|------|------|
| | | | Percentage of total employment | | | |
| 11 | 367 | electronic components & assembly | 12.72 | 0.10 | 0.02 | 12.84 |
| 12 | 281 | industrial inorganic chemicals | 9.46 | 3.14 | 0.05 | 12.65 |
| 13 | 282 | plastics & synthetic resins | 9.38 | 1.81 | 0.17 | 11.36 |
| 14 | 351 | engines & turbines | 10.16 | 0.48 | 0.01 | 10.65 |
| 15 | 348 | ordnance | 9.37 | 0.99 | 0.06 | 10.42 |
| 16 | 289 | miscellan. chemicals | 6.35 | 3.70 | 0.05 | 10.10 |
| 17 | 386 | photographic equipment | 8.67 | 0.80 | 0.01 | 9.48 |
| 18 | 362 | electrical industrial apparatus | 9.24 | 0.03 | 0.03 | 9.30 |
| 19 | 361 | electrical transmission equipment | 8.55 | 0.03 | 0.01 | 8.59 |
| 20 | 353 | construction equipment | 8.34 | 0.05 | 0.04 | 8.43 |
| 21 | 285 | paints & varnishes | 3.22 | 4.97 | 0.01 | 8.20 |
| 22 | 303 | reclaimed rubber | 5.26 | 2.27 | 0.00 | 7.53 |

| Rank | SIC | Title | (a) Engineering/ engineering technicians/ computer scientists | (b) Life & physical scientists | (c) Mathematics | Total a, b, c |
|------|-----|-------|------|------|------|------|
| | | | Percentage of total employment | | | |
| 23 | 356 | general industrial machinery | 7.21 | 0.04 | 0.02 | 7.27 |
| 24 | 374 | railroad equipment | 6.58 | 0.08 | 0.09 | 6.75 |
| 25 | 365 | radio & TV receiving equipment | 6.62 | 0.06 | 0.04 | 6.72 |
| 26 | 287 | agricultural chemicals | 4.58 | 1.79 | 0.11 | 6.48 |
| 27 | 254 | metal working machinery | 6.27 | 0.01 | 0.00 | 6.28 |
| 28 | 384 | medical & dental supplies | 5.42 | 0.57 | 0.04 | 6.03 |
| 29 | 284 | soap | 3.14 | 2.71 | 0.06 | 5.91 |

## APPENDIX B

## FOUNDER CATEGORY USE IN SAMPLING

| Category | | | n = |
|---|---|---|---|
| Non-Founders | ................................ | | 312 |
| Founders of Businesses: | Founders of non-High-Tech..... | 116 | |
| | Founders of High-Tech ........ | <u>136</u> | |
| | Total Founders.............. | | 252 |
| Successful and Failed: | Founders of High-Tech ........ | 136 | |
| Less: | Successful | (100).... | 100 |
| | Failed | ( 20).... | 20 |

# APPENDIX C

## **QUESTIONNAIRE**

Instructions:

     This questionnaire asks questions about your leadership strengths and your description of the business environment in which you are required to operate. The firm is not being evaluated, only your description of your leadership skills, and the firm's environment is being collected. Your name and the firm's name are confidential as well as any other data you provide, and will not be used in either any published data or in any conversations with others.

**DEMOGRAPHICS:**

Firm Name_____

Your Name_____

Your Sex _____

CEO Name_____Date_____

Sex_____                          Age_____

How long in business?_____ Annual Sales $_____

**Questions:**

1.    Are you? (mark one)  Founder of this firm_____

                     Successor to the founder    _____

                     Member of executive team    _____

2.    What is your title?  (Please mark one)

        CEO                 _____
        Chairman           _____
        President           _____
        Chief Operating Officer  _____

        Other  (name)_____

3.    Would you please list your firm's major products or product categories:

4. Would you please list the leadership skills which you feel make you effective in this business?

5. Would you please describe briefly what you consider to be your major duties in the position you hold with the firm?

6. In trying to explain in which areas you work most, please rank the following in terms of their importance: (Use 1 for most important, 6 for least important.)

    A. Strategy                   \_\_\_\_\_

    B. Scientific Technology   \_\_\_\_\_

    C. Operations              \_\_\_\_\_

    D. Staffing                \_\_\_\_\_

    E. Financing               \_\_\_\_\_

    F. Marketing               \_\_\_\_\_

## QUESTIONNAIRE FOR FOUNDERS ONLY

1. How long before you started this business did you begin preparing to start it?

_____(months/years)

2. What activities did you perform in preparing to start this business?

3. For what reasons did you start this business?

4. What did you consider to be the major business and/or economic factors which would insure the success of this business? (for example: was there a need? if so what was it? if there were some favorable trends, what were they? was money available? etc.)

5. What personal skills do you feel you bring to the business which would insure its success?

Leadership Skills

Other Skills

6. If you did not found this business by yourself, how many were in the group that founded it?

_____

7.   If there was a group, who were the people and what
     skills did they bring to the enterprise?

     <u>Name</u>                <u>Position</u>              <u>Skills</u>

_____

_____

_____

_____

_____

8.   How did you finance the company when you started it?

     Personal funds invested          _____%

     Investment by family members      _____%

     Bank funding (loans or other)     _____%

     Other (name)_____      _____%

## QUESTIONNAIRE FOR CEOs OF LIQUIDATED FIRMS

1.  Would you please list the reasons for which you feel the business was closed?

2.  What leadership strengths do you feel you brought to the business?

3.  What technical strengths do you feel you brought to the business?

4. If you feel you had some leadership or technical weaknesses, what would you say they were?

5. If you had it to do over, what would you do differently?

**THANK YOU**
**FOR TAKING THE TIME**
**TO**
**ANSWER THIS QUESTIONNAIRE**

**APPENDIX D**

**CALIBRATION SAMPLE
CHI SQUARE ANALYSIS**

| | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Founders | 39.00 | 56.00 | 44.00 | 8.00 | 3.00 | 0.00 | 11.00 | 7.00 | 168.00 | 0.52 |
| | 46.15 | 47.70 | 33.19 | 13.48 | 7.26 | 3.63 | 7.78 | 8.81 | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | |
| Non-Founders | 50.00 | 36.00 | 20.00 | 18.00 | 11.00 | 7.00 | 4.00 | 10.00 | 156.00 | 0.48 |
| | 42.85 | 44.30 | 30.81 | 12.52 | 6.74 | 3.37 | 7.22 | 8.19 | | |
| | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | |
| | 89.00 | 92.00 | 64.00 | 26.00 | 14.00 | 7.00 | 15.00 | 17.00 | 324.00 | |

| Fo | Fe | Fo-Fe | (Fo-Fe)2 | (Fo-Fe)2/Fe | Fo2 | Fo2/Fe |
|---|---|---|---|---|---|---|
| 39.00 | 46.15 | -7.15 | 51.10 | 1.11 | 1521.00 | 32.96 |
| 56.00 | 47.70 | 8.30 | 68.83 | 1.44 | 3136.00 | 65.74 |
| 44.00 | 33.19 | 10.81 | 116.96 | 3.52 | 1936.00 | 58.34 |
| 8.00 | 13.48 | -5.48 | 30.05 | 2.23 | 64.00 | 4.75 |
| 0.00 | 3.63 | -3.63 | 13.17 | 0.00 | 0.00 | 0.00 |
| 11.00 | 7.78 | 3.22 | 10.38 | 1.33 | 121.00 | 15.56 |
| 7.00 | 8.81 | -1.81 | 3.29 | 0.37 | 49.00 | 5.56 |
| 50.00 | 42.85 | 7.15 | 51.10 | 1.19 | 2500.00 | 58.34 |
| 36.00 | 44.30 | -8.30 | 68.83 | 1.55 | 1296.00 | 29.26 |
| 20.00 | 30.81 | -10.81 | 116.96 | 3.80 | 400.00 | 12.98 |
| 18.00 | 12.52 | 5.48 | 30.05 | 2.40 | 324.00 | 25.88 |
| 11.00 | 6.74 | 4.26 | 18.14 | 2.69 | 121.00 | 17.95 |
| 7.00 | 3.37 | 3.63 | 13.17 | 0.00 | 49.00 | 0.00 |
| 4.00 | 7.22 | -3.22 | 10.38 | 1.44 | 16.00 | 2.22 |
| 10.00 | 8.19 | 1.81 | 3.29 | 0.40 | 100.00 | 12.22 |
| 147.00 | 140.52 | | | 23.49 | 11633.00 | 341.74 |

X2 = 194.74      X2 for 7 df at .001 prob. should be = 24.32

FOUNDERS OF BUSINESSES

versus

NON-FOUNDERS OF BUSINESSES

Chi Square Analysis

Calibration Samples

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|  | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP |  |  |
|---|---|---|---|---|---|---|---|---|---|---|
| Founders Non-High-Tech | 17.00 | 10.00 | 6.00 | 2.00 | 0.00 | 0.00 | 2.00 | 3.00 | 40.00 | 0.27 |
|  | 10.14 | 13.42 | 11.23 | 1.64 | 0.82 | 0.00 | 1.37 | 1.37 |  |  |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |  |  |
| Founders High-Tech | 20.00 | 39.00 | 35.00 | 4.00 | 3.00 | 0.00 | 3.00 | 2.00 | 106.00 | 0.73 |
|  | 26.86 | 35.58 | 29.77 | 4.36 | 2.18 | 0.00 | 3.63 | 3.63 |  |  |
|  | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |  |  |
|  | 37.00 | 49.00 | 41.00 | 6.00 | 3.00 | 0.00 | 5.00 | 5.00 | 146.00 |  |

| Fo | Fe | Fo-Fe | (Fo-Fe)2 | (Fo-Fe)2/Fe | Fo2 | Fo2/Fe |
|---|---|---|---|---|---|---|
| 17.00 | 10.14 | 6.86 | 47.10 | 4.65 | 289.00 | 28.51 |
| 10.00 | 13.42 | -3.42 | 11.73 | 0.87 | 100.00 | 7.45 |
| 6.00 | 11.23 | -5.23 | 27.38 | 2.44 | 36.00 | 3.20 |
| 2.00 | 1.64 | 0.36 | 0.13 | 0.08 | 4.00 | 2.43 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2.00 | 1.37 | 0.63 | 0.40 | 0.29 | 4.00 | 2.92 |
| 3.00 | 1.37 | 1.63 | 2.66 | 1.94 | 9.00 | 6.57 |
| 20.00 | 26.86 | -6.86 | 47.10 | 1.75 | 400.00 | 14.89 |
| 39.00 | 35.58 | 3.42 | 11.73 | 0.33 | 1521.00 | 42.75 |
| 35.00 | 29.77 | 5.23 | 27.38 | 0.92 | 1225.00 | 41.15 |
| 4.00 | 4.36 | -0.36 | 0.13 | 0.03 | 16.00 | 3.67 |
| 3.00 | 2.18 | 0.82 | 0.68 | 0.31 | 9.00 | 4.13 |
| 0.00 | 9.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3.00 | 3.63 | -0.63 | 0.40 | 0.11 | 9.00 | 2.48 |
| 2.00 | 3.63 | -1.63 | 2.66 | 0.73 | 4.00 | 1.10 |
| 35.00 | 36.44 |  |  | 14.45 | 3626.00 | 161.27 |

X2 = 126.27        X2 for 7 df at .001 prob. should be = 24.32

FOUNDERS OF NON-HIGH-TECH BUSINESSES

versus

FOUNDERS OF HIGH-TECH BUSINESSES

Chi Square Analysis

Calibration Samples

348

| | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Successful | 10.00 | 18.00 | 15.00 | 2.00 | 1.00 | 0.00 | 2.00 | 2.00 | 50.00 | 0.83 |
| Founders | 10.00 | 18.33 | 15.00 | 1.67 | 1.67 | 0.00 | 1.67 | 1.67 | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | |
| Unsuccessful | 2.00 | 4.00 | 3.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 10.00 | 0.17 |
| Founders | 2.00 | 3.67 | 3.00 | 0.33 | 0.33 | 0.00 | 0.33 | 0.33 | | |
| | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | |
| | 12.00 | 22.00 | 18.00 | 2.00 | 2.00 | 0.00 | 2.00 | 2.00 | 60.00 | |

| Fo | Fe | Fo-Fe | (Fo-Fe)2 | (Fo-Fe)2/Fe | Fo2 | Fo2/Fe |
|---|---|---|---|---|---|---|
| 10.00 | 10.00 | 0.00 | 0.00 | 0.00 | 100.00 | 10.00 |
| 18.00 | 18.33 | -0.33 | 0.11 | 0.01 | 324.00 | 17.67 |
| 15.00 | 15.00 | 0.00 | 0.00 | 0.00 | 225.00 | 15.00 |
| 2.00 | 1.67 | 0.33 | 0.11 | 0.07 | 4.00 | 2.40 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2.00 | 1.67 | 0.33 | 0.11 | 0.07 | 4.00 | 2.40 |
| 2.00 | 1.67 | 0.33 | 0.11 | 0.07 | 4.00 | 2.40 |
| 2.00 | 2.00 | 0.00 | 0.00 | 0.00 | 4.00 | 2.00 |
| 4.00 | 3.67 | 0.33 | 0.11 | 0.03 | 16.00 | 4.36 |
| 3.00 | 3.00 | 0.00 | 0.00 | 0.00 | 9.00 | 3.00 |
| 0.00 | 0.33 | -0.33 | 0.11 | 0.33 | 0.00 | 0.00 |
| 1.00 | 0.33 | 0.67 | 0.44 | 1.33 | 1.00 | 3.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.33 | -0.33 | 0.11 | 0.33 | 0.00 | 0.00 |
| 0.00 | 0.33 | -0.33 | 0.11 | 0.33 | 0.00 | 0.00 |
| 45.00 | 45.00 | | | 2.57 | 691.00 | 62.24 |

X2 = 17.24    X2 for 7 df at .020 prob. should be = 16.622

FOUNDERS OF SUCCESSFUL HIGH-TECH BUSINESSES

versus

FOUNDERS OF UNSUCCESSFUL HIGH-TECH BUSINESSES

Chi Square Analysis

Calibration Samples

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# APPENDIX E

## VALIDATION SAMPLE
## CHI SQUARE ANALYSIS

|  | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP |  |  |
|---|---|---|---|---|---|---|---|---|---|---|
| Founders | 35.00 | 53.00 | 45.00 | 15.00 | 2.00 | 0.00 | 9.00 | 9.00 | 168.00 | 0.52 |
|  | 43.04 | 44.59 | 32.67 | 15.56 | 8.30 | 3.63 | 8.30 | 11.93 |  |  |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |  |  |
| Non-Founders | 48.00 | 33.00 | 18.00 | 15.00 | 14.00 | 7.00 | 7.00 | 14.00 | 156.00 | 0.48 |
|  | 39.96 | 41.41 | 30.33 | 14.44 | 7.70 | 3.37 | 7.70 | 11.07 |  |  |
|  | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |  |  |
|  | 83.00 | 86.00 | 63.00 | 30.00 | 16.00 | 7.00 | 16.00 | 23.00 | 324.00 |  |

| Fo | Fe | Fo-Fe | (Fo-Fe)2 | (Fo-Fe)2/Fe | Fo2 | Fo2/Fe |
|---|---|---|---|---|---|---|
| 35.00 | 43.04 | -8.04 | 64.59 | 1.50 | 1225.00 | 28.46 |
| 53.00 | 44.59 | 8.41 | 70.68 | 1.59 | 2809.00 | 62.99 |
| 45.00 | 32.67 | 12.33 | 152.11 | 4.66 | 2025.00 | 61.99 |
| 15.00 | 15.56 | -0.56 | 0.31 | 0.02 | 225.00 | 14.46 |
| 0.00 | 3.63 | -3.63 | 13.17 | 0.00 | 0.00 | 0.00 |
| 9.00 | 8.30 | 0.70 | 0.50 | 0.06 | 81.00 | 9.76 |
| 9.00 | 11.93 | -2.93 | 8.56 | 0.72 | 81.00 | 6.79 |
| 48.00 | 39.96 | 8.04 | 64.59 | 1.62 | 2304.00 | 57.65 |
| 33.00 | 41.41 | -8.41 | 70.68 | 1.71 | 1089.00 | 26.30 |
| 18.00 | 30.33 | -12.33 | 152.11 | 5.01 | 324.00 | 10.68 |
| 15.00 | 14.44 | 0.56 | 0.31 | 0.02 | 225.00 | 15.58 |
| 14.00 | 7.70 | 6.30 | 39.64 | 5.15 | 196.00 | 25.44 |
| 7.00 | 3.37 | 3.63 | 13.17 | 0.00 | 49.00 | 0.00 |
| 7.00 | 7.70 | -0.70 | 0.50 | 0.06 | 49.00 | 6.36 |
| 14.00 | 11.07 | 2.93 | 8.56 | 0.77 | 196.00 | 17.70 |
| 148.00 | 135.85 |  |  | 22.88 | 10878.00 | 344.18 |

X2 = 196.18      X2 for 7 df at .001 prob. should be = 24.32

FOUNDERS OF BUSINESSES

versus

NON-FOUNDERS OF BUSINESSES

Chi Square Analysis

Validation Samples

351

| | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Successful | 8.00 | 15.00 | 15.00 | 6.00 | 0.00 | 0.00 | 3.00 | 3.00 | 50.00 | 0.83 |
| Founders | 8.33 | 15.83 | 15.00 | 5.00 | 0.00 | 0.00 | 2.50 | 3.33 | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | |
| Unsuccessful | 2.00 | 4.00 | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 10.00 | 0.17 |
| Founders | 1.67 | 3.17 | 3.00 | 1.00 | 0.00 | 0.00 | 0.50 | 0.67 | | |
| | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | |
| | 10.00 | 19.00 | 18.00 | 6.00 | 0.00 | 0.00 | 3.00 | 4.00 | 60.00 | |

| Fo | Fe | Fo-Fe | (Fo-Fe)2 | (Fo-Fe)2/Fe | Fo2 | Fo2/Fe |
|---|---|---|---|---|---|---|
| 8.00 | 8.33 | -0.33 | 0.11 | 0.01 | 64.00 | 7.68 |
| 15.00 | 15.83 | -0.83 | 0.69 | 0.04 | 225.00 | 14.21 |
| 15.00 | 15.00 | 0.00 | 0.00 | 0.00 | 225.00 | 15.00 |
| 6.00 | 5.00 | 1.00 | 1.00 | 0.20 | 36.00 | 7.20 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3.00 | 2.50 | 0.50 | 0.25 | 0.10 | 9.00 | 3.60 |
| 3.00 | 3.33 | -0.33 | 0.11 | 0.03 | 9.00 | 2.70 |
| 2.00 | 1.67 | 0.33 | 0.11 | 0.07 | 4.00 | 2.40 |
| 4.00 | 3.17 | 0.83 | 0.69 | 0.22 | 16.00 | 5.05 |
| 3.00 | 3.00 | 0.00 | 0.00 | 0.00 | 9.00 | 3.00 |
| 0.00 | 1.00 | -1.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.50 | -0.50 | 0.25 | 0.50 | 0.00 | 0.00 |
| 1.00 | 0.67 | 0.33 | 0.11 | 0.17 | 1.00 | 1.50 |
| 44.00 | 44.17 | | | 2.34 | 598.00 | 62.34 |

FOUNDERS OF SUCCESSFUL HIGH-TECH BUSINESSES

versus

FOUNDERS OF UNSUCCESSFUL HIGH-TECH BUSINESSES

Chi Square Analysis

Validation Samples

$X2 =$ 18.34     X2 for 7 df at .020 prob. should be = 16.622

| | STJ | NTJ | NTP | STP | SFJ | SFP | NFJ | NFP | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Founders Non-High-Tech | 14.00 | 13.00 | 5.00 | 4.00 | 1.00 | 0.00 | 1.00 | 2.00 | 40.00 | 0.28 |
| | 8.83 | 12.97 | 10.21 | 3.59 | 0.55 | 0.00 | 1.38 | 2.48 | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | |
| Founders High-Tech | 18.00 | 34.00 | 32.00 | 9.00 | 1.00 | 0.00 | 4.00 | 7.00 | 105.00 | 0.72 |
| | 23.17 | 34.03 | 26.79 | 9.41 | 1.45 | 0.00 | 3.62 | 6.52 | | |
| | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | |
| | 32.00 | 47.00 | 37.00 | 13.00 | 2.00 | 0.00 | 5.00 | 9.00 | 145.00 | |

| Fo | Fe | Fo-Fe | (Fo-Fe)2 | (Fo-Fe)2/Fe | Fo2 | Fo2/Fe |
|---|---|---|---|---|---|---|
| 14.00 | 8.83 | 5.17 | 26.75 | 3.03 | 196.00 | 22.20 |
| 13.00 | 12.97 | 0.03 | 0.00 | 0.00 | 169.00 | 13.03 |
| 5.00 | 10.21 | -5.21 | 27.11 | 2.66 | 25.00 | 2.45 |
| 4.00 | 3.59 | 0.41 | 0.17 | 0.05 | 16.00 | 4.46 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.38 | -0.38 | 0.14 | 0.10 | 1.00 | 0.73 |
| 2.00 | 2.48 | -0.48 | 0.23 | 0.09 | 4.00 | 1.61 |
| 18.00 | 23.17 | -5.17 | 26.75 | 1.15 | 324.00 | 13.98 |
| 34.00 | 34.03 | -0.03 | 0.00 | 0.00 | 1156.00 | 33.97 |
| 32.00 | 26.79 | 5.21 | 27.11 | 1.01 | 1024.00 | 38.22 |
| 9.00 | 9.41 | -0.41 | 0.17 | 0.02 | 81.00 | 8.60 |
| 1.00 | 1.45 | -0.45 | 0.20 | 0.14 | 1.00 | 0.69 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4.00 | 3.62 | 0.38 | 0.14 | 0.04 | 16.00 | 4.42 |
| 7.00 | 6.52 | 0.48 | 0.23 | 0.04 | 49.00 | 7.52 |
| 36.00 | 35.59 | | | 8.33 | 3062.00 | 151.88 |

X2 = 115.88     X2 for 7 df at .001 prob. should be = 24.32

FOUNDERS OF NON-HIGH-TECH BUSINESSES

versus

FOUNDERS OF HIGH-TECH BUSINESSES

Chi Square Analysis

Validation Sample

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# CURRICULUM VITAE

**ROBERT A. BLUMENTHAL, PHC**

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## EDUCATION

| | | |
|---|---|---|
| University of Washington | **Ph.D.** | 8/91 |
| Azusa Pacific University, Management | **M.B.A.** | 6/80 |
| University of California (UCLA) English/History/Naval Science | **B.A.** | 6/50 |

## EMPLOYMENT (MOST IMPORTANT ONLY)

| | |
|---|---|
| University of Washington, (Lecturer) | 1991 - |
| University of Washington, (TA) | 1990-1991 |
| Seattle Consulting Group, Inc. (President) | 1982 - |
| Seattle Pacific University (Assoc. Prof.) | 1980-1990 |
| Azusa Pacific University (Assist. Prof.) | 1977-1980 |
| SS Manufacturing, Inc. (President) | 1959-1977 |
| Blumenthal Manufacturing Co. (Salesman) | 1953-1961 |
| United States Navy, Submarines (Lt. Comdr.) | 1950-1953 |

## CERTIFICATIONS

Standard Designated Subjects Teaching Credential,
California (Issued for LIFE)         1967

Certified to command submarines

## PROFESSIONAL AFFILIATIONS

Academy of Management (Presentor)

Association for Psychological Type (Presentor)

Seattle Chamber of Commerce
(Small Business Council, former member)
(Consultant to the Chamber)

International Small Business Council
(Presentor, Contributor to Proceedings)

Foreign Affairs Council of Seattle
( former member)

## UNIVERSITY COMMITTEES (SPU)

School of Business and Economics
MBA Committee
Learning Resources Committee

University Standing Committees
Interdisciplinary Studies
Compensation Philosophy
Development for The University
Internship Committee
Task Force for Restructuring
 the University
Decentralization Task Force
HRD Masters Development Committee
Long Range Planning Retreat Committee

## ADDITIONAL ACTIVITIES

Small Business Management contributor to the Puget Sound
Business Journal

President and Director, The Seattle Consulting Group, Inc.
The Seattle Consulting Group, Inc. is a publishing and
consulting firm which holds copyrights to management
training publications and is used as a consulting
vehicle.  A partial list of recent clients:

Microserv
Meteor Communications
Floathe Johnson, High-Tech Advertising
North American Rockwell
Honeywell, Marine Systems Division
Crowley Maritime
Foss Tug
Seattle Chamber of Commerce
United Way of Puget Sound
Leadership Tomorrow
Goulds Pumps
Reuland Electric
Dari-Marketing Services
Port of Seattle
Moss Adams C.P.A. firm
Mayne Nickless, Inc.
Pierce County Medical and Blue Shield

Participant/Speaker at numerous conferences including
Seattle Executives, Small Business Administration,
various Chambers of Commerce, Seattle Roundtable,
Association of Association Executives, United Way of
Puget Sound.

## COURSES TAUGHT

### Undergraduate and Graduate

Strategic Management and Organizational Policy
                                        SPU, UW, Chapman
Organizational Theory and Practice
        Seattle Pacific Univ.(SPU), Univ. of Wash.,
        Chapman College
Organizational Development       SPU, Chapman Col.
Organizational Behavior          SPU, UW
International Business            SPU, Chapman
Marketing Management             APU, SPU
Sales Management &
  Salesmanship                   APU, SPU
Advertising                      SPU
Entrepreneurial Marketing        SPU
Entrepreneurial Strategy         SPU

## PUBLICATIONS

### DISSERTATION

Winners and Losers:  The Role of Personality in
High-Tech Business Success.  University of Washington,
School of Business Administration, 1991.

### REFEREED

Blumenthal, R. 1991.  Winners and Losers in High-Tech.
in Proceedings, Association for Psychological Type, in
press for July.

Blumenthal, R. 1985.  Management Training in The Small
Business Setting.  International Council for Small
Business Journal, 77-90.

### PERIODICALS

Blumenthal, R. 1991.  Different Types:  Founders of High-
Tech Businesses.  Advanced Technology in Washington
State, 1991 Directory.  Seattle, Wa.:  Commerce
Publishing Corp.

Blumenthal, R. 1990.  Big,bigger, biggest...but what's the
point?  Puget Sound Business Journal, p. 14.

Blumenthal, R. 1986.  Garment manufacturers can aid the
national Economy.  Garment Manufacturers Newsletter:
Dhaka, Bangladesh, p. 2.

Blumenthal, R. 1985. Indian Garment Manufacturing Units Can
Benefit From U.S. Marketing and Technology. Indo-
American Times, special edition on the occasion of
Rajiv Ghandi's visit to U.S., June, pp 10-11.

Blumenthal, R. 1984. A Year's Vacation With No Worries.
Insider, April/May/June, p. 1.

Blumenthal, R. 1983. Watch Your Technicals.  Insider.
April/May/June, p. 1.

Blumenthal, R. 1982. Blumenthal:  dispelling myths about
success.  Seattle Business Journal, Sept., p. 10.

**TEXTS**

Blumenthal, R. 1991. Strategic Cash Flow Management  Seattle
    Consulting Group, Inc.: Seattle: in press.

Blumenthal, R. 1985. Leadership:  An anthology of the honors
    reading seminar, edited, Seattle Pacific University,

Blumenthal, R. 1989.  Entrepreneurial Marketing:  An outline
    of a marketing plan for a new business.  SPU.

Blumenthal, R.; Kargar, J.: and Dagbo, B. 1980.  The
    Management of Change and Innovation.  Claremont
    Graduate School.  Published by Seattle Pacific
    University:  Seattle.

Blumenthal, R. and Jabs, R. 1978. Handbook: workshop for
    Training the trainers. National Management Association,
    Ohio.

**PRESENTED PAPERS AND CONFERENCE PARTICIPATION**

Blumenthal, R. 1991.  Winners and Losers in High Tech.
    Association for Psychological Type, Richmond, Virginia
    Conference.

Blumenthal, R. 1986. Development of a student-faculty
    consulting organization for service to the business
    community.  British Columbia Institute of Technology,
    Vancouver, B.C.

Blumenthal, R. 1985. Management training in the small
    business setting.  30th Annual World Conference of the
    International Council For Small Business, Montreal,
    Canada, June 16-19.

Kierulff, H. and Blumenthal, R., 1984.  Undergraduate
    entrepreneurship education at Seattle Pacific
    University.  Coalition of Christian Business
    Schools,  Dallas, Texas.

Blumenthal, R. 1984.  A push-pull strategy model for
    university small business involvement in economic
    development programs.  29th Annual World Conference of
    the International Council for Small Business, Chicago,
    June.

Hope, J.; Harris, D.; and Blumenthal, R. 1983.  Innovative
     methods for teaching business courses. Western Academy
     of Management, Vancouver, B.C.

Hope, J.; Harris, D.; and Blumenthal, R. 1982.  Making
     business courses interdisciplinary.  Western Academy of
     Management.  Phoenix, Ariz.

Blumenthal, R. 1981.  Integrating business community
     involvement into the classroom.  Western Academy of
     Management, Monterey, California.

## WHITE PAPERS

Blumenthal, R. 1986.  University Compensation Philosophy.
     Prepared  for the Committee for University Employee
     Compensation, Seattle Pacific University. Seattle.

Blumenthal, R. 1983.  Organization design and organizational
     decentralization. Prepared for the Task Force on
     University Reorganization. Seattle Pacific University.
     Two papers. Seattle.

## PRESENTATION OF SEMINARS FOR THE BUSINESS COMMUNITY
   (Chronological Order)

Bell, Cecil and Blumenthal, R. 1991.  Leadership and
     business  management development for CEO/Founders of
     High-Tech firms. University of Washington, Seattle.

Blumenthal, R. 1990.  The keys to successful business
     operation for founders of new businesses.  Small
     Business Administration and University of Washington,
     Seattle, WA.  Presented three times, over 250
     attendees.

Blumenthal, R. 1990.  Smart business planning:  designing
     and implementing the business plan. Seattle Business
     Executives, Inc. Seattle, WA.

Blumenthal, R.; French, W.; Hansel, T.; Harris, D. 1987,
     1988. Management training for partners and senior firm
     members.Five days for Moss Adams C.P.A. firm.  Provided
     under the auspices of Seattle Pacific University.
     Blakeley Island, Wa.

Blumenthal, R.; Hansel, T.; French, W. 1989. Management
training for senior management, directors, and
department managers. Presented for Dari-Marketing
Services, Inc. Blakely Island, Wa.

Blumenthal, R.; Deming, J.; Karns, G.; Leonard, K. 1983,
1984, 1985, 1986, 1987. Cash flow management for small
business owners and managers. Sponsored by the Small
Business Administration and Seattle Pacific University,
over 6,000 attendees. Seattle, Spokane, Vancouver,and
Bellinghlam Wa.

Kierulff, H. and Blumenthal, R. 1987. Cash flow management
for small business customers of the bank. City Bank,
Lynnwood, Wa.

Blumenthal, R. 1986. Cash flow managment for small
business entrepreneurs. Presented for the Seattle
First National Bank's Entrepreneurship Fair. Seattle,
Wa.

Blumenthal, R.; Hansel, T.; Peterson, N.; 1985. Leadership
Tomorrow: Training for volunteer community leaders:
a four day retreat. Sponsored by the Seattle Chamber of
Commerce and Puget Sound United Way. Winthrop, Wa.

Blumenthal, R. and Karns, G.; Chamberlain, R. 1984, 1985,
1986. Salesmanship. Sponsored by the Small Business
Administration and Seattle Pacific University, Seattle,
WA. Over 1500 participants.

French, Wendell; Blumenthal, R. and McKenna, D. 1984, 1985.
The solution of difficult personnel problems for small
business owners and managers. Sponsored by the Small
Business Administration. Over 400 participants.

Blumenthal, R. and Kierulff, H. 1984. Coping with difficult
small business owners with cash flow problems. For
Rainier Bank, Seattle, Wa.

Jabs, R. and Blumenthal, R. 1978, 1979. Management for
supervisors. City of Industry, California.

Hope, J.; Jabs, R.; Blumenthal, R. 1978, 1979. Train the
trainers workshop for The National Management
Association. Ohio. 250 attendees from companies all
over the United States.