

**INTROVERSION-EXTROVERSION AND EFL
PROFICIENCY AMONG FIRST YEAR STUDENTS AT
ADDIS ABABA UNIVERSITY**

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ADDIS ABABA UNIVERSITY
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INTROVERSION-EXTROVERSION AND EFL PROFICIENCY
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ABSTRACT

This study investigated the relationship between the introversion-extroversion tendencies of first year students at Addis Ababa University and their proficiency in English as a Foreign Language (EFL). It was hypothesized that in an ESL/EFL situation, introverted students would attain higher English proficiency scores in reading, grammar and listening tests because of their tendency to prefer reading to talking, rules to examples, working alone to with others, figuring things to talking to others. In order to test the hypothesis that introverts are more proficient in English reading, grammar and listening, students from a randomly selected classes in the Science Faculty and the College of Social Sciences completed a personality questionnaire (EPI) and 45 subjects from the Science Faculty and 49 from the College of Social Sciences took an English proficiency test that was designed and formatted on the basis of examination papers normally prepared by the Department of Foreign Languages and Literature (DEFLI).

The hypothesis that introverts are more proficient in English reading, grammar and listening tests was not supported. The average score comparison showed that extroverts (both males and females) scored higher than introverts. No significant age difference was observed between introverts and extroverts.

Although the correlation coefficient value showed a significant inverse relationship between introversion-extroversion and English proficiency test scores in grammar and listening, the insignificant correlation coefficient values for the relationship between introversion-extroversion and reading as well as the total English proficiency test score are taken as evidences for the absence of significant relationships. These findings are discussed with respect to psychological and cultural factors that are predominant in Ethiopian society.

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CHAPTER ONE

INTRODUCTION

In this section, the background of the study, the main objectives in undertaking it, the importance and delimitations of the study, as well as the organization of the **thesis** will be presented consecutively. In addition, some new symbols and abbreviations used in the **thesis** will be described.

1.1 Background of the Study

It has often been claimed by many teachers and researchers that there is a relationship between being outgoing, sociable and interested in people and their languages, which characterize extroverts, and proficiency in a foreign language. This claim arises basically from the hypothesis that extroverts are better language learners (especially in acquiring oral skills) than introverts. Researchers who propose such a hypothesis associate good language learners with those who have a strong desire to communicate.

In contrast to the above claim, other researchers start from the assumption that extroverts are better foreign language learners. For instance, Brown (1973) insists that it is just a common belief among teachers in general, particularly in western countries that introversion is an undesirable behaviour. Thus, it is better to be an outgoing person. Since the quiet and reserved persons are considered as persons with problems, language teachers seek ways of encouraging extroversion. However, Brown questions whether introverts are qualitatively less proficient than extroverts. The belief that extroverts are better than introverts in learning a language can be just a matter of intuitive claim. Much evidence can be found which support the assumption that introverts can be better at learning to read and write in a second language than learning to speak (See, Naiman et

al., 1978 in Ellis, 1985 and Stern, 1983; Rubin, 1975; Stern, 1975 in Stern, 1983; Bedilu, 1996).

Although a number of hypotheses have been proposed concerning the relationship between introversion-extroversion tendencies and foreign language learning, only very few studies have been undertaken to investigate and produce empirical findings to test these hypotheses. Bush (1982) states that the studies made by Naiman et al., (1975, 1978) were said to be some of those which considered the issue at some length. The aim of the studies, according to Busch, was to find out whether certain personality characteristics might affect learning strategies and outcomes. The studies resulted in insignificant correlations between extroversion and proficiency in second language learning. Similarly, Busch's (1982) study on Japanese students learning English as a foreign language showed no relationship between extroversion and proficiency in English. The statistical analysis of the study revealed that extroversion had a significant negative correlation with pronunciation, a sub-component of the oral interview test. In addition, introverts tended to have higher scores on the reading and grammar components of the standardized English test. Although introverts tended to score better on most of the English proficiency measures, in Busch's study, it was found that Junior College males who had tendencies towards extroversion scored higher on the oral interview test.

Bedilu (1996) also compared the average scores of introvert and extrovert subjects of three Ethiopian colleges in reading and writing tests in Amharic. He found no significant difference between introverts' and extroverts' average scores on the reading comprehension test. However, introverts scored better than extroverts on the writing test. His study also investigated whether sex and age show significant effect on subjects' performance in reading and writing tests in Amharic. The results of the statistical analysis do not show any significant effect.

Because most of previously undertaken studies revealed different results, it has so far been difficult to reach at reliable conclusions. What is suggested is only to undertake a large number of researches in varied contexts. Some researchers claim that results are considered as inconclusive for the reason that, on the one hand, only very few studies have so far been undertaken, and on the other, these few studies are concentrated only on European language speaking pupils learning other European languages as a second language.

In addition to the above claims, some other researchers add that differences on results may be due to factors other than personality such as age, sex, family and cultural backgrounds, etc. According to Anthony (1973), for instance, some research findings documented by Eysenck and Cookson (1969), Elliot (1972), Entwistle (1972), and others show that young school children with tendencies towards extroversion characteristics were found better in their performance than young introverts. But in the comparison of older pupils' performance, those with introversion characteristics performed better than their extrovert counterparts. The reason these researchers suggest for the change of the correlation from positive to negative for extroverts and negative to positive for introverts in their performance as age increases, is that introverts are late developers when compared to extroverts. This, in other words, means that the increase in age results in change of students' performance that those young extroverts who performed well in their primary and junior classes may not perform well in their senior high school and college classes. Because introverts are said to be late developers, they are expected to perform better, in their senior high school and college classes, than do extroverts.

In general, there is a clear difference between researchers in their reasoning for differences on research results. It is such different results and assumptions that initiated the researcher of this paper to undertake such a research project to attempt to contribute towards the already available **findings**. Based on these and other factors, the research has

focused on first year students at Addis Ababa University (Science Faculty and College of Social Sciences). The study concentrates on comparing the averages of introverts and extroverts on their age on the one hand and English proficiency test scores on the other. At the same time, it tries to investigate the relationship between introversion-extroversion tendencies and age as well as English proficiency test scores in an EFL situation.

As far as the English proficiency tests are concerned, the focus is on the total proficiency test score. However, each sub-component test (i.e. reading, grammar and listening) is also investigated separately to see if there is distinctive relationship with the given personality characteristics. The reason for treating reading, grammar and listening in isolation is that first, two of the sub-component tests are grouped as receptive skills on which introverts and extroverts may show differences in their performance. In addition, those research findings previously reviewed indicate that students' performance on these two receptive skills and grammar tests resulted in differences among students in relation to their personality differences. The second reason for focusing on these two skills and grammar is that they can be scored by a single person (by the researcher) and also the tests can be administered and scored easily and within a limited period of time.

1.2 Objectives of the Study

In an EFL situation such as that which exists here in Ethiopia, it would seem that extroverted students should attain a higher proficiency in English, especially in oral English. This is because they are expected to take advantage of the few opportunities they get to receive input in English and practice the language both inside and outside the classroom. They can have contacts with foreigners, as a result of which they may have the chance to speak in the target language. Similarly, the introverts, since they prefer reading to talking, may be higher scorers in reading comprehension, grammar and listening in the target language. Based on these and other assumptions, this research

aims at studying or investigating whether the first year students at Addis Ababa University who have tendencies towards extroversion, defined as high sociability and impulsivity, tend to be less proficient in the EFL tests as measured by a standardized proficiency tests in reading, grammar and listening. Similarly, the study aims at finding out whether the students, at the same level and institution as indicated above, who have tendencies towards introversion, defined as low sociability and impulsivity, tend to have higher averages on their age as well as total English proficiency test which composed reading, grammar and listening as sub-component tests.

Thus, the research tries to answer the following two research questions:

1. Is there significant average (mean) difference between introverts and extroverts on their age, as well as English proficiency tests in reading, grammar and listening?

This research question will be answered based on the following hypotheses.

- H_0 : There will be no significant difference between introverts and extroverts on their averages (means) on age, as well as English proficiency tests in reading, grammar and listening. ($\bar{X}_I = \bar{X}_E$) at $P < .05$ level, one-tailed (directional) decision.
- H_1 : Introverts will show a significantly higher averages on their age, as well as English proficiency tests in reading, grammar and listening than do extroverts. ($\bar{X}_I > \bar{X}_E$) at $P < .05$ level, one-tailed (directional) decision.
2. Is there significant systematic relationship between the introversion-extroversion tendencies of first year students at Addis Ababa University and their age, on the one hand, and performance on a standardized English proficiency test that composed reading, grammar and listening as sub-component tests on the other?.

The research tries to answer this question based on the following research hypotheses.

- H₀: There will be no significant relationship between introversion-extroversion tendencies and age on the one hand and between introversion-extroversion tendencies and total English proficiency test score that composed reading, grammar and listening. ($r = 0$) at $P < .05$ level, one-tailed (directional) decision.
- H₁: There will be negative relationship between the introversion-extroversion tendencies and age, as well as English proficiency test scores in reading, grammar and listening. ($r < 0$) at $P < .05$ level, one tailed (directional) decision.

Note that all the hypotheses express a one tailed (directional) decision level.

1.3 Importance of the Study

The results that are found in the study of the average (mean) differences between introverts and extroverts as well as the relationship between introversion-extroversion tendencies and age, on the one hand and between introversion-extroversion tendencies and English proficiency test scores in reading, grammar and listening in an EFL situation on the other, can have implications for the following conditions.

1. Results can benefit programmes of teaching and learning a foreign language at all school levels (i.e. primary, secondary and college) of government, private and community schools.
2. Teachers can adjust their teaching strategies in favour of all learners as a result of their awareness of learners' differences in different activities.
3. Material designers and writers can consider which groups of learners may benefit from the prepared material.
4. Teachers, parents and the community at large may avoid forcing pupils towards activities against their will. The responses can be considered in different terms - emotional, motivational and interpersonal.

5. Other researchers can use the results of the study as a reference for other studies related to personality preferences and language learning.

1.4 Delimitation of the Study

This study, as stated earlier, has taken the study of the relationship between introversion-extroversion tendencies and age, on the one hand, and between introversion-extroversion and English proficiency test scores in reading, grammar and listening on the other, as its major concern. The subjects under study are regular first year students at Addis Ababa University (Science Faculty and the College of Social Sciences). The study is undertaken first, by comparing the averages (means) of introverts and extroverts for their age as well as English proficiency test scores. Second, by correlating extroversion scores on the Eysenck Personality Inventory with subjects' age as well as with scores on the English proficiency test. In the personality inventory responses, the highest extroversion scores or the scores above the median (central point) refer to tendency towards extroversion and the lower extroversion scores or scores below the median refer to tendency towards introversion.

There are a number of factors that affect the relationship between introversion-extroversion and proficiency in language such as - age, sex, first language, culture, family and economic background, etc. However, this research has concentrated only on the effects of the first two (i.e. age and sex differences).

1.5 Organization of the Thesis

The study is organized in the following procedures. As it proceeds from the introduction which is in chapter one, then comes chapter two. In chapter two the necessary literatures are reviewed. These literatures have ideas which they raise in relation to the relationship between personality factors and ESL/EFL proficiency. In addition, some researchers' views on the definition of the term personality and their

differences on this issue is discussed in this chapter. Similarly, results of recently undertaken research works in relation to the topic of the relationship between personality characteristics and language learning are also described.

Chapter three deals with the methods, instruments and procedures used in the process of administering the questionnaire and the test, collecting and analysing data and finalizing the whole research project. The methods, instruments and procedures used in this study are previously tried by other researchers and proved to be successful. In addition, the researcher of this study tried all the methods, instruments and procedures on a pilot study before working on the final project and has proved their applicability.

The results of this study are described in chapter four. The description of the results begins by showing the results of age comparisons between introverts and extroverts within each campus. Age comparisons are investigated in various terms. This means that the comparison considers differences and similarities in personality as well as sex, both within subjects of each campus and between subjects of the two campuses combined. In addition to age comparison, subjects' English proficiency test scores are compared. However, this time the comparison treats subjects' scores for each campus separately. Correlation results are also described next to average (mean) comparisons for each campus.

The last chapter (chapter five) discusses results in relation to the research questions posed at the beginning in the research as well as in relation to previous research findings on the same topic. Chapter five ends in giving concluding remarks as well as recommendations.

Lists of references and appendixes are to be found at the end of the research paper immediately following chapter five.

1.6 Abbreviations and Symbols Used in the Study

df/DF	=	degrees of freedom (The number of pairs of items minus two).
EFL/ESL	=	English as a Foreign Language/English as a Second Language.
EPI	=	Eysenck Personality Inventory.
Extro.	=	Extroverts
F.Extro.	=	Female Extroverts
M.Extro.	=	Male Extroverts
F.Intro.	=	Female Introverts
M.Intro.	=	Male Introverts
Intro.	=	Introverts
k	=	the number of categories
N/n	=	number of observation in a category
r	=	sample correlation coefficient
rcrit.	=	the critical value of the appropriate r distribution
robs.	=	the observed value of the calculated correlation.
t.crit.	=	the critical value of t-test.
t-obs.	=	the observed value of the calculated t-test.
s.d/SD	=	standard deviation
X	=	arithmetic mean for the variable X
Σ	=	sum of all scores that follow.

CHAPTER TWO

REVIEW OF RELATED LITERATURES

2.1 Personality Factors and Language Learning

In studying the relationships between personality factors and language learning or in considering the effects of one on the other, researchers insist on owing due regard to the definition of the term personality. According to Fiske (1978), there is not any standard definition for the term personality. This means that, although there are a number of theories about the term personality, there is no common agreement on the definition. However, researchers attempt to formulate their own theory for the definition of personality. According to Hall and Lindzey (1957), what seems general is that most personality theorists consider man as a purposive creature. Man is considered to be motivated by a conscious attempt to maximize pleasure and minimize pain.

The term 'personality' is defined, in Schultz (1986: 30) as, "The unique and relatively enduring internal and external aspects of an individual's character that influence behaviour in different situations." This definition is similar to that of Allport's (1937) theory in Hall and Lindzey (1957) which stresses the importance of giving a full consideration to individuality.

In studying personality, the field of general psychology explores it in terms of a number of personal traits which in aggregate constitute the personality of an individual.

Unable to define personality in a single and brief way or unsatisfied with those definitions stated by different theorists, a number of scholars have attempted to find ways or methods for measuring personality. For instance, as Ellis (1985) states Cattell tried to measure personality in a series of dichotomies. These dichotomies, such as

cool/warm, shy/virtuesome, not assertive/dominant, are considered as poles on the continuum.

Similar to those of Cattell, Eysenck (1953 in Ellis 1985) identifies two major personality dimensions which are represented as dichotomies. These are: extrovert/introvert and neurotic/stable categories.

As Ellis (1985) states, some other second language researchers rather prefer to develop their own battery of personality traits. Such batteries of personality traits, according to Ellis, are those associated with "social styles" (Fillmore, 1979; Strong, 1983) and those associated with "ego centric factors" (Brown, 1981). Similarly, other researchers (such as Dulay, Burt, and Krashen, 1982) include cognitive style as a personality trait.

All these show that defining the term personality is not an easy task. Thus, each researcher conceives the term according to his/her view. Regarding the complex nature of personality and the measures researchers take in overcoming the difficulties of defining the term, Ellis writes the following as the main reason: "This confusion resulted from both the many-faceted nature of personality and the need that individual researchers have felt to investigate traits which intuitively strike them as important" (1985: 119-20).

Spolsky (1989) states that as far as studies on personality are concerned, those which are made by Guiora and the University of Michigan Personality and Language Behaviour Research Group are considered as the major ones. The original attempt of the study was based on the interest in clinical questions. Thus, the original proposal under this question was for a collaborative research between the discipline of clinical psychology and language sciences. By transposing their focus of study from other

aspects of behaviour to language, Guiora, Lane, and Bosworth (1968) in Spolsky (1989) try to achieve greater empirical validity. The basic question under the study was then 'How will language affect personality development and how will personality development in turn affect language behaviour?'

Based on Guiora's et al. ideas, Spolsky (1989) continues to state that the main attempt of choosing the authenticity of pronunciation as the realm of behaviour in the testing hypotheses about empathic capacity was due to the notion that both pronunciation ability and empathy are to be influenced by the same underlying processes. These processes are called permeability of ego boundaries. To make the concept clear and precise 'language ego' is introduced as a mediating construct. Here 'language ego' is considered as a maturational concept, as that of the concept of 'body ego', that refers to self-representation with physical outlines and firm boundaries.

Here, it is fundamental to refer to the Whorfian view in which language is treated as a manifestation and as an engine of the individual's personality. This view, according to Spolsky (1989), refers to language to be treated as a psychological process that interweaves and interacts with other psychological processes which are transitory or stable to influence, change, or determine an individual's behaviour.

The concept of 'empathy', which refers to the willingness and capacity to identify with others, was applied to the ability of the second language learner to identify with the communicative behaviour of the native speakers of the target language. This concept, 'empathy', as Stern (1983) states, originally was intended to be applied in clinical and personality psychology and later on in language, especially native language.

Quoting Naiman et al., (1978), Stern (1983) states that 'empathy' as a personality variable is allied to the integrative orientation. As the concept of empathy is applied to

second language learning, the psychoanalytic interpretation of ego development can be applied to language development.

It is for this main reason that the concept of 'language ego' compares language learning to the acquisition of other aspects of personality. Such as body image, ego boundaries, and ego flexibility. The idea is that as a child acquires a 'body image', he/she acquires a language ego. In the early years of an individual, according to Stern (1983), the language ego is fluid and its boundaries are flexible. This can be briefly explained by the expectation to adopt a new language, a new accent, and a new dialect more readily on the part of the young child than the old. In this case, the increase in age can be associated with the decrease in the flexibility of the language ego and the losing of its permeability (Spolsky, 1989). However, this, as Spolsky states, does not mean that there is no difference among the adults themselves. There are always individual differences in the ability to retain the language ego. Some may retain a more permeable language ego than others. Some may be more open to the influences of the social environment in which they live. Thus, as Stern (1983: 381) states, "The willingness and refusal to learn a language are accounted for in terms derived from such general psychological characteristics."

It is these psychological characteristics called personality factors that interact with a person's willingness or refusal in acquiring or learning a language. The interaction between the two (i.e. the personality factors and the acquisition or learning of a language) can be interpreted in terms of one affecting the other. Here, the effects of 'neuroticism', which is one of the major personality factors, on scholastic attainment can be taken as a good example. In relation to this, Elliot states the following:

... those scholarly studies by Butcher et al., 1968; Entwistle and Welsh, 1969; Eysenck and Cookson, 1969; Leith and Davis, 1971; Savage, 1960; confirmed that high emotionality has an adverse effect on the performance of school children (1972, pp.23-4).

Since most studies which are made on personality, prejudice and child training do not reach conclusive results, scholars suggest that an individual's attitudes to countries, ethnic groups and languages and the motives for and against language learning should be considered and investigated in relation to the background of the more deep-seated generalized attitudes or personality factors. In other words, focusing on mere responses of the individual to his/her immediate experiences alone cannot be taken as sufficient.

2.2 Introversion-Extroversion as a Personality Dimension

Introversion-Extroversion is one of the major personality constructs that has remained controversial but productive in the research studies undertaken over the years. It was first introduced by Jung (1923) as a dimension of the normal personality. Since then the construct has been extended in many directions. As Carrigan states, "... it has been linked with physiological processes and morphology, with perceptual and cognitive behavior, with socio-cultural phenomena, with physical and psychopathological disorders of one sort and another " (1960: 329).

Most of the demonstrations in the early years of the establishment of the construct produced unsatisfactory results. Thus, researchers began to doubt the validity of the construct. This again led the research focus to turn on factor analysis. According to Carrigan (1960), in his factorial studies of personality, what Eysenck (1953) observed was that there was no clear picture of the construct. However, the main outlines were becoming more and more definite. According to Eysenck's (1953) explanation, as Carrigan (1960) states, at the level where concepts can be generalized on the intercorrelations between traits, three main dimensions appear to have been established (namely: Neuroticism, Introversion-Extroversion, and Psychoticism). These three, as to Eysenck's explanation, appear to be relatively orthogonal to each other.

As Carrigan states, "Eysenck's conclusions as they apply to extroversion-introversion embrace two issues of longstanding concern-briefly, the unidimensionality of the construct, and its relationship to 'neuroticism' or, more broadly, adjustment" (1960: 320). However, Eysenck's study did not resolve the issues adequately at the time.

Many researchers in the last few years have become convinced that introversion-extroversion is an important dimension of personality. However, there is still a disagreement in defining its exact nature. For instance, Cattell (1957 in Carrigan 1960) indicates the origin of introversion-extroversion characteristics as largely environmental. On the contrary, Eysenck (1956 in Eysenck and Eysenck 1969) states that on the basis of different studies undertaken it can be concluded that heredity plays a major role in defining introversion-extroversion characteristics. The existence of such disagreements suggest that more investigations are needed in order to define the essential nature of introversion-extroversion. Carrigan states the following to show how superficial similarities between introversion and extroversion may lead to wrong generalization, "Extroversion-introversion may not be a single dimension after all, and that the impression of unity may have resulted from the too hasty attachment of a familiar label to a number of quite different dimensions, on the basis of superficial similarity" (1960: 330).

By drawing the distinction between introversion and extroversion, Eysenck and Eysenck (1969) have tried to reflect how each characteristic interacts with different social and communicative demands in different studies. According to them, the distinction between the two refers, on the one hand, to the tendency to withdraw from social interaction and just rely on inner thoughts and feelings, which is a typical characteristic of introverts, and on the other, to the tendency to be outgoing and to be interested in people and things in the environment, which is a characteristic of

extroverts. This, in other words, means that the personality characteristics introversion and extroversion reveal attitudinal differences between individuals. Schultz (1986) also writes, "Much of our conscious perception of and reaction to the world around us is determined by the attitudes of extroversion and introversion." (p.78). Similarly, Jung's belief was that the libido can be channelled externally, toward the outside world, or internally, toward the self. Schultz writes the following to make the ideas of the terms 'introversion' and 'extroversion' clear:

When we say people are introverted, we mean that they are somewhat withdrawn, often shy, and focusing on self. Extroverts, on the other hand, are much more open, sociable, and socially aggressive. Everyone, according to Jung, has the capability for either attitude, but one becomes dominant (for reasons he did not make clear). Once an attitude has become the dominant one, the person's behavior and consciousness are largely ruled by it. (1986: 79).

However, according to Jung, Schultz writes that the non-dominant attitude does not disappear once and for all. It remains as part of the personal unconscious behaviour and is still capable of influencing the existing behaviour. Thus, an introverted person may, in certain situations, display characteristics of extroversion. Therefore, a person cannot be exclusively or totally extrovert or introvert.

Eysenck (1957 in Eysenck and Eysenck 1969) also tries to discuss the difference between introversion and extroversion in biological terms. Thus, he states, "Introverted people are characterized by strong excitatory and weak inhibitory potentials, whereas extroverted people are characterized by weak excitatory and strong inhibitory potentials" (p.50). According to his explanation, 'excitation' refers to the facilitation of cortical events underlying perceptual, learning and motor movement phenomena, whereas 'inhibition' would refer to the depression of this phenomena.

Eysenck did not stop with this, rather he reformulated his previous hypothesis again and proposed the law as follows:

Introverts are characterized by a reticular formation the activating part of which has a relatively low threshold of arousal, while the recruiting part of it has a relatively high threshold of arousal, conversely, extraverts are characterized by their possession of a reticular formation whose recruiting (synchronizing) part has a low threshold of arousal. Under identical conditions, therefore, cortical arousal will be more marked in introverts, cortical inhibition in extraverts." (Eysenck, 1965 in Eysenck and Eysenck, 1969: 52).

In a learning situation, the performance of introverts and extroverts can be expected to differ according to whether or not the level of the task difficulty is above or below the optimal level. The habit strength of an individual for correct or incorrect responses may be related to the difficulty or the easiness of a task. The task may be found difficult in a situation where correct performance of the task depends upon a relatively weak habit. The task may be found relatively easy in the case of a correct performance which is based on relatively a strong habit. According to Elliot (1972), in a situation where the level of task difficulty is optimal or below, introverts are expected to show better learning performance than extroverts. This, according to Elliot's explanation, is because introverts have a higher level of arousal, a lower level of reactive inhibition and quicker dissipation of any reactive inhibition which develops. The increase in task difficulty above the optimal level is expected to lead the introverts to a reduced efficiency in their performance.

Gray (1970 in Elliot 1972) states that introverts are well known for their behaviour of susceptibility to punishment, or the omission of an anticipated reward. This affects introverts functionally or makes them develop a negatively-conditioned responses to a greater extent than extroverts. As Jones (1960 in Elliot 1972) states, "High levels of task difficulty may be expected to evoke a 'conditioned avoidance drive' (CAD) which has been learned after having previously been produced in failure

situations." (p.29). What is commonly understood by these researchers is that failure, or non-receipt of expected reward, is just as likely as punishment to evoke such responses for the introverts.

Moody (1988) differentiates introverts and extroverts by referring to those who tend to be more restrained, focusing mainly on the inner world of concepts and ideas which is related to the characteristics of the former and those who tend to be outgoing and are interested in the actions in the outer world. Moody further explains their learning preferences by grouping them into two. Accordingly, introversion prefers ideas, relationships, thinking, depth of concentration, rule first, reading/verbal reasoning, working alone, written tests and concepts, whereas extroversion prefers specific facts to ideas; spontaneous action to thinking; examples first to rules; talking/discussing with a group to reading/verbal reasoning; social interaction to working alone; practical application to concepts and such individuals are more interested in psychomotor activity.

Introverts and extroverts also show attitudinal differences on their interest towards job preferences. According to the results of a study on college students, "Introverts had strong interests in occupations that did not involve close interactions with other people, such as technical and scientific work. Extroverts were more interested in jobs that offered high levels of social interaction, such as sales and public relations." (Stricker and Ross, 1962 in Schultz 1986).

2.2.1 Introversion-Extroversion and Language Learning

Most teachers, researchers and students of second language accept the assumption that there is a relationship between introversion-extroversion and proficiency in a foreign language. Based on this assumption, a number of researchers have proposed a number of hypotheses. However, only very few of them have

investigated the topic thoroughly. As Busch states, "The studies done by Naiman, Frohlich and Stern (1975) and Naiman, Frohlich, Stern, and Todesco (1978) represent the most ambitious attempts to identify the characteristics of good second language learners." (1982: 111). According to Busch, the rationale for undertaking the studies was to investigate whether certain personality characteristics might affect learners' strategies and learning outcomes. The researchers identified learners' personality tendencies by using the Eysenck Personality Inventory (EPI). Their study resulted in absence of any significant relationship between extroversion and second language proficiency which was measured by standardized tests. However, calling out answers and hand-raising, which are believed to be behaviours of the extroverts, are positively related with second language proficiency.

In another study, Rossier (1975 in Busch 1982) examined the relationship between introversion-extroversion, contact with English speakers, and English proficiency scores. Positive correlation was observed between extroversion and oral English fluency.

Similarly, Chastain (1975 in Busch 1982) found out that an outgoing personality was significantly related to the final course grade of American high school students. In this case, the instrument was different (i.e. the Marlowe-Crowne Reserved) and the students were studying three European languages (i.e. French, German and Spanish).

The other published study which Busch refers to, concerned with the relationship between personality factors and second language proficiency is that of Seliger's (1977). This time, the study was based on classroom observation rather than using personality scales to determine levels of introversion-extroversion. The hypothesis of the study was that students who initiate language interactions (High Input Generators, or HIGs) achieved higher results in second language learning. Seliger

devised, for the observation, an experiment in which six students could be observed in a classroom situation. The result showed that the HIGs scored higher than the Low Input Generators (LIGs). The Low Input Generators (LIGs) are students who are believed to be passive in language interaction situation. In addition, the HIGs were found to have more contact with the second language outside the classroom. These results led Seliger finally to conclude that those active learners who use all opportunities in learning the second language learn at a faster rate.

Since many of the research findings produced results that showed the importance of extroversion in acquiring oral skills, again researchers began to draw a hypothesis on why extroverts were probably better language learners, especially in acquiring oral skills when compared to introverts. Rubin (1975), for instance, states that a good language learner has a strong desire to communicate and those with such strong desire to communicate are people with extroversion characteristics. This strong desire, without the need for motivation or with a little of it, lets such individuals learn the second language efficiently. This, in other words, means that although some people are highly motivated to learn a language, because of lack of a strong desire to communicate, they may not learn the language in question efficiently. The following remarks (by Rossier 1975, Rubin 1975, Seliger 1977, as Busch 1982 summarizes) strengthen the assumption that extroverts are good language learners: "... extroverted people may have an obvious advantage over their introverted counterparts in learning a SL because they create more opportunities to practice the language, obtain input, and experience success in communicating " (p.110).

In the case of the introverted people, the possibility of creating such situations may be rare that they may have limited opportunities to practice, obtain input, and experience success in the language they learn.

In contrast to all the above assumptions which consider the characteristic extroversion to be related with success in language learning, other researchers question if such an assumption is true at all. Thus, Brown (1973) for instance, states that it is simply a common belief among some researchers and many teachers to consider the characteristic introversion as an undesirable behaviour. This is a major problem, especially, in the western countries. Therefore, many language teachers in many language classrooms treat the quiet and reserved individuals as persons with problems. Thus, they seek ways of encouraging them to be more talkative and outgoing.

The belief that extroverts are qualitatively better in language learning than introverts is now considered as an intuitive assumption. Although some studies have shown evidence that extroverts are proficient in oral skills, introverts might be better in other language skills such as reading and writing. This, success for introverts, is expected to be true especially in the higher educational levels. For instance, Busch's (1982) study on Japanese learners of English as a foreign language seems to prove that introverts are better in their pronunciation scores than their extrovert counterparts. This is also true in other skills, such as grammar/vocabulary and reading. However, these tests are sub-tests (i.e. pronunciation is a sub-test of the oral proficiency test which also include other tests, and grammar/vocabulary and reading are sub-tests of the standardized tests).

However, whatever studies have been undertaken using the introversion-extroversion scales, the results are inconclusive. This is because the studies are either too few or even these are only focused on European languages spoken by other European countries as a second or foreign language. In consideration with the national levels of extroversion where the score is low, results may be insignificant. This, in fact, may be due to cultural and social barriers that prevent a person from interaction with others and get input in a second language. This is true in countries where the

second language may not be spoken outside of class (such as in Japan) where the language in question can be seen as a foreign language. With regard to the opportunities the introverts may have, Rossier (1975 in Busch 1982) states that the situation where English is a second language is very important to introverted people in comparison to the situation where English is a foreign language. In an EFL situation, the only place for practising the language may be limited to the classroom. Since the introverts rarely show the desire to communicate in any of the situations, they are usually at a disadvantage.

2.2.2 Introversion-Extroversion and Age

Researchers have been trying to find out whether certain aspects of an individual's personality can be observed at a certain age level, as a result of which differences among individuals in their performance may be determined. Such research has an important implication for pedagogy. This, in other words, refers to answering the question why children are more successful than adults in learning to speak any new language or why self-confident people may be found to be good second language learners, etc.

According to Anthony (1973) some research findings documented by Eysenck and Cookson (1969), Elliot (1972), Entwistle (1972) and others show that young school children with extroversion characteristics were found to be better in their performance in learning. But when older pupils were compared, those with the introversion characteristics performed better than their extrovert counterparts. The reason why the correlation changes from positive to negative for extroverts and from negative to positive for introverts in their ability as age increases, according to Eysenck's and Cookson's (1969 in anthony 1973) suggestion, is that introverts are found to be late developers.

As Rachman (1969 in Eysenck and Eysenck 1969) states, "Extroversion increases with age, at least from 7 to 13; there is a slight decline after that age." (p.309). Similarly, according to Eysenck (1965 in Anthony 1973), the mean extroversion scores increase rapidly in ages from 7 to 10 for boys and 7 to 11 for girls. After 10 or 11, the growth can be irregular-slower upto 13 in boys and 14 in girls, which again can be followed by an irregular decline. Emmerick (1964 in Eysenck and Eysenck 1969) suggests, "The available evidences on the development of extroversion encourages the view that it is an enduring dimension and can be detected at a fairly early age." (p.260).

Similarly, Gutman (1966 in Eysenck and Eysenck 1969) report that people in their twenties have higher extroversion scores than people in their thirties. The score declines for people with increasing age and this is true for both sexes and all social classes.

Many of the research findings report that extroversion reaches its peak at ages 13 to 14, after which the decline in extroversion scores begins and the increase in introversion scores can be observed. However, this does not mean that extroversion scores die once and for all. The work of Entwistle (1972 in Anthony 1973) has shown that positive correlation can be observed between extroversion and scholastic attainment at ages upto and including 14. The correlation becomes negative as age increases more and more. Thus, it is wrong to assume that a person who scores high in his/her extroversion or ability at one time of life will be likely to be ahead at another time.

Although research findings seem to support the trend that positive correlations between extroversion and achievement turn into negative as age increases, no follow-up studies have been undertaken. Thus, theories that state the late developing of

introverts may not be taken as conclusive. Eysenck and Eysenck (1969) write the following with regard to the trend that introverts are late developers:

In a recent unpublished study D.Cookson and H.J. Eysenck found a marked positive relation between extroversion and both IQ and school achievement in a very large random sample of Staffordshire children, both boys and girls. Similarly, much research in the literature has shown the superiority of introverts at older ages and at university. Unfortunately, no follow-up studies have been done with this hypothesis in mind; until this is done alternative theories to that of late developing of introverts cannot be ruled out." (p.314).

2.2.3 Introversion-Extroversion and Sex

Many researchers, in psychological studies, emphasize the need for considering sex differences. This is because there is always a difference with regard to reacting to the social and environmental demands between the two sexes. For instance, Eysenck and Eysenck (1969) state that women are naturally opposite to men in endorsement. They like to get acquainted with most people, withdraw from speaking in public, and like to be listeners rather than speakers. In addition, they usually receive rather than communicate ideas. Eysenck and Eysenck write the following in strengthening what is said above about women:

... often feel 'just miserable' for no good reason at all, consider themselves as lively individuals, and are regarded as such by other people, sometimes feel happy and sometimes depressed without any apparent reason, tend to take life too seriously, be listeners rather than talkers in social conversation, like to have time to be along with their thoughts, ... keep their opinions to themselves during group discussions, ... enjoy entertaining people, and are easily influenced in their mood by people around them. It embarrasses them a great deal to do or say the wrong thing in a social group. They find it difficult to get rid of salesmen, and, lastly, they would rather work for a good boss than for themselves. (1969: 74-5).

Because of the above assumed characteristics of females, it may be reasonable to accept the suggestion that there are differences between the two sexes at the

extroversion level. In reference to Entwistle and Cunningham (1968), Entwistle and Welsh (1969) and Eysenck and Cookson (1969), Elliott (1972) states that differences between sexes in the level of extroversion are likely to give rise to different correlations between extroversion and attainment for each sex at a given age level. Eysenck and Eysenck (1969) state that Eysenck's (1965) study resulted in a small but consistent trend towards higher extroversion scores in boys. This was also found to be true on Gibson's (1964) study. Busch (1982) also suggests that introversion-extroversion tendencies may have importance in learning English for males rather than for females. But this researcher ~~clearly~~ hesitates to draw such a conclusion.

In another context, the study made by Bedilu Wakjira (1996) on college students seems to show that there is no relationship between introversion-extroversion and proficiency in reading and writing with regard to sex differences. This, in other words, means that being male or female is not a variable in affecting the relationship between introversion-extroversion and academic performance in reading and writing.

2.3 Factorial Analysis and the Development of Personality Measurements

Eysenck views personality as a hierarchical organization. The hierarchy, according to him, stretches, from the most general levels or broad dimensions called 'types' to the next level called 'traits', which were originally used by Cattell, then below 'traits' is the level of 'habitual responses', and at the bottom of the hierarchy are specific responses, where the behaviour actually can be observed. At the 'type' level, Eysenck analyses personality under three dimensions: neuroticism, introversion-extroversion, and psychoticism. His most empirical works are observed in the first two of these factors. Eysenck's two major personality dimensions, neuroticism and introversion-extroversion, are linked with Cattell's second-order factors which he puts in his rating and questionnaire data. Although Eysenck shares such a view with Cattell, he has

developed his own level of analysis which is theoretically more meaningful and empirically more dependable. (Eysenck 1953 in Hall and Lindzey 1957).

Eysenck has used ratings, questionnaires, situational tests, and psychological measures in investigating his personality factors. He has also been interested in hereditary influences on personality, and has done studies in neuroticism and introversion-extroversion.

An important methodological innovation of Eysenck's factor analysis is his criterion analysis. In the criterion analysis, a factor is adjusted to bring about clear separation to a particular criterion group.

In this work, Eysenck has generated a new range of research possibilities on the basis of his personality factors that are linked with certain basic learning processes.

By using the method of factor analysis, Guilford and Guilford's (1934 in Hall and Lindzey 1957) attempt was the first one. In his study, which he did with his wife, first devised 36 introversion-extroversion questions which he administered. Four of these factors were identified as "social introversion, emotional sensitiveness, impulsiveness, and interest in self." (Eysenck and Eysenck 1969: 29). However, Guilford's early works had been misinterpreted as doing away with the notion of extroversion and introversion as a descriptive factor in personality research.

According to Eysenck and Eysenck (1969), the study by Guilford and Zimmerman (1956) is considered as the latest and most extensive work. In their factor analysis, they treated 13 of the factors which were originally hypothesized by Guilford.

Eysenck's (1947) first factorial study produced for him 39 items. And in his later work (1956, 1959, and Eysenck and Eysenck, 1964), he focused on the development of personality questionnaires along factorial lines (Eysenck and Eysenck 1969). The questionnaires which were developed in his later work are: "The Maudsley Medical Questionnaire (MMQ), the Maudsley Personality Inventory (MPI) and the Eysenck Personality Inventory." (Eysenck and Eysenck 1969: 37).

As described in Eysenck and Eysenck (1969), the Eysenck Personality Inventory (EPI) is the newly constructed and improved version of the Maudsley Personality Inventory. It consists of 114 questions concerned with the neuroticism and introversion-extroversion aspects of personality, of which 48 are concerned with neuroticism and the other 48 with introversion-extroversion and 18 are called lie scales.

According to Busch (1982), the EPI is easy to answer and takes only 10 to 15 minutes to administer. It has been used by researchers who have investigated the relationship between proficiency in English as a second or foreign language and introversion-extroversion. Busch (1982) states that research findings by Naiman et al. (1975, 1978), Rossier (1975), are a few of those which considered the issue and are found to provide a good basis for comparison.

Recently, the EPI has been used also here in Ethiopia by Bedilu (1996). This recent study is concerned with investigating the relationship between introversion-extroversion and college students' proficiency in reading and writing skills in the local language, Amharic.

As it happens to many personality measurements, the EPI may not be free from some conditions that inhibit subjects to respond freely and without hesitation. Some of such conditions are discussed as follows.

2.3.1 Acquiescent Tendencies

Most of the scores on personality scales have been regarded as being susceptible to the influence of acquiescent tendencies which can be seen as a result of the imbalance in the 'true-false' or 'agree-disagree' keying of the items in the scale. As Couch and Kensiton (1960), Fricke (1956), Jackson and Messick (1958, 1961), Messick and Jackson (1961), Wiggins (1959) have tried to discuss in Edwards (1970), if there are reliable individual differences in answering 'true' in the personality items, then individuals with high rates of 'true' responses could be expected to obtain high scores on the scales where all trait responses are true responses, whereas those individuals with low rates of 'true' responses could be expected to obtain low scores on the same scales.

Thus, scores on two scales in which all items are keyed to 'true' might be expected to have some degree of positive correlation because of individual differences in acquiescent tendencies. Similarly, scores on two scales in which all the items are keyed to 'false' might be expected to have some degree of positive correlation, and the scores on the scale in which all the items are keyed to 'true' and one in which all of the items are keyed to 'false' might be expected to have some degree of negative correlation.

2.3.2 Cultural Norms and Social Desirability

Every society makes an effort to teach its children those standards of conduct and behaviour that are considered good or bad or socially desirable and undesirable. Children are also rewarded for acts that are considered as desirable and are punished for acts that are considered undesirable. As a result, the adolescents are expected to have acquired such norms of their own culture. As a matter of fact such considerations are truly applied to personality questions and make variations in the way the individual responds to each item. As Cronbach states, "A high 'socially desirable' score may mean

that the person truly has an admirable personality, but it is also possible that he has been less than frank in filling out the questionnaire. Nor can one dismiss the possibility that he is deceiving himself and has never realized some of the faults in his behavior." (1949: 496). Such conditions, in fact, happen when respondents confront with a questionnaire item. This invokes a tendency to respond in terms of social desirability.

2.3.3 Validity and Reliability

Validity refers to the extent in which the measurement applied measures the required ~~behaviour~~. The personality measurement is prepared to measure only one of two types of personalities. The measurement can be valid if it has measured what it is required to measure correctly. For instance, the items or questions in the EPI are expected to measure the introversion-extroversion characteristics if they are intended to measure the two. However, if the measurement does not measure what it is intended to measure, then the validity of the measurement can be put in question. In this case, the EPI is considered as a valid one even when it is translated and adapted to the cultural and social norms of any country.

Similarly, personality measurements are also expected to be reliable. The reliability of an item/test, as Brown defines is, "the extent to which the results can be considered consistent or stable." (1988: 98). This, in other words, refers to the extent to which the measurement brings about the same results at different times and conditions. In this case, the EPI is regarded to be reliable after being used in different contexts. However, although the EPI is considered as the best for use in comparison to other scales, due consideration should be given when translated and adapted.

2.4 Testing Language Skills

Language tests are considered as means of assessing students' performance in language. According to Heaton (1988), language tests, especially classroom tests,

are concerned with evaluation "for the purpose of enabling teachers to increase their own effectiveness by making adjustments in their teaching to enable certain groups of students or individuals in the class to benefit more" (p.6). Similarly, proficiency tests are concerned with "measuring a student's control of the language in the light of what he or she will be expected to do with it in the future performance of a particular task"(Heaton, 1988: 172-3). Thus, tests help to locate certain areas of difficulty by the class or by individual student.

There are four major skills, in communicating through language, which a person uses for communication purposes. These skills are: reading, writing, listening and speaking which may include grammar and vocabulary as sub-components.

Because each skill has its own identification, although all are to be used integratively for communication purposes, the way for assessing performance on each skill also differs. The way for assessing students' performance in each skill is discussed as follows. It should be noted that the discussion in this study has focused only on two of the major skills (reading and listening) and one sub-skill (grammar) which were included in the test in separate sections (parts).

2.4.1 Testing Reading Skill

Reading comprehension refers to the understanding of the necessary information that is in the text. The process of understanding the information can differ based on the aim or purpose of reading and the techniques one applies to understand the information. For instance, a reader does not read written information on a notice-board and in a magazine in the same way.

There are specific skills involved in reading. Because of this, several ways of testing reading skills have been developed. These test types range from multiple-

choice items to open-ended questions (questions that require students to write answers in sentences of their own). Multiple-choice items are the most suitable for testing reading; however, writers warn that it should not be over-used. The types of questions, in fact, can be determined by the type of the text. Some texts may lend themselves to multiple-choice items, others to the true/false items, others to matching items, others to rearrangement items, others to completion items, and still others to open-ended questions. However, sometimes the same text may demand at least two or three different types of items (Heaton, 1988).

2.4.1.1 Multiple-choice items

The multiple-choice items, in testing reading, are useful. However, all multiple-choice reading tests may not be necessarily good tests of reading comprehension. A multiple-choice (or any other) test can be considered as good test when it measures what is intended to be measured. And this depends largely on the effectiveness of the items used.

The type of item in multiple-choice questions may be a test of vocabulary rather than of reading comprehension. However, whatever the type of the test may be texts should be understood to be answered correctly.

As to any type of test, multiple-choice questions have their own weaknesses in testing the reading skill of the individual. For instance, in multiple-choice questions students are exposed to making more mistakes. This is for the reason that such questions do not require critical thinking, as a result introverts may get correct answers just by guessing.

2.4.1.2 Open-ended Question Types

Because of the stated weaknesses from which the multiple-choice questions suffer, the need arises for preparing open-ended question types. These types of questions make students think critically and participate actively. Thus, the questions can be prepared in such a way as to ask students what is stated in the reading passage directly or they may be prepared that students can answer questions by relating to other matters outside of what is stated in the passage. This, of course, can be done based on students' level of understanding and ability of relating things or ideas. But, most of the time open-ended question types seem to measure testees' writing skill more than reading comprehension.

2.4.2 Testing Grammar

The knowledge on grammar is considered as the core of language ability. Thus, the testing of this ability is regarded as basic in different times. However, language proficiency tests seem to focus on language skills than abilities. This is because of the view that the testing of skills is more general than abilities can be tested as components than in isolation. Such a view has got consideration in many proficiency tests that most of them avoid to test grammar in isolation.

Although, there is a disagreement, on the testing of grammar in isolation, between language testers, there are still proficiency tests that retain a grammar section. The reason for this, in fact, is that grammar test items are believed to be easier to administer and score within a limited period of time.

Because grammar has a role to play in promoting other skills, it can be quite reasonable to include the testing of grammar in the achievement, placement and diagnostic tests.

According to Heaton (1988), some of the most common types of objective items used to test awareness of the grammatical features of the language are the following:

- multiple-choice items
- error-recognition items
- rearrangement items
- completion items
- transformation items
- items involving the changing of words
- 'broken sentence' items
- combination items
- addition items (p.34)

Heaton states that ~~such test types~~ are intended to test language accuracy than fluency. Although the ability to use language to express meaning, attitude, emotions, etc. is very much necessary, mastering the grammatical systems of a language also play significant role. Thus, classroom tests of grammar and usage can be considered as useful to be handled in a language programme.

2.4.3 Testing Listening Skill

One may think of testing listening skill separately from speaking as odd. This is because the two are inseparable and are typically exercised in oral interaction. However, there are occasions when we are listening to the radio, listening to lectures, or listening to announcements, where no speaking can be called for.

Because the testing of listening skill is the testing of one of the receptive skills, it can be paralleled to the testing of reading which is the other receptive skill.

Listening may include the following as macro-skills:

- listening for specific information.
- obtaining the gist from what is being said.
- following directions

- following instructions
- interpretation of intonation patterns
- recognition of function of structures

Similar to the testing of reading skill, types of testing listening include questions such as of multiple-choice, short answer, information transfer, note taking, partial dictation types, etc.

With regard to the advantages and disadvantages of using multiple-choice test items, listening tests have similar cases with those identified for reading tests. However, as far as listening tests are concerned, students may face problems of holding more than one or two items of alternatives in their head while listening to the passage for dictation.

Thus, if multiple-choices are to be introduced, then alternatives should be short and simple. Short answers can be required in the form of completion, minimal writing, etc. In this case, the items need to be brief and those that call for short responses. This works well in listening tests. In testing listening skill, dictation is considered to be a useful technique. This is especially so because it is possible to administer when other tests of listening are impractical. It can be used diagnostically to test students' ability to cope with particular difficulties.

The listening test can be presented either using records or a single reader of a text or speaker. The test will be reliable if uniformity in the testing is applied to a single speaker.

CHAPTER THREE

METHODOLOGY

Two groups of first year university students were randomly selected to participate in the study. The first group consisted of students from the Science Faculty. The other group consisted of students from the College of Social Sciences. Members in each group differed in age and sex.

All the subjects, first, completed a questionnaire from the Eysenck Personality Inventory (EPI) and then took a proficiency test in English that composed reading, grammar and listening. The proficiency test was designed and formatted on the basis of examination papers normally prepared by the Department of Foreign Languages and Literature of the Addis Ababa University.

3.1 Subjects

Subjects in the first group were 45 in number (39 males and 6 females) ranging in age from 17 to 21. All the subjects had taken the course "College English" for a semester. College English is given for 180 to 200 minutes a week. The course is designed to enable all first year university students to practise and improve their proficiency in the four major skills: speaking, listening, reading, and writing, and the two sub-skills: grammar in use and vocabulary in the target language, English.

Subjects in the second group were 49 students (43 males and 6 females) ranging in age from 17 to 24. They had the same or comparable learning experience as that of subjects in the first group.

3.2 Instruments and Procedures

The instruments used in the study were the Eysenck Personality Inventory (EPI) and EFL proficiency test that composed reading, grammar and listening for a dictation.

The Eysenck Personality Inventory (EPI) measures two major personality dimensions (introversion-extroversion and neuroticism-stability). However, in this study only the introversion-extroversion scale was used. The introversion scale measures subjects' non-impulsive and analytic behaviour and the extroversion scale measures subjects' impulsivity and sociability.

The Eysenck Personality Inventory (EPI) was chosen because it was proved to be easy to administer and score by researchers (such as Naiman et al., (1975, 1978), Rossier (1975) in Busch (1982)). In addition, although the inventory was developed to be used in America and Europe, it has been used and validated in other countries such as Japan by Busch (1982). Recently, the EPI was used at Addis Ababa University for an MA thesis on Amharic and validated by the researcher (see Bedilu Wakjira, 1996). In all of the above studies the EPI has been proved to be adequate enough in providing a good basis for the comparison of the relationship between introversion-extroversion and English language proficiency in a second/foreign language context.

For this study, the EPI was translated into the local language, Amharic, to avoid language problems on the inventory. The translation was studied and improved by a well-known Amharic-English bilingual expert. 

Before starting to work on the final study, a pilot study had been carried out on the same topic. The pilot study enabled the researcher to discover some problems related to collecting the necessary information on the inventory. One of these problems was that, since subjects were made to complete only the translated Amharic version of

the questionnaire in the pilot study, a lot of respondents did not appear to understand the questions. Secondly, questions on the inventory, such as, "Do you sometimes gossip?", seemed to be too personal and arouse students' feelings when translated directly. Some respondents also claimed that such questions were culturally inappropriate and went against the norms of the society to obtain 'yes' or 'no' responses. Care was therefore taken to remove such 'bugs' in the final study. Thus, first both the English and Amharic versions were used together. Secondly, questions of the above type that were found to be unreliable were discarded for better understanding.

Information about subjects' age and sex was collected from the part of the questionnaire left for filling in personal information.

The EFL proficiency test was primarily designed by the researcher to include all the skills (i.e. speaking, reading, writing, listening and grammar/vocabulary). However, due to lack of students' cooperation for interviews and their carelessness in writing the written examination well, the two productive skills - speaking and writing were excluded from the test. In addition to the above problems, the testing and scoring of the test results on the two skills was found to involve additional funds and manpower. Thus, the researcher decided to focus on the two receptive skills (reading and listening) and grammar. It must be noted that all the problems were discovered during the pilot study.

The final forms of the EPI and the test were administered after all the problems discovered in the pilot study were satisfactorily eliminated. Since both the EPI and the test forms were planned to be administered during the regular classes by the regular teachers, except for the listening test, the administration took two sessions. During the first session, only the EPI form was administered. This enabled the researcher to have sufficient time to mark students' EPI responses and to decide which students could take

the next test. In addition, the time between the administration of the first form (the EPI) and the second form (the proficiency test) was used for checking the reliability coefficient of the EPI. The calculated reliability coefficient of the introversion-extroversion scale for both the Science and the Social Science campuses was .71 (using KR_{21} formula) which was equal to alpha .71 reported for the Japanese students (Busch, 1982), and slightly higher than .68 reported for Ethiopian college students (see Bedilu Wakjira, 1996). The calculation for the reliability coefficient using KR_{21} formula is indicated in Appendix A-2.

The administration of the proficiency test was undertaken next to the EPI for selected subjects whose EPI scores had been recorded. The test had three parts. Part one consisted of 20 questions on a reading passage divided into three sub-sections: comprehension, reference, and vocabulary items. Part two was a 20-item grammar section which was divided into two sub-sections. In both sections students answered questions by filling in spaces in reading passages by choosing from alternatives of words, expressions, and verb forms given for completing the passages. The third part was a 20-item listening test that was designed to be completed after students listened to a text that was read out by the researcher himself. The test for listening was read out by the researcher to take care of uniformity of a speaker. After the tests were marked, the overall proficiency scores were used for calculating test reliability. The calculated reliability coefficient was found to be .80. This was a coefficient obtained by using the split-half, especially the odd-even method of correlation applied to the Pearson correlation method of analysis. In order to test reliability for all items of the test, the Spearman-Brown correction formula was applied since the odd-even form estimates only half the length of the whole test. This resulted a reliability coefficient of .90 which was significant. The whole procedure for the calculation is indicated in Appendix B-2.

Both reliability coefficients (i.e. those for the EPI and for the English proficiency test) proved that the questionnaires as well as the tests were consistent and valid. Thus, the process of setting up the correct statistical decisions for the analysis was undertaken. These decisions, as Brown (1988: 114) states, "depend on the type of research questions that are posited." In this study, because the researcher is interested in comparing English proficiency average scores (means) for introverts and extroverts; as well as in investigating the degree of relationship between introversion-extroversion and EFL proficiency, two statistical reports were included.

The first report concentrated on choosing the correct statistics for comparing average scores (means). The hypothetical study of this research for comparing average scores (means) had one dependent variable: overall proficiency in English, as reflected by the scores on the English proficiency test, an interval scale. There was also one independent variable in the study which grouped students into two: introverts and extroverts. This variable would be a nominal scale. Such a hypothetical study, according to Brown (1988), apply a t-test analysis, which can also be used in any sample size.

Correlation analysis was included as the second report of the statistical analysis. Only two variables were involved for correlation analysis and both were interval scales. Introversion-extroversion was the independent (predictor) variable 'X' and proficiency in English, as measured on the test, was the dependent or criterion variable 'Y'.

Here, it must be noted that in this study the items in the EPI were keyed towards extroversion that it was the 'Yes' response which was considered. A student with 'Yes' response was awarded one point for each 'Yes'. Thus, the highest extroversion score was expected to be 48 (because the total number of extroversion items was 48), whereas the lowest was supposed to be zero. Extroversion scores above the median

(the middle point in the distribution of population extroversion scores) were considered as higher extroversion scores, whereas those scores below the median as lower extroversion scores. As a result, subjects with extroversion scores above the median were grouped as extroverts and those with scores below the median as introverts. As Eysenck and Eysenck (1969: 124) stated, "The method of nominated groups may be of considerable use in analysing problems of validity." Thus, problems of overlap (between introversion and extroversion) may be reduced though may not be abolished.

CHAPTER FOUR

RESULTS

After the necessary data were collected using the Eysenck Personality Inventory (EPI) and the English proficiency test that composed reading comprehension, grammar and listening for a dictation, a statistical analysis was undertaken. The results of the analysis are described and discussed as follows.

4.1 Results of the Eysenck Personality Inventory

Since the use of the inventory aims at identifying which subjects would be introverts and which extroverts, each subject's 'yes' response for each item is counted and marked out of 48, which is the total number of the extroversion items. Each subject's extroversion score is described in Appendix A-3.

The description of subjects' scores on the inventory shows that the highest 'extroversion' score is 44(for the Social Sciences) and the lowest is 3(for the Sciences). In order to group subjects as introverts and extroverts, based on their self-rating responses, it was needed to find the central point of the distribution of the population extroversion scores. Thus, the method of median split technique is applied and calculated a median score 21.5. The details of the computation or calculation can be seen in Appendix A-4.

Thus, subjects whose scores are below the median are grouped and nominated as introverts and subjects whose scores are above the median are grouped and nominated as

extroverts. This enables us to know the number of introvert and extrovert subjects of each campus (i.e. Science and Social Science) easily. The distribution of introverts and extroverts in the two campuses is described below. It must be noted that 'introverts' refers to subjects with lower extroversion scores, whereas 'extroverts' to subjects with higher extroversion scores.

Table 4.1

The Distribution of Introvert and Extrovert Subjects by Campus

Subjects	Science Faculty	College of Social Sciences	Total
Introverts	26	21	47
Extroverts	19	28	47
Total	45	49	94

As indicated in the table above, out of 45 subjects in the Science Faculty, 26 are found to be introverts and the rest 19 extroverts. In the College of Social Sciences, the total number of subjects is found to be 49, out of which 21 are introverts and the rest 28 extroverts. The table also indicates that the total number of introverts, out of the whole population for the study, is equal to the total number of extroverts. This, in other words, means that 47 of the total population for the study scored below the median and 47 of the total population scored above the median.

Similarly, in order to decide how many of the introverts are males/females and how many of the extroverts are males/females, the sex distribution for both campuses is described as follows (See Table 4.2 below).

Table 4.2

Sex Distribution of Introverts and Extroverts in the Two Campuses

Sex	Science Faculty		College of Social Sciences		Total
	Introverts	Extroverts	Introverts	Extroverts	
Male	23	16	18	25	82
Female	3	3	3	3	12
Total	26	19	21	28	94

The table shows that out of 26 introvert subjects in the Science Faculty, 23 are males and the rest(3)are females. Similarly, out of the 19 extrovert subjects of the same faculty, 16 are males and the rest(3)are females. In the College of Social Sciences, out of 21 introvert subjects, 18 are males and the rest 3 are females. Out of the total number of extrovert subjects (28) in the Social Sciences, 25 are males and the rest(3)are females. The total number of male subjects of the two Campuses combined (i.e. 82) is much higher than the total number of female subjects (i.e. 12). Since the selection of subjects was based on a random selection of classes, the number of female subjects to be so small is not surprising. (Subjects' sex can be referred in Appendix,A-3).

The other necessary piece of information collected using the EPI is subjects' age. The data on age is investigated to see if there is a significant difference between introverts' and extroverts' average ages in the two campuses. The statistical description of subjects' age is shown in the following table.

Table 4.3

The Statistical Description of Subjects' Ages in the Two Campuses

Subjects	Campuses					
	Science Faculty		College of Social Sciences		Combined	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Introverts	^a 18.8	1.1	^b 19.6	1.4	^c 19.2	1.3
Extroverts	^d 18.9	1.0	^e 19.5	1.4	^f 19.3	1.3
Combined	^g 18.8	1.0	^h 19.6	1.4		

$$n_a = 26 \quad n_b = 21 \quad n_c = 47 \quad n_d = 19 \quad n_e = 28$$

$$n_f = 47 \quad n_g = 45 \quad n_h = 49$$

As indicated in the table above, the average age of introverts and extroverts within each campus is almost the same. This, in other words, means that the average age of introvert subjects of the Science Faculty is almost equal to the average age of extroverts of the same faculty. Similarly, the average age of introvert subjects of the College of Social Sciences is almost equal to the average age of extroverts of the same college. In the other comparison, the average age of introverts of the two campuses combined is almost equal to the average age of extroverts of the two campuses combined. However, to some extent, a difference between the average ages is observed when the comparison is between subjects of the two campuses. Thus, Science Faculty introverts' and extroverts' average age combined is lower than that of the College of Social Sciences' introverts and extroverts. This implies that subjects in the Science Faculty (both introverts and extroverts) are younger than subjects of the College of Social Sciences. (Each subject's age is described in Appendix A-3.

In order to decide whether the differences between the average ages of introverts and extroverts in the Science Faculty and the average ages of introverts and extroverts in

the College of Social Sciences are significant or not, a t-test was run. The results of the t-test analyses are described as follows:

Table 4.4

t-test Result for Introvert Subjects' Ages of the Two Campuses

Campuses	$\bar{X}$	SD	D.F.	t.obs.	t.Crit.	Level of Difference
^a College of Social Sciences	19.6	1.4	45	2.00	2.01*	Not Significant
^b Science Faculty	18.8	1.1				

* $P < 0.05$ (Non-Directional)

$$n_a = 21$$

$$n_b = 26$$

As indicated in table 4.4 above, there is a difference in the average ages of introverts in the two campuses. However, in order to decide if the difference is significant, the t. observed value must be greater than the t. critical value. In this case, the t. observed value, 2.00, is slightly smaller than 2.01 which is the t. critical value at 45 degrees of freedom (DF) at $p < 0.05$, non-directional, level of significance. Thus, the difference between the average ages of introverts in the two campuses is not significant. This, in other words, means that introvert subjects in the Science Faculty have almost the same ages with introvert subjects in the College of Social Sciences.

In another analysis, the average ages of extroverts of the two campuses were investigated to see the differences and to decide whether the differences are significant or not. The result of the t-test analysis is shown as follows:

Table 4.5

t-test Result for Extrovert Subjects' Ages of the Two Campuses

Campuses	$\bar{X}$	SD	D.F.	t.Obs.	t.Crit.	Level of difference
^a College of Social Sciences	19.5	1.4	45	1.20	2.01*	Not Significant
^b Science Faculty	18.9	1.0				

*P<0.05 (Non-Directional)

 $n_a = 28$ $n_b = 19$

Similar to that of introvert subjects in the two campuses, the difference in the average ages for extroverts is not significant. Table 4.5 above, shows that the t. observed value, 1.20, is smaller than the t. critical value 2.01. Here, the calculated (t. observed) value, 1.20, for the average age difference between Social Science extrovert subjects and Science Faculty extrovert subjects is near to Zero when compared to the calculated (t. observed) value, 2.00, for the average ages difference between introverts of the two campuses. This means that the difference in age is larger between introvert subjects in the two campuses than between extrovert subjects.

The final analysis regarding age is done for introvert and extrovert subjects' average ages combined in the College of Social Sciences to be compared with introvert and extrovert subjects' average ages combined in the Science Faculty. The result for the t-test analysis is shown below.

Table 4.6

t-test Result for All Subjects' Ages of the Two Campuses

Campuses	$\bar{X}$	SD	D.F.	t.Obs.	t.Crit.	Level of difference
^a College of Social Sciences	19.5	1.4	92	2.33	1.99*	Significant
^b Science Faculty	18.8	1.0				

*P<0.05 (Non-Directional)

 $n_a=49$ $n_b=45$

Here, Table 4.6 shows that the t.observed value is greater than the t.critical (2.33>1.99) at 92 degrees of freedom where $p<0.05$ (non-directional) level of significance. Because the t.observed value, 2.33, is greater than the t.critical value 1.99, the difference between the two average ages (i.e. the average ages of introverts and extroverts combined in the College of Social Sciences and the average ages of introverts and extroverts combined in the Science Faculty) is found to be significant. This clearly shows that subjects in the two campuses are not of the same ages.

However, since no significant difference is observed on the t-test analysis for introvert and extrovert subjects' average ages both within each campus and between the two campuses, the analysis was tried with sex differences. The statistical description of introvert and extrovert subjects' ages in the two campuses based on sex difference is shown below as follows.

Table 4.7

Statistical Description of Introvert and Extrovert Subjects' Average Ages in the
Two Campuses by Sex

Sex	Science Faculty				College of Social Sciences				Combined			
	Introverts		Extroverts		Introverts		Extroverts		Introverts		Extroverts	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Male	^a 18.9	1.1	^b 19.1	1.0	^c 19.7	1.4	^d 19.7	1.3	^e 19.2	1.3	^f 19.5	1.3
Female	^g 18.3	0.6	^h 18.3	0.6	ⁱ 19	1.0	^j 17.7	0.6	^k 18.7	0.8	^l 18	0.6
Combined	^m 18.8	1.1	ⁿ 18.9	1.0	^o 19.6	1.4	^p 19.5	1.4	^q 19.2	1.3	^r 19.3	1.3

 $n^a=23$ $n^b=16$ $n^c=18$ $n^d=25$ $n^e=41$ $n^f=41$ $n^g=3$ $n^h=3$ $n^i=3$ $n^j=3$ $n^k=6$ $n^l=6$ $n^m=26$ $n^n=19$ $n^o=21$ $n^p=28$ $n^q=47$ $n^r=47$

According to the statistical description in Table 4.7 above, only few of the average ages seem to have large differences between them. However, since a simple eye-view of all the average ages may not show where the significant difference may take place, a t-test analysis was applied for comparing all the average ages. Thus, average age differences between males and females, males and males and females and females were compared based on personality differences and similarities. The comparison considered also differences within each campus and between subjects of the two campuses. The results of the t-test analyses, within each campus and between subjects of the two campuses, are described consecutively below.

Table 4.8

Results of t-test Analyses of Introvert and Extrovert Subjects' Age
Difference in the Science Faculty by Sex

Sex	Introverts		Extroverts		t.obs.	t.crit.
	$\bar{X}$	SD	$\bar{X}$	SD		
Male	18.9	1.1	19.1	1.0	0.50	2.03*
Female	18.3	0.6	18.3	0.6	0	2.77*
t.Obs.	1.00		1.33			
t.crit.	2.06*		2.11*			

*P<0.05(Non-Directional)

Table 4.9

Results of t-test Analyses of Introvert and Extrovert Subjects' Age Difference in the
College of Social Sciences

Sex	Introverts		Extroverts		T.Obs.	t.Crit.
	$\bar{X}$	SD	$\bar{X}$	SD		
Male	19.7	1.4	19.7	1.3	0	2.02*
Female	19	1.0	17.7	0.6	1.90	2.77*
t.Obs.	0.80		2.50			
t.crit.	2.09*		2.06*			

*P<0.05(Non-Directional)

As indicated in Tables 4.8 and 4.9 above, none of the results of the t-test analyses shows any significant difference between subjects' average ages in both campuses, except for the average age difference between male and female extroverts in the College of Social Sciences. The t. observed value, 2.50, calculated for the average age difference between male extroverts and female extroverts of the Social Sciences, is found to be greater than the t.critical value, 2.06, with n_1+n_{2-2} degrees of freedom at $p<0.05$ level. Thus, because

the t. observed value is greater than the t. critical, the difference between the two average ages is significant. This, in other words, means that male extroverts' ages in the College of Social Sciences is significantly higher than female extroverts' age of the same campus.

In the investigation of the insignificant t. values, the highest figure, 1.90, is read for the average age difference between introvert and extrovert female subjects in the College of Social Sciences. The next highest t. value is read for male and female extrovert subjects' average age difference in the Science Faculty. The t. value, 0, is read for the average age difference between introvert and extrovert female subjects in Science Faculty as well as between introvert and extrovert male subjects in the College of Social Sciences. Note that the t. value, zero, refers to the average ages which are the same and their difference ($\bar{x}_1 - \bar{x}_2$) is zero. The other insignificant t. values range between zero and one.

Average ages are also compared for subjects with the same personality and sex in the two campuses. Tables 4.10 and 4.11 below show the results of the t-test analyses.

Table 4.10

Results of t-test Analyses for Average Age Differences Between Introvert Subjects in the Two Campuses by Sex

Sex	Science Faculty		College of Social Sciences		t.Obs.	t.Crit.
	$\bar{X}$	SD	$\bar{X}$	SD		
Male	^a 18.9	1.1	^b 19.7	1.4	2.70	2.02*
Female	^c 18.3	0.6	^d 19	1.0	0.90	2.77*

*p<0.05(Non-Directional)

n_a=23

n_b=18

n_c= 3

n_d= 3

Table 4.11

Results of t-test Analyses for Average Age Differences Between Extrovert Subjects in the Two Campuses by Sex

Sex	Science Faculty		College of Social Sciences		t.Obs.	t.Crit.
	$\bar{X}$	SD	$\bar{X}$	SD		
Male	^a 19.1	1.0	^b 19.7	1.3	1.50	2.02*
Female	^c 18.3	0.6	^d 17.7	0.6	1.00	2.77*

* $P < 0.05$ (Non-Directional)

$n_a = 16$

$n_b = 25$

$n_c = 3$

$n_d = 3$

According to the results for introvert subjects' average age differences in Table 4.10 above, a significant difference is observed between male introverts of the Science Faculty and the College of Social Sciences. The t. observed value, 2.70, is greater than the t. critical value, 2.02, with $n_1 + n_2 - 2$ degrees of freedom at $p < 0.05$ level of significance (non-directional). This result implies that male introvert subjects in the College of Social Sciences are older than male introverts in the Science Faculty. With regard to female introverts' ages, although those in the College of Social Sciences show higher figures than those female introverts in the Science Faculty, the difference is not found to be significant. In other words, the difference between the average ages of female introverts in the Science Faculty and the College of Social Sciences is said to be insignificant and weak.

Table 4.11 above shows results of the t-test analyses for average age differences between male extroverts of the two campuses, on the one hand, and between female extroverts on the other. Accordingly, neither of the differences is significant. In fact, males' (extroverts) average age comparison shows a t. value which is far from Zero than that of females'. The t. observed value for males is 1.50, which is smaller than the t. critical

value 2.02. The t. observed value for the average age differences between females is 1.00, which is also smaller than the t. critical value 2.77. Thus, it can be said that there is no strong difference between the average ages of extroverts (males and females) of the two campuses.

All the preceding results are on the basis of a small number of subjects. Thus, most of the results show insignificant differences between the average ages of subjects. Thus, analysis was made by increasing the sample size of introverts and extroverts (both males and females) by combining subjects of the same personality type and sex to be compared with other subjects whose personality type and sex are grouped in one category. This, in other words, means that the average age of all male introverts of the two campuses combined are compared with the average age of all male extroverts. Similarly, all female introverts' average age is compared with the average age of all female extroverts. The final comparison focuses on the average age of all male introverts compared with the average age of all female introverts and similarly of all male extroverts' and all female extroverts' average ages. The results of the t-test analyses are described consecutively as follows (See Tables 4.12 and 4.13 below).

Table 4.12

Results of the t-test Analyses for Male Introverts' Average Age (in the Two Campuses Combined) as Compared to Male Extroverts' Average Age

Male Subjects	$\bar{X}$	SD	D.F.	t.Obs.	t.Crit.	Level of Significance
^a Introverts	19.2	1.3	80	3.00	1.99*	Significant at *P<0.05
^b Extroverts	19.5	1.3				

$$n_a = 41$$

$$n_b = 41$$

Table 4.13

Results of the t-test Analyses for Female Introverts' Average Age (in the Two Campuses Combined) as Compared to Female Extroverts' Average Age

Female Subjects	$\bar{X}$	SD	D.F.	t.Obs.	t.Crit.	Level of Significance
^a Introverts	18.7	0.8	10	1.40	2.23*	Not Significant at * $P < 0.05$
^b Extroverts	18	0.6				

$$n_a = 6$$

$$n_b = 6$$

According to the results of the t-test analysis for male introverts' average age as compared to the average age of male extroverts (in Table 4.12 above), the difference between the two average ages is highly significant. The t. observed value, 3.00, is found to be greater than the expected t. critical value, 1.99, with $n_1 + n_2 - 2$ degrees of freedom at $P < 0.05$ level. This means that male extroverts in the two campuses combined are significantly older than male introverts.

With regard to the description in Table 4.13 above, the results show that there is no significant difference between female introverts' and extroverts' average ages of subjects of the two campuses combined. The t. observed value is found to be 1.40 which is less than the expected t. critical value, 2.23, at $P < 0.05$ level. This means that although female introverts of the two campuses combined show higher average age than female extroverts, the difference is not found to be significant.

In another analysis of a t-test value for the comparison of the average ages of all female introverts, on the one hand, and of all female extroverts of subjects of the two campuses combined, on the other, the following results are obtained (See Tables 4.14 and 4.15 below).

Table 4.14

Results of the t -test Analysis for the Comparison of the Average Age of All Male Introverts with That of All Female Introverts of the Two Campuses Combined

Introverts	$\bar{X}$	SD	D.F.	t.Obs.	t.Crit.	Level of Significance
^a Males	19.2	1.3	45	0.83	2.01*	Not Significant at *P<0.05
^b Females	18.7	0.8				

$$n_a = 41$$

$$n_b = 6$$

Table 4.15

Results of the t -test Analysis for the Comparison of the Average Age of All Male Extroverts with that of All Female Extroverts of the Two Campuses Combined

Extroverts	$\bar{X}$	SD	D.F.	t.Obs.	t.Crit.	Level of Significance
^a Males	19.5	1.3	45	2.50	2.01*	Significant at *P<0.05
^b Females	18	0.6				

$$n_a = 41$$

$$n_b = 6$$

Table 4.14 above, shows that the t. observed value in the analysis is found to be 0.83 and the expected t. critical value is 2.01. This t. observed value is very much less than the t. critical value. Thus, the difference between the average age of male introverts and female introverts is not significant. This, in other words, means that male and female introvert subjects in the two campuses are of almost the same age. In fact, male introverts are a little older than females. However, this age difference is not significant.

With regard to male and female extroverts' average age difference, the description in Table 4.15 above shows that the t-test analysis has produced a t. observed value 2.50 which is greater than the t. critical value 2.01. Thus, because the t. observed value is greater than the t. critical value, the average age difference between male and female

extroverts is said to be significant at $P < 0.05$ level. This means that male extroverts of the two campuses combined are significantly older than female extroverts.

In general, with regard to age differences among subjects in the two campuses, it can be said that subjects in the College of Social Sciences (males and females and introverts and extroverts) are older than those in the Science Faculty. With regard to age differences between the two sexes, both introvert and extrovert males of the two campuses are found to be older than females as a whole. In the comparison of the ages of introvert and extrovert subjects, no significant difference is observed both within each campus and in both campuses as a whole. In this case, sex seems to play a major role in determining age differences. It is only when subjects are grouped as males and females as well as introverts and extroverts that significant differences are observed. The comparison can be between subjects with the same sex but different personality types, or between different sexes but the same personality type, or between the same sex and the same personality type. In the comparison of the average ages of subjects with the same sex but different personality types, males show significant differences (male extroverts show higher figures than male introverts, Refer back to Table 4.12). With regard to females, introverts show higher figures than extroverts, but the difference is not significant (Refer back to Table 4.13).

In the comparison of the average ages of subjects of different sexes but the same personality type, extroverts show significant difference (male extroverts show higher figure than female extroverts) (Refer back to Table 4.15). With regard to introverts, although the difference is not significant, males show higher figures than females (Refer back to Table 4.14).

Note that the calculations for the t-test analysis for all results related to age are found in the appendixes at the end. All t.values, observed, are compared to the t.critical values listed in books on language and psychological research. The level of significance used is $P < 0.05$ (Non-Directional or two-tailed) which means 5% (five percent) is left for the probability of errors to occur by chance and the rest 95% (Ninety five percent) is for the results observed to occur for sure.

In addition, the researcher is interested in deciding if there is significant age difference between subjects in the two campuses. Therefore, the decision level is made to be non-directional or two-tailed because of the absence of any source that attempted to see differences between Science and Social Science subjects' ages.

4.2 Results of the Relationship between Introversion-Extroversion and EFL Proficiency Tests for Subjects in the Science Faculty and the College of Social Sciences

All the 94 subjects whose EPI scores are recorded for the study took a proficiency test in English and their scores for the test, which composed reading, grammar and listening sections, is investigated for each campus separately. Thus, the findings are treated for each campus as follows. Note that subjects' total English proficiency test scores together with the scores for each skill can be found in Appendix B. But for simplicity and convenience for the reader, the descriptive statistics of the English proficiency test scores of the subjects in each campus is shown in Table 4.16 below.

Table 4.16

Descriptive Statistics of the EFL Proficiency Test Scores for Subjects in the Science Faculty and the College of Social Sciences

Test	Science Faculty (n=45)		College of Social Sciences (n=49)	
	$\bar{X}$	Range	$\bar{X}$	Range
Reading Comp.	15.5	9-19	14.4	8-19
Grammar	12.4	3-18	11.5	4-19
Listening/Dictation	16.2	6-20	15.5	6-20
Total Score	44	26-55	41.1	20-53

*Note:- Each sub-test is marked out of 20 and the total mark is out of 60. Since no standard deviation information is included here in Table 4.16, no statistical analysis could be done to compare the averages.

4.2.1 Findings in the Science Faculty

Table 4.17 below, shows the descriptive statistics for all test scores measured for introvert and extrovert subjects in the Science Faculty. All the data for all tests are put in two major columns according to subjects' personality type (i.e. introverts and extroverts). The third column indicates the statistics for introverts and extroverts combined (Each subject's score on each test and the statistical analyses can be seen in Appendix B).

Table 4.17

Descriptive Statistics of Test Scores for Subjects in the Science Faculty

Variable	Introverts (n=26)		Extroverts (n=19)		Combined (n=45)	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
EPI	15.7	4.9	26.2	3.8	20.1	6.9
Age	18.8	1.0	18.9	1.0	18.8	1.0
Reading Comp.	15.5	2.4	15.5	1.7	15.5	2.1
Grammar	11.6	3.9	13.3	2.5	12.4	3.5
Listening	15.3	3.4	17.4	2.4	16.2	3.2
Total Proficiency	42.5	7.7	46.2	5.1	44	7.0

Table 4.17 above, shows that the averages of extroverts are higher than that of the introverts for all variables, except for age and reading. Subjects' average age is almost the same for both introverts and extroverts. Similarly, subjects' (introverts and extroverts) average reading scores are the same although the standard deviation for introverts is higher than that of the extroverts'. With regard to introverts' and extroverts' average scores for the other variables, the highest average score is registered for total proficiency (extroverts= 46.2 and introverts = 42.5) and the lowest for grammar where introverts scored 11.6 and extroverts, 13.3. The other averages are between the highest, 46.2, and the lowest, 11.6.

Since most of the average scores of introverts and extroverts show differences between them, it is necessary to check to what extent the differences between the averages of introverts and extroverts are significant. Thus, a t-test value is computed to decide whether the differences are significant or not for all variables. The results of the t-test analyses are described below. Note that, here, introverts and extroverts are treated as two independent groups.

Table 4.18

Results of t-test Analyses for All Variables between Introverts and Extroverts in the Science Faculty

Variable	t.observed	t.critical	Remark
EPI	7.50	1.67*	Highly significant
Age	0.25	1.67*	Not significant
Reading Comp.	0.00	1.67*	No difference
Grammar	1.70	1.67*	Significant but weak
Listening	2.30	1.67*	Significant
Total proficiency	1.80	1.67*	Significant

*P<0.05 (Directional or One-tailed)

n=45

As indicated in Table 4.18 above, the results of the t-test analyses show that the t. observed value for age difference is 0.25 and for reading is 0.00. The t. observed values for grammar, listening and total proficiency scores are greater than Zero and are above the t. critical value, 1.67 (directional). Similarly, the t. observed value for EPI is also greater than the t. critical value 1.67. The t. observed values for age, on the one hand, and for reading, on the other, which are found to be nearly equal to Zero (for age) and equal to Zero (for reading), indicate that introverts and extroverts show no/little difference between them. This, in other words, means that introvert subjects in the Science Faculty are almost as old as extrovert subjects of the same Faculty. In addition, introverts and extroverts show equal performance on the reading test.

With regard to the average scores of introverts and extroverts in grammar, listening and total proficiency tests, there is a clear difference between the two groups (i.e. between introverts and extroverts). Extroverts scored higher in these three (grammar, listening and total proficiency) tests than did introverts. In addition, the differences between introverts and extroverts in these tests average scores are found to be significant. Thus, it can be said that there are significant differences between introverts and extroverts in their grammar, listening and total proficiency tests performances.

These results seem to contradict with the hypothesis that introverts perform better in grammar and listening than do extroverts. In addition, extroverts have shown higher total proficiency average than do introverts and this difference has been found to be significant. Because the total proficiency score also includes the score on the reading test, this again proves that extroverts have higher proficiency scores in English tests than do introverts in the Science Faculty.

The average scores of introverts and extroverts are also compared on the basis of sex differences and similarities for subjects in the Science Faculty. The number of introvert subjects in this faculty is 26, out of which 23 are males and the rest(3)are females. Similarly, the total number of extrovert subjects in the same faculty is 19, of which 16 are males and the rest(3)are females. Table 4.19 below, shows the statistical description of the averages for all variables for males and females (introverts and extroverts).

Table 4.19

Descriptive Statistics in the Science Faculty for Introverts' and Extroverts'
Average Scores for All Variables by Sex

Variable	Introverts				Extroverts			
	a) Males		b) Females		c) Males		d) Females	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
EPI	15.8	5.0	15.3	3.8	26.8	3.8	23.3	2.3
Age	18.9	1.1	18.3	0.6	19.1	1.0	18.3	0.6
Reading Comp.	15.5	2.4	15.0	2.6	15.6	1.6	15.3	2.5
Grammar	11.9	4.1	10.3	2.3	13.4	2.7	12.7	1.2
Listening	15.0	3.5	17.3	3.1	17.4	2.4	17.3	3.1
Total Proficiency	42.4	8.1	42.7	3.5	46.4	5.2	45.3	5.9

$$n_a = 23$$

$$n_b = 3$$

$$n_c = 16$$

$$n_d = 3$$

As indicated in the statistical description , the whole data are divided into the introvert and extrovert groups which are again subdivided into male and female groups. A preliminary overview of the data shows that extrovert subjects (both male and female) have higher averages than introverts (both male and female) for most of the variables.

In the comparison of males' and females' averages, the data show that male introverts show higher figures on EPI, age, reading and grammar, while female introverts show higher averages than male introverts on listening and total proficiency test. In the comparison of extroverts' averages (males with females) , male extroverts have shown higher averages than female extroverts for all variables.

In the comparison of the averages of male introverts with male extroverts, the data show that male extroverts scored higher for all variables than did male introverts. Similarly, in the comparison of the averages of female introverts with that of female extroverts', the data show that female extroverts have scored higher on EPI, reading, grammar and total proficiency tests than do female introverts. Female introverts and extroverts have obtained the same averages on age and listening.

Since differences are observed in the averages of introverts and extroverts (both between different sexes and the same sex), it is necessary to determine whether the differences are significant or not. Thus, t-test analyses were run to determine the significance of the differences. The results of the t-test analyses are described in the following tables. (See Tables 4.20 and 4.21 below). Note that details of the analyses can be seen in Appendix B-3.1(ii).

Table 4.20

Descriptive Statistics of the Results in the Science Faculty of t -test Analyses for Average Differences between Introverts and Extroverts for All Variables by Sex (Between Subjects of the Same Personality but Different Sexes)

	M. Intro. Vs. F. Intro.		M. Extro. Vs. F. Extro.		
Variable	t.obs.	t.crit.	t.obs.	t.crit.	Level of Significance
EPI	0.20	2.06*	1.50	2.11*	*P<0.05(Non -Directional)
Age	1.00	2.06*	1.30	2.11*	"
Reading Comp.	0.30	2.06*	0.30	2.11*	"
Grammar	0.70	2.06*	0.40	2.11*	"
Listening	1.10	2.06*	0.10	2.11*	"
Total Proficiency	0.10	2.06*	0.30	2.11*	"

$$n_M.\text{Intro.} = 23$$

$$n_M.\text{Extro.} = 16$$

$$n_F.\text{Intro.} = 3$$

$$n_F.\text{Extro.} = 3$$

Table 4.21

Results of t -test Analyses for the Averages of Introverts and Extroverts for All Variables by Sex (Between Subjects of the Same Sex but Different Personality types)

	M. Intro. Vs. M. Extro.		F. Intro. Vs. F. Extro.		
Variable	t.obs.	t.crit.	t.obs.	t. crit.	Level of Significance
EPI	6.11	1.69*	2.70	2.13*	*P<0.05(Directional)
Age	0.50	1.69*	0.00	2.13*	"
Reading Comp.	0.12	1.69*	0.12	2.13*	"
Grammar	1.10	1.69*	1.41	2.13*	"
Listening	2.00	1.69*	0.00	2.13*	"
Total Proficiency	1.50	1.69*	0.60	2.13*	"

$$n_M.\text{Intro.} = 23$$

$$n_F.\text{Intro.} = 3$$

$$n_M.\text{Extro.} = 16$$

$$n_F.\text{Extro.} = 3$$

As indicated in Table 4.20 above, in the comparison of the averages of male introverts for all variables with those of the female introverts', none of the differences

shows any significant t.value at $p < 0.05$ level. Similarly, no significant t.value is observed in the comparison of the averages of male extroverts for all variables with those of the female extroverts'. Thus, it can be said that although subjects show differences in their averages, the differences are not significant. This, in other words, means that sex has little or no effect on subjects' averages of the same personality type. Male introverts and female introverts have scored almost the same for all variables in the study. Similarly, there is not any significant average difference between male extroverts and female extroverts.

With regard to the comparison of the averages of introverts and extroverts of the same sex (i.e. male introverts with male extroverts and female introverts with female extroverts), Table 4.21 above, shows that most of the t.values are not significant. However, the t.values for the comparison of the averages on EPI and listening of male introverts with male extroverts have been found to be significant. This means that male extroverts have scored significantly higher on their EPI and listening averages than do male introverts. All the other t.values are not significant. The t.value of female introverts and female extroverts, for the EPI is also found to be greater than the t.critical value. Thus, it can be said that significant differences between male introverts and extroverts, on the one hand, and between female introverts and extroverts, on the other, are observed on EPI and listening for the former and only on EPI for the later. These significant differences are said to be due to differences in personality rather than due to sex differentiation. The t.value, 0.00, of the ages of female introverts and female extroverts, shows that these groups are about the same age.

In addition to the t-test analyses which run to determine the significant values for the differences of the averages of all variables between introverts and extroverts, a Pearson

Product-Moment correlation test was also run. The Pearson Product-Moment correlation enables us to determine whether introversion-extroversion and English proficiency test scores are significantly correlated or not. The results of the Pearson Product-Moment correlation analyses for ‘Introversion and English proficiency test scores’ and for ‘Extroversion and English proficiency test scores’ are described below in Table 4.22. Note that ‘Introversion’ refers to subjects’ lower extroversion (EPI) scores and ‘Extroversion’ refers to subjects’ higher extroversion scores. In addition, the details for the Pearson correlation analyses can be seen in Appendix B-3.2.

Table 4.22

Pearson Correlations between EPI and the Variables: Age, Reading, Grammar, Listening and Total Proficiency Scores for Subjects in the Science Faculty

Variable	(a) Introversion and English Proficiency Scores		(b) Extroversion and English Proficiency Scores	
	r.Obs.	r.crit.	r.obs.	r.crit.
Age	-.23	.32*	-.04	.38*
Reading Comp.	-.10	.32*	.01	.38*
Grammar	.03	.32*	.35	.38*
Listening	.10	.32*	.12	.38*
Total Proficiency	.00	.32*	.23	.38*

*P<0.05(Directional or One-tailed)

$n_a = 26$

$n_b = 19$

According to the results of the Pearson correlation analyses in Table 4.22 above, none of the relationships between the ‘Extroversion’ scores (both lower and higher) and Proficiency scores is significant. However, although not significant, most of the r.observed values are well below or above Zero. It is only the relationship between introversion (lower extroversion scores) and total proficiency that equals Zero. This means that there is no relationship between tendency towards introversion and subjects’

total proficiency scores in reading, grammar and listening. The r.observed value for subjects with higher extroversion scores and total English proficiency, .23, is well above Zero. This can be taken as an indication that tendency towards extroversion plays a role in students' performance in total English proficiency test. However, since the r.observed value, .23, is less than the r.critical value, .38, ($r_{obs} < r_{crit}$), the null hypothesis which states that 'there is no systematic relationship between the independent and dependent variables (r equals 0) is accepted. Note that subjects' personality characteristic (introversion or extroversion) is considered as the independent variable whereas subjects' English proficiency test score of each skill as the dependent variable.

With regard to the other variables an inverse relationship is observed between 'Extroversion' scores (both higher and lower) and age. The r.observed value for introversion (lower extroversion scores) as an independent variable and age as a dependent variable is -.23. This value is well below Zero, but less than the r.critical value $\pm .32$. Although the relationship is said to be not significant and the null hypothesis ($r=0$) is accepted, the negative result shows that as subjects' 'Extroversion' scores on the EPI decrease, age increases or vice versa. This is also true for subjects with higher extroversion scores and age relationship. Here, the r.observed value, -.04, is below Zero, but very much less than the r.critical value, $\pm .38$. Due to the negative r.observed value, the relationship between tendency towards extroversion and age, the independent and dependent variables respectively, is said to be inverse. This implies that as subjects' extroversion scores increase, age decreases or vice versa.

The other insignificant r.observed value is for introversion and reading. This value, -.10, shows that there is an inverse relationship between introversion (lower extroversion scores) and reading. The implication of such a negative relationship,

although not significant, is that as subjects' extroversion scores decrease, the same subjects' reading test scores increase or vice versa. The r_{observed} value for extroversion and reading, .01, is positive but almost equal to Zero. This implies that, although the r_{observed} value is not significant, as the extroversion score of a subject increases, his/her reading score also increases, or as one of the scores decreases the other score on the other variable also decreases.

The r_{observed} values for introversion and grammar, on the one hand, and introversion and listening, on the other, are positive but not significant. The positive values mean that as subjects' extroversion scores on the EPI decrease, the scores on grammar and listening tests (two different dependent variables) also decrease. This is because introverts have lower extroversion scores on the Eysenck Personality Inventory. Another way of saying the same thing is that the lower extroversion scores on the independent variable (introversion in this case) result in lower scores on the dependent variables (grammar and listening, each as a single dependent variable). The same kinds of results (positive) are also observed for extroversion and grammar and listening. The r_{observed} value for extroversion and grammar, as independent and dependent variables respectively, is .35 which is well above Zero, but less than the r_{critical} value, $\pm .38$. Thus, it can be said that although the null hypothesis is not to be rejected because of the insignificant r_{observed} value, as subjects' extroversion scores on the EPI increase, grammar test scores of the same subjects also increase. Similarly, since the r_{observed} value for extroversion and listening, .12, is positive (although not significant), it can be said that as subjects' extroversion scores increase the scores in listening also increase. On the contrary, the decrease in the score in one of the variables (the independent or the dependent) results in the decrease of the score in the other.

4.2.2 Findings in the College of Social Sciences

Similar to that in the Science Faculty, the necessary investigation is also made for introvert and extrovert subjects in the College of Social Sciences. As stated in chapter three, the total number of subjects in the College of Social Sciences is 49, of which 21 are introverts and the rest 28 extroverts. All these subjects' scores for all variables are investigated independently and separately. Table 4.23 below, shows the descriptive statistics for the subjects' scores for all variables. Note that each subject's score for each variable and the whole analyses in each instrument (i.e. the t-test and correlation coefficient) can be seen in Appendices A and B.

Table 4.23

Descriptive Statistics for All Variables in the College of Social Sciences

Variable	Introverts (n=21)		Extroverts (n=28)		Combined (n=49)	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
EPI	17.8	2.8	26.9	5.0	23.0	6.2
Age	19.6	1.4	19.5	1.4	19.5	1.4
Reading Comp.	13.9	2.9	14.7	2.7	14.4	2.8
Grammar	10.0	2.9	12.6	4.0	11.5	3.8
Listening	15.0	3.3	15.9	3.2	15.5	3.3
Total Proficiency	38.7	6.8	42.8	7.0	41.1	7.2

As indicated in Table 4.23 above, extrovert subjects scored higher in all of the variables than did introverts, except for age in which introvert subjects had slightly higher figure than had extroverts. Even these figures can be said to be almost equal because the difference is a matter of 0.1.

With regard to the other variables, the differences between the averages of introverts and extroverts are large enough. Thus, it is necessary to check to what extent

the differences are significant. Similar to those made for subjects in the Science Faculty, t-test analyses were run in order to determine the significance levels of the differences in the averages for subjects in the College of Social Sciences. Table 4.24 below, shows the results of the t-test analyses for all the variables. Note that details of the analyses are given in Appendix B-4.1(i).

Table 4.24

Results of the t-test Analyses for the Averages Differences between Introverts and Extroverts in the College of Social Sciences

Variable	t.observed	t.critical	Remark
EPI	7.00	1.67*	Highly significant
Age	0.25	1.67*	Not significant
Reading Comp.	0.88	1.67*	Not significant
Grammar	2.36	1.67*	Significant
Listening	0.90	1.67*	Not significant
Total Proficiency	1.95	1.67*	Significant

*P<0.05 Level (Directional)

n=49

As indicated in Table 4.24 above, three of the t.observed values are above the t.critical values and three of the t.observed values are below the t.critical values. Those t.observed values above the t.critical values are for the variables: EPI, grammar and total proficiency. The t.observed value, 7.00, which is for EPI shows that there is a highly significant difference between introverts' and extroverts' average 'extroversion' scores. The t.observed value, 2.36, which is for grammar is the other significant value. The average score of extroverts for grammar is 12.6 and that of introverts is 10.0. Since the t.observed value is said to be significant at $p < 0.05$ level (directional), thus, extroverts' average score on grammar is highly different from that of the introverts'. This implies that extroverts performed better on the grammar test than did their introvert counterparts.

With regard to the other t. observed values which are significant at $p < 0.05$ level (directional), the t. observed value, 1.95, is read for the total proficiency test score and is the only significant t. value next to the EPI and grammar. In addition, this t. value is slightly higher than the t. critical value, 1.67, when compared with the other significant t. values. Thus, since extroverts' average scores for all the significant t. values are higher than those of the introverts', it can be said that extroverts performed better on their EPI, grammar and total proficiency tests than did introverts in the College of Social Sciences.

All the above results refer to the investigation of introverts' and extroverts' averages for comparison. Since significant differences are observed only for three of the variables, it is necessary to compare the averages of introverts and extroverts in relation to differences in sex. Thus, subjects' (introverts and extroverts) averages for all variables are investigated to see if sex has a role to play in subjects' scores. Table 4.25 below shows the statistical description of subjects' averages for all variables by sex. It must be noted that subjects' (males and females) individual scores can be seen in Appendices A and B.

Table 4.25

Descriptive Statistics for Introverts' and Extroverts' Averages for All Variables by Sex in the College of Social Sciences

Variable	Introverts				Extroverts			
	a) Males		b) Females		c) Males		d) Females	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
EPI	17.6	2.9	19.0	1.7	26.9	5.0	27.3	4.9
Age	19.7	1.4	19.0	1.0	19.7	1.3	17.7	0.6
Reading Comp.	14.4	2.5	10.7	3.8	14.6	2.8	15.3	2.1
Grammar	10.7	2.4	6.0	1.7	11.8	4.5	16.0	2.6
Listening	15.4	2.8	12.7	5.8	15.5	3.2	19.3	0.6
Total Proficiency	40.5	4.7	28.0	9.5	42.0	7.0	50.0	0.0
$n_a = 18$		$n_b = 3$		$n_c = 25$		$n_d = 3$		

As indicated in Table 4.25 above, male introverts scored higher on age and reading, grammar, listening and total proficiency scores than did female introverts. Female introverts showed higher average than male introverts only in their extroversion score (EPI). This seems to mean that being male is an advantage in scoring higher on English proficiency tests as far as introverts (males and females) are concerned. Similarly, male introverts have higher average age figure than female introverts. This implies that female introverts are younger than male introverts.

With regard to extrovert subjects' (males and females) averages, the statistical description shows that female extroverts scored higher in all the variables, except for age, than did male extroverts. This is contrary to introverts' averages in which male subjects scored higher in the majority of the variables. Male extroverts had higher figures than female extroverts only on age. This, in other words, means that female extroverts are at an advantage to score higher on English proficiency tests than are their male counterparts. Thus, it can be said, as far as subjects with the same personality type are concerned, that there is a difference in sex. For the majority of the tests, male introverts and female extroverts scored higher than female introverts and male extroverts, respectively.

The comparison of subjects' averages of the same sex (i.e. males with males or females with females) but different personality types shows that male extroverts scored higher in all the variables than did male introverts, except for age in which both introverts and extroverts were the same. Similarly, female extroverts scored higher in all variables than did female introverts, except for age in which female introverts had higher figures.

This means that extroverts (both males and females) performed better on English proficiency tests than did introverts (both males and females). As far as age is concerned, female extroverts are found to be younger than female introverts. Males (both introverts and extroverts) have the same age. This means that male introverts are as old as male extroverts in the College of Social Sciences.

Since the average differences between subjects of the same personality type but different sexes or between subjects of the same sex but different personality types are large enough, it is essential to determine to what extent the differences are significant. Thus, t-test analyses were run to determine the significance levels of the differences between the averages in all variables. The results of the t-test analyses are described in Tables 4.26 and 4.27 below. Note that details for the t-test analyses can be found in Appendix B.-4.1 (ii).

Table 4.26

Statistical Description of the Results of the t-test Analyses for Average Score Differences Between Introverts and Extroverts for All Variables in the College of Social Sciences by Sex (Between the Same Personality but Different Sexes)

Variable	M.Intro. Vs. F.Intro.		M.Extro. Vs. F.Extro.		Level of Significance
	t.obs.	t.crit.	t.obs.	t.crit.	
EPI	0.80	2.09*	0.12	2.06*	*P<0.05 (non-directional)
Age	0.77	2.09*	2.50	2.06*	“
Reading Comp.	2.17	2.09*	0.41	2.06*	“
Grammar	3.13	2.09*	1.50	2.06*	“
Listening	1.22	2.09*	2.00	2.06*	“
Total Proficiency	3.47	2.09*	1.95	2.06*	“

$$n_{M.Intro.} = 18$$

$$n_{M.Extro.} = 25$$

$$n_{F.Intro.} = 3$$

$$n_{F.Extro.} = 3$$

Table 4.27

Results of the *t*-test Analyses for the Average Score Differences between Introverts and Extroverts for all Variables in the College of Social Sciences by Sex (Between the Same Sex but Different Personality Types)

Variable	M.Intro.vs. M.Extro.		F.Intro. vs. F.Extro.		Level of Significance
	t.obs.	t.crit.	t.obs.	t.crit.	
EPI	7.15	1.68*	2.30	2.13*	*P<0.05 (Directional)
Age	0.00	1.68*	1.62	2.13*	“
Reading Comp.	0.25	1.68*	1.53	2.13*	“
Grammar	0.91	1.68*	4.54	2.13*	“
Listening	0.11	1.68*	1.60	2.13*	“
Total Proficiency	0.79	1.68*	3.28	2.13*	“

$$n_{M.Intro.} = 18$$

$$n_{F.Intro.} = 3$$

$$n_{M.Extro.} = 25$$

$$n_{F.Extro.} = 3$$

According to the results in Tables 4.26 and 4.27 above, the majority of the *t*.observed values are below the *t*.critical values. However, more significant values are observed here for subjects in the College of Social Sciences than for subjects in the Science Faculty.

In the comparison of the averages of male introverts with female introverts' for all variables, significant differences are observed for reading comprehension, grammar and total proficiency scores, each of which has a *t*.observed value: 2.17, 3.13 and 3.47, respectively. These *t*.observed values are well above the *t*.critical value, 2.09, at $p < 0.05$ level. Male introverts scored higher in all the three variables. Thus, it can be said that since male introverts scored higher than did female introverts on the reading, grammar and total English proficiency test, introvert male subjects seem to be at an advantage to score higher in these tests. Although female introverts scored higher than male introverts

on the EPI, since the t. observed value, 0.80, is below the t. critical value, 2.09, the differences between male introverts and female introverts on their extroversion scores are insignificant.

With regard to male and female extroverts' average differences, the results of the t-test analyses show that none, except for age, of the t. observed values is significant at $p < 0.05$ level. The t. observed value for age difference between male extroverts and female extroverts is 2.50, which is well above the t. critical value, 2.06. Thus, since males have higher figures than females on age, it can be said that male extroverts are significantly older than female extroverts. Female extroverts scored higher than male extroverts in all the other variables, except for age. But, because the t. observed values for all these variables are below the t. critical value, 2.06, the average score differences between male extroverts and female extroverts for EPI, reading, grammar, listening and total proficiency test are said to be insignificant. This, in other words, means that there is no significant difference between male extroverts and female extroverts on the EPI, reading, grammar, listening and total proficiency tests.

In the comparison of the averages for subjects of the same sex but different in personality, a few significant t. values are observed in the t-test analyses. According to the statistical description in Table 4.25 above, male extroverts scored higher than did male introverts in all the variables, except for age. However, the computed t. observed value as indicated in Table 4.27 above, is found to be significant only for EPI. Male extroverts had an average extroversion score, 26.9, on EPI and male introverts had 17.6. The t. observed value for these two average extroversion scores difference is 7.15, which is well above the t. critical value, 1.68, at $p < 0.05$ level. Thus, it can be said that male extroverts' average score of the EPI is significantly higher than that for male introverts'. With regard to the

other average differences both male introverts and extroverts are almost the same. Therefore, as far as the average differences between male introverts and male extroverts are concerned, the null hypothesis which states that 'there is no significant difference between introverts' and extroverts' averages on age, reading, grammar, listening and total proficiency tests' can be accepted.

The comparison of the average scores of female introverts and female extroverts for all variables shows that extroverts have scored higher than introverts for all variables, except for age. However, although female extroverts have scored higher than female introverts on the EPI, reading, grammar, listening and total proficiency test, the averages' differences are found to be significant only for the variables: EPI, grammar and total proficiency test. The t. observed value for EPI is 2.30, for grammar 4.54 and for total proficiency test 3.28. These t. observed values are all above the t. critical value, 2.13. Therefore, it can be said, as far as female subjects' English proficiency scores are concerned, that extroverts perform better on grammar and total proficiency than do introverts. However, this is not true for male subjects' scores. There is no significant difference between introverts and extroverts on grammar and total proficiency averages for males.

As for subjects in the Science Faculty, a Pearson Product-Moment correlation analysis is also run for subjects in the College of Social Sciences. The t-test analysis was run in order to determine whether the superficially observed differences between the average scores of introverts and extroverts on the variables: EPI, age, reading, grammar, listening and total proficiency were significant or not, i.e. to find out whether the two groups show significant average score difference between them.

The Pearson Product-Moment correlation analysis is run in order to find out whether subjects' tendencies towards introversion-extroversion characteristics show significant correlation with subjects' age, on the one hand, and with performance on English proficiency test that composed reading, grammar and listening as sub-sections, on the other.

The results of the correlation coefficient analyses for introversion and age, reading, grammar, listening and the total proficiency as well as for extroversion are described in Table 4.28 below. Note that details for the analyses can be seen in Appendix B-4.2.

Table 4.28

Pearson Correlations between EPI and the Variables: Age, Reading, Grammar, Listening and Total Proficiency Scores for Subjects in the College of Social Sciences

Variable	(a) Introversion and English Proficiency Scores		(b) Extroversion and English Proficiency Scores	
	r.obs.	r.crit.	r.obs.	r.crit.
Age	-.05	.36*	.01	.32*
Reading Comp.	-.13	.36*	-.17	.32*
Grammar	-.02	.36*	-.3274	.3233*
Listening	-.39	.36*	.19	.32*
Total Proficiency	-.25	.36*	-.18	.32*

* $P < 0.05$ (Directional)

$n_a = 21$

$n_b = 28$

According to the results of the Pearson correlation coefficient analyses in Table 4.28 above, none of the relationships, except for introversion and listening and extroversion and grammar, is significant at $p < 0.05$ level. In addition, most of the r. observed values are negative. These negative r. observed values suggest that introversion

in the College of Social Sciences has an inverse relationship. This contrasts with the results observed in the Science Faculty where introversion has a positive correlation for most of the variables except for age and reading. The r_{observed} value, $-.02$, for grammar is the nearest score to Zero for the correlation with introversion in the College of Social Sciences. On the contrary, the r_{observed} value, $-.39$, for the correlation between introversion and listening is the score which is very far from Zero.

As far as the r_{observed} values which are **found** significant are concerned, those for the relationship between introversion and listening, $-.39$, and between extroversion and grammar, $-.3274$, are the only significant r_{observed} values. These significant r_{observed} values suggest that as subjects' extroversion scores for EPI decrease the same subjects' scores on the grammar and listening test increase or vice versa. The other r_{observed} values are all insignificant. Thus, it can be said that in cases of lower 'extroversion' scores such as those for the introverts, higher scores are expected to occur on the dependent variables. Similarly, in cases of higher 'extroversion' scores such as those for the extroverts, lower scores are expected to occur on the dependent variables. It must be noted that these are the implications of inverse relationships. However, still because the r_{observed} values are not significant, except for introversion and listening and extroversion and grammar, the null hypothesis which proposes the absence of any significant relationship between the introversion-extroversion tendencies and age, on the one hand, and introversion-extroversion and English proficiency test scores, except for grammar and listening, on the other, is accepted. In addition, although the r_{observed} values for grammar, $-.3274$, and for listening, $-.39$, said to be significant, the relationship between introversion-extroversion and grammar and listening can be called very weak significant relationships.

Extroversion has a positive insignificant correlation with age and listening. This means that the increase on subjects' 'extroversion' scores on the EPI results in the increase on age as well as on listening test. The negative insignificant r -observed values for extroversion and reading and extroversion and total proficiency test scores are the other r -observed values those seem to suggest inverse relationships. The r -observed values, which are nearly equal to zero and insignificant show a stronger absence of relationship between introversion-extroversion and each dependent variable than the r -observed values which are further away from zero. Thus, in this case, the absence of a relationship is much stronger for extroversion and age, r -observed value, $-.01$, than for extroversion and listening, r -observed value $-.19$.

In general, significant relationships, which are weak, are observed between introversion and listening, and extroversion and grammar in the College of Social Sciences. In addition, both these relationships are inverse relationships. In the case of the Science Faculty, none of the relationships is significant at $p < 0.05$ level.

In the next and final chapter, all the results will be discussed in relation to other research findings of related topics. In addition, the research questions and hypotheses which were posited at the beginning of the study will be answered on the basis of the findings in the study. Finally, conclusions and recommendations will be given based on the results obtained in this study.

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

In the previous chapter (chapter four), results, which were achieved by applying the necessary methods, instruments and procedures for collecting and analysing data, are described in detail. The description of the results composed the results of the average (mean) score comparisons and the correlation coefficient analyses for subjects in the two campuses (i.e Science Faculty and College of Social Sciences).

In this final chapter, those results described in the previous chapter will be discussed in relation to the research questions as well as hypotheses posited at the beginning of the study. Following the discussion come conclusions. The conclusions will be given based on the findings in this research as well as previous related research hypotheses and findings. Finally, recommendations which may be considered in future research programmes related to the topic of this study, will be given.

5.1 Discussion

The description of the results in the previous chapter has shown that not all average score differences are significant. Similarly, the results of the correlation coefficient analyses have shown that only a few of the correlation coefficient values have been found to be significant. Thus, based on the results described earlier, it is now possible to discuss the research questions posited at the beginning of the study. These research questions and hypotheses are the following:

1. Is there significant average (mean) difference between introverts and extroverts on their age, as well as English proficiency tests in reading, grammar and listening?
 H_0 : There will be no significant average score difference between introverts and extroverts on their averages(means)on age, as well as English proficiency tests in reading, grammar and listening. ($\bar{X}_I = \bar{X}_E$) at $P < 0.05$ level one-tailed (directional) decision).
 H_1 : Introverts will show a significantly higher averages on their age, as well as English proficiency tests in reading, grammar and listening than do extroverts. ($\bar{X}_I > \bar{X}_E$) at $P < 0.05$ level, one-tailed (directional) decision).
2. Is there significant systematic relationship between the introversion-extroversion tendencies of first year students at Addis Ababa University and their age, on the one hand, and performance on a standardized English proficiency test that composed reading, grammar and listening as sub-component tests, on the other?
 H_0 : There will be no significant relationship between introversion-extroversion tendencies and age, on the one hand, and between introversion-extroversion and English proficiency test score that composed reading, grammar and listening. ($r = 0$) at $P < 0.05$ level, one tailed (directional) decision).
 H_1 : There will be negative relationships between the introversion-extroversion tendencies and age as well as English proficiency test scores in reading, grammar and listening. ($r < 0$) at $P < 0.05$ level, one-tailed (directional) decision).

Note that all the above hypotheses express a one-tailed(directional) decision level.

The results of this study have shown significant average score differences between introverts and extroverts for grammar, listening and total proficiency test scores for subjects in the Science Faculty and for grammar and total proficiency test scores for subjects in the College of Social Sciences. Extroverts have scored higher than introverts in all the significant average score difference values in both campuses. Age and reading averages do not show significant differences between introverts and extroverts in both campuses. In addition, the listening average score difference between introverts and extroverts has not been found significant for subjects in the College of Social Sciences. In this case, the null hypothesis that states the absence of significant average score difference between introverts and extroverts can be accepted for subjects' age and reading averages in both campuses and also for listening in the College of Social Sciences.

However, since the total proficiency score differences between introverts and extroverts are significant in both campuses, the null hypothesis is rejected, except for age. This is for the reason that the significant t_{observed} values on the total proficiency scores also include the scores of the insignificant variables which are sub-component tests. Thus, the decision lies in the hypothesis that states the presence of significant average score differences between introverts and extroverts (H_1). In this case, because the results contradicted the hypothesis (H_1), the hypothesis that introverts score significantly higher on their age and English proficiency tests in reading, grammar and listening is not supported. The insignificant average reading score differences between introverts and extroverts in both campuses also suggest that both groups (i.e introverts and extroverts) have almost identical average reading scores.

With regard to average age differences, the results in the Science Faculty show that extroverts have slightly higher average than introverts. On the contrary, introverts have higher average age than extroverts in the College of Social Sciences. However, average age differences are not significant in both campuses. Thus, age does not seem to have any effect on subjects' differences on performance on their English proficiency tests as well as on EPI scores.

Since all the above significant and insignificant average score differences for the given variables have not considered sex differences, investigation has been tried with regard to sex to see whether sex has an effect on the differences. The result has shown significant average score differences on EPI and listening between introverts and extroverts in the Science Faculty and on EPI, grammar and total English proficiency test scores in the College of Social Sciences. But, these differences, which are significant, are observed between introverts and extroverts of the same sexes. Male extroverts have scored significantly higher than male introverts on their EPI and listening in the Science Faculty. Female extroverts have scored significantly higher than female introverts on their EPI, grammar and total proficiency averages in the College of Social Sciences. These can be considered as additional evidences which show the performances of extroverts of both sexes to be better than introverts'.

It must be noted that these differences between introverts and extroverts on their averages are not due to sex differences. This, in other words, means that the average differences are not between males and females. Rather, the differences are between introverts and extroverts of same sex.

Thus, it has been needed to find out where exactly sex difference may show its effect. The results of the t-test analyses have shown significant differences for subjects' average score comparisons between subjects of the same personality characteristics. Male introverts have scored significantly higher than female introverts on their reading, grammar and total English proficiency scores while male extroverts have scored significantly higher than female extroverts on their age only. Note that these significant average differences are observed only for subjects in the College of Social Sciences.

Although male and female subjects have almost identical EPI averages, the significant differences on their English proficiency average scores can be taken as a considerable fact that there is a role which sex difference may play in determining subjects' performance on English proficiency tests. This study has found that sex difference does not affect subjects' performance on reading test. This finding agrees with Bedilu's(1996) results.

In general, the hypothesis that introverts score higher than extroverts on English proficiency test, that composed reading, grammar and listening as sub-tests in it, has contradicted the findings of this study. It has, instead, supported the assumption that extroverts are better on English proficiency tests (See Tables 4.18, and 4.24 in chapter four). It must be noted that this study considered total English proficiency t.observed values for subjects in the two campuses, as its major concern for a generalized decision.

The average score comparison based on sex has shown significant t.observed value for subjects' total proficiency score only in the College of Social Sciences. This significant t.observed value is for the comparison of the average scores between subjects

of the same sex but different personality (i.e. between female introverts and female extroverts). In this case also extroverts have scored higher than introverts. There is no any significant t. observed value of total proficiency score on which introverts scored higher than extroverts. However, males have shown a significantly higher average score than females on total proficiency when the comparison is between subjects of the same personality. In this case, introverts in the College of Social Sciences show such a result. (See. Tables 4.26 and 4.27 in Chapter four).

With regard to differences between subjects in the two campuses (i.e. when subjects in the Science Faculty are compared with subjects in the College of Social Sciences), there are major differences which the results on this study have shown. One of the major differences is that the distribution of introverts and extroverts is not the same. In this case, more introvert subjects have been observed in the Science Faculty while more extroverts have been observed in the College of Social Sciences. This is also true for the distribution of male introverts and extroverts (more male extroverts have been observed in the College of Social Sciences while more male introverts have been observed in the Science Faculty). The distribution of female introverts and extroverts has been found to be the same in both campuses.

The other major difference has been observed in the comparison of age averages. Both introverts and extroverts (males and females) in the College of Social Sciences have been found to be older than those in the Science Faculty. However, female extrovert subjects in the Science Faculty have been found to be older than female extroverts in the College of Social Sciences. Significant difference between subjects in the two campuses on their average age has been observed when the comparison is between introverts and

extroverts (males and females) in the Science Faculty and the College of Social Sciences. This significant average age difference shows that subjects in the Science Faculty are younger than those in the College of Social Sciences.

Similarly, differences between subjects in the two campuses have been observed on English proficiency average scores. In all tests' averages, subjects (both introverts and extroverts) in the Science Faculty have scored higher than subjects in the College of Social Sciences. However, when the comparison is on the basis of sex, subjects in the College of Social Sciences show higher averages than subjects in the Science Faculty on listening (male introverts and female extroverts), on grammar and total proficiency (female extroverts only). In addition, subjects in the College of Social Sciences have scored higher than subjects in the Science Faculty on their (EPI) averages.

The results of the correlation coefficient analyses for the relationship between introversion-extroversion and proficiency in English test scores have shown very few significant r -observed values. No significant correlation has been found between introversion-extroversion and total English proficiency test scores for subjects in the Science Faculty. Age also has no significant relationship with introversion-extroversion in this faculty.

On the contrary, significant correlation has been observed between introversion-extroversion and English proficiency in grammar and listening test scores for subjects in the College of Social Sciences. These correlation coefficient values have been found negative that the relationships between introversion-extroversion and English proficiency test scores in grammar and listening are said to be inverse. Thus, the significant negative

correlation coefficient value for the relationship between introversion-extroversion and grammar test score shows that as subjects' 'extroversion' scores increase, the same subjects' grammar test scores decrease or vice versa. This, in other words, means that the higher a subject's score on EPI, the lower his/her grammar test score is, and the lower a subject's score on EPI, the higher his/her score on grammar test is. This is true also for subjects' score on EPI and listening. Note that extroverts are expected to score higher than introverts on EPI.

Although not significant, the majority of the correlation coefficient values have been found to be positive for subjects in the Science Faculty. On the contrary, more negative insignificant correlation coefficient values have been observed in the College of Social Sciences.

The significant negative correlations between introversion-extroversion and English proficiency test scores in grammar and listening, in the College of Social Sciences, show that subjects with tendency towards introversion(i.e. subjects with lower extroversion scores) perform well on grammar and listening tests. This finding agrees with that of Busch's (1982) and Entwistle and Entwistle's(1970) findings which show significant negative correlation between introversion-extroversion and grammar test scores.

However, because the correlation between introversion-extroversion and total English proficiency scores have been found to be insignificant, the null hypothesis (H_0), which states that there is no significant relationship between introversion-extroversion and age, on the one hand, and English proficiency in reading, grammar and listening, on the

other, is accepted. On the contrary, the hypothesis that suggests the presence of a significant correlation between the two (i.e. H_1) is rejected. Thus, the answer for the research question, 'Is there significant relationship between introversion-extroversion tendencies of first year students at Addis Ababa University and their age as well as performance on a standardized English proficiency tests in reading, grammar and listening', is 'no'. In this case, the findings in this study have agreed with those findings which show insignificant correlation between introversion-extroversion and proficiency in second/foreign languages (See-Naiman et al. 1975, 1978 in Busch 1982; Busch 1982; Savage 1962; Maqsud 1980).

5.2 Conclusions

On the basis of the results discovered in this study, the researcher has reached the following conclusions:

1. There is a significant average score difference between introverts and extroverts in their performance on English proficiency tests, especially, in grammar and listening. In addition, although introverts and extroverts have almost identical averages in reading, the total English proficiency average score is higher for extroverts than for introverts and this difference is significant. Thus, because extroverts perform better than introverts on English proficiency tests, it can be said that subjects' tendency towards extroversion may contribute towards success in learning a foreign language.
2. Because there is no significant difference on age between introverts and extroverts, age cannot be considered as a factor affecting or contributing towards subjects' differences in their performance in English proficiency tests. In addition, subjects' tendency towards introversion or extroversion does not affect their performance on

reading test in isolation. This agrees with the findings by Busch(1982) and Bedilu(1996).

3. Sex has no any significant effect on subjects' personality as well as on their performance in English proficiency tests: reading, grammar and listening. In addition, sex difference has no relationship with subjects' age differences. This, in other words, means that differences in subjects' personality, age and performance in English proficiency tests: reading, grammar and listening, cannot be considered as due to differences in sex.
4. There is no significant correlation between introversion-extroversion tendencies and performance on the overall English proficiency test. However, tendency towards introversion contributes significantly towards performance in grammar and listening tests.
5. The absence of a significant correlation between introversion-extroversion and Overall English proficiency can be explained by factors other than age and sex differences. Factors such as culture and family background, classroom or environmental situations and foreign language contexts can be taken as reasons for the insignificant correlation between introversion-extroversion and overall proficiency in English language test.

5.3 Recommendations

Finally, on the basis of the results observed and discussed and the conclusions, the researcher recommends the following:

1. Because extroverts appear to be superior over their introvert counterparts (both males and females) in achieving higher scores in English proficiency tests and because this might be due to a lack of sufficient motivation on the part of

introverts, classroom teachers, parents as well as the community at large should motivate introverts towards communicative activities. In addition, Rubin (1975) states that good language learners are those with a strong desire to communicate. Thus, although some people are highly motivated to learn a language, because of a lack of strong desire to communicate, they may lag behind in learning the language in question efficiently. This, as Rossier (1975 in Busch 1982) states, may be the reason why some learners who appear to be highly motivated fail to attain proficiency in a foreign language. Therefore, classroom teachers, parents or the family and the community at large should help introverts in creating the desire in them to communicate in English.

2. Extroverts are said to be in an advantageous position over their introvert counterparts in learning a second or foreign language because of their sociable and outgoing characteristics. As a result, they can create more opportunities to practise the language in question, obtain input and experience success in communicating. On the contrary, introverts' desire to create such opportunities may be rare. In addition, the culture here in Ethiopia is largely inhibitory to children and the young towards being outgoing in their personality. The family, parents and the community, as a result, coerce children and the young, especially girls, to withdraw from talking in front of elders as well as strangers and this is considered as a way of showing respect to others. Therefore, instead of treating such tendencies towards introversion as weaknesses, classroom teachers, parents, concerned people and the community should find ways of removing such obstacles and promote widespread interaction.
3. Busch(1982) states that introversion-extroversion needs to be studied along with other personality factors in the contexts of situation under which a foreign language

is learned. This, according to Busch, is because whether a student is introverted or extroverted may be specific to a given setting only. In situations as those which exist here in Ethiopia, where the classroom is the only place to learn a foreign language and where the introverted behaviour is assumed to be a way of showing respect to the classroom teacher, the possibility of obtaining much input will be rare. As a result, introversion-extroversion alone would have very little to do with language proficiency in an EFL situation. Therefore, tendency towards introversion-extroversion should be examined in relation to other personality factors on the basis of the context of situation under which the foreign language is learned.

4. This study has been undertaken in a limited number of subjects (especially females). In addition, the study is concentrated on reading, grammar and listening as components of the overall proficiency test. Thus, the conclusions reached may not be taken as reliable in themselves. Rather, they can be considered as relevant initiatives for further research that may shed light on the relationship between introversion-extroversion and second/foreign language proficiency. Thus, a consideration of other factors which may be believed to affect the relationship should be investigated in order to broaden and strengthen this area of research for more systematic and comprehensive results.

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APPENDIX-A

EYSENCK'S PERSONALITY INVENTORY AND

VARIOUS RELATED TABLES AND

ANALYSES

A-1: Eysenck's Personality Inventory

የኢዜንክ የሰብዕና መለያ

መመሪያ

በሚቀጥሉት ገጾች ውስጥ ያሉትን ጥያቄዎች ለመመለስ እንድትችሉ/ይ/ በየጥያቄዎቹ ፊት ለፊት /ትይዩ/ በሚገኙ ክፍት ቦታዎች ላይ ሁለት ሁለት አማራጮች ተሠጥተዋል። አማራጮቹ አዎ ወይም አይደለም የሚሉ ሲሆን አንተ/ቺ/ በመረጥከው/ሺው/ ምርጫ ሥር ባለው ክፍት ቦታ ላይ ✓ ምልክት በማድረግ ብቻ አመልክት/ቺ/።

እነዚህ ጥያቄዎች በተቻለ መጠን በፍጥነት መመለስ መቻል አለባቸው። የትኛውም መልስ ግን ትክክል ወይም ስህተት ሊባል አይችልም። ለዚህም ምክንያቱ ጥያቄዎቹ የችሎታ ወይም የብቃት መለኪያ አይደሉምና ነው።

የመጠይቁ በትክክል መሞላት እጅግ አስፈላጊ ሲሆን በውጤቱም ተጠቃሚው አጥኝው ክፍል እና መረጃውን ለትክክለኛው ጥናት መጠቀም የሚሹ ሁሉ ናቸው። ይህንን መጠይቅ በትክክል በመሙላትህ/ሽ/ ትክክለኛውን መረጃ በመስጠት ተባብረሃልና /ሻልና/ የጥናቱ የመጨረሻ ውጤት የአንተም/ቺም/ ጥረት ውጤት እንደሆነ ይገመታል።

የግል ሁኔታ

ሥም _____

ፋኩልቲ /ዲፓርትመንት/ _____

ጾታ _____

ዕድሜ _____

የአፍ መፍቻ ቋንቋ _____

ሌሎች የምትናገራቸው/ሪያቸው/ ቋንቋዎች _____ ÷ _____

_____ ÷ _____

እንግሊዝኛን ለምን ያህል ዓመታት ተማርክ/ሽ/? _____

እንግሊዝኛ ተናጋሪ በሆኑ አገሮች ውስጥ ቆይታ አድርገሃል/ሻል/?

አድርጌያለሁ _____

አላደረግሁም _____

አድርገህ/ሽ/ ከሆነ ለምን ያህል ጊዜ? _____

No. ቁጥር	Questions /ጥያቄዎች/	Yes አዎ	No አይደለም
1.	Do you often long for excitement? አብዛኛውን ጊዜ ደስታን ትመኛለህ/ትመኚያለሽ?		
2.	Are you usually carefree? አብዛኛውን ጊዜ ግድያለሽ ነህ/ነሽ/?		
3.	Don't you find it hard to really enjoy yourself at a lively party? በፖርቲ /ድግስ/ ላይ ራስህን ማስደሰት አይቸግርህም/ሽም/?		
4.	Do you prefer meeting people to reading? መጽህፍትን ከማንበብ ይልቅ ከሰዎች ጋር መገናኘትን ትመርጣለህ /ትመርጪያለሽ/?		
5.	Do you like going out a lot? ብዙውን ጊዜ ወጣ ወጣ ማለት ትወዳለህ/ትወጃያለሽ/?		
6.	When people shout at you, do you shout back? ሰዎች ሲጮሁብህ/ሽ/ አንተም/ቺም/ መልስህ/ሽ/ ትጮህባቸዋለህ /ትጮሂባቸዋለሽ/?		

No. ቁጥር	Questions /ጥያቄዎች/	Yes አዎ	No አይደለም
7.	Can you usually let yourself go and enjoy yourself at a cheerful party? ሁል ጊዜ አስደሳች የሆነ ፓርቲ /ድግስ/ ላይ እንደልብህ/ሽ/ ራስህን /ሽን/ ማዝናናት ትችላለህ/ትችያለሽ/?		
8.	Do other people think of you as being very lively? ሌሎች ሰዎች አንተን /አንቺን አስቂኝና ተጫዋች አድርገው ይገምቱሃል/ሻል/?		
9.	Do you sometimes gossip? አልፎ አልፎ የሰዎችን ማንነት በሌሉበት ትገልጻለህ/ትገልጫለሽ/?		
10.	Would you rather talk to someone than look something up in a book? ስለአንድ ጉዳይ መጻህፍትን ከማንበብ ይልቅ ሰዎችን በማነጋገር መረዳትን ትመርጣለህ/ትመርጫለሽ?		
11.	Would you always declare everything at the customs even if you knew you would be caught? እንደማይነቃብህ/ሽ/ ወይም እንደማትያዝ/ገር/ ብታውቅም /ብታውቂውም/ የያዝከውን/የያዝሽውን/ ዕቃ ሁሉ ለጉምሩክ በይፋ ትገልጻለህ/ትገልጫለሽ/?		
12.	Do you like being with a crowd who play jokes on one another? እርስ በርስ ከሚቀላለድና ከሚበሻሽቅ ቡድን ጋር መሆን ትወዳለህ /ትወጂያለሽ/?		
13.	Do you like doing things in which you have to act quickly? ፈጣን ተግባራዊ ምላሽ የሚሹ ነገሮችን ነው መሥራት የምትወደው /የምትወጂው/?		

No. ቁጥር	Questions /ጥያቄዎች/	Yes አዎ	No አይደለም
14.	Would you be very unhappy if you could not see lots of people most of the time? አብዛኛውን ጊዜ ከሰዎች ጋር ካልሆንክ/ሽ/ አትደስትም /አትደስቺም/?		
15	Do you think that you are fairly self-confident? በሚገባ በራሴ እተማመናለሁ ብለህ/ሽ/ ታስባለህ/ታስቢያለሽ/?		
16.	Do you generally do and say things quickly without stopping to think? ሥራ ስትሰራም/ሪም/ ሆነ ስትናገር/ሪ/ ስለ ጉዳዩ ቆም ብለህ/ሽ/ ሳታስብ/ቢ/ ነው?		
17.	Are you rather lively? ቀልደኛና ደስተኛ ነህ/ነሽ/?		
18.	Do you like playing mischievous tricks on others? በሰዎች ላይ ተንኮል ያለበት ቀልድ መቀለድ ትወዳለህ /ትወጂያለሽ/?		
19.	Do you like plenty of excitement going on around you? አካባቢህ/ሽ/ በሙሉ ደስታና ፈንጠዚያ ቢሆን ትወዳለህ /ትወጂያለሽ/?		
20.	Would you rather play than sit and watch at parties? በፓርቲዎችና ድግሶች ላይ ቁጭ ብሎ ከመመልከት ይልቅ ተነስቶ መጫወትን ትመርጣለህ/ትመርጫለሽ/?		
21.	When drawn into a quarrel do you prefer to have it out to being silent? ወደ ፀብ/ግጭት/ የሚገፋፉ ሁኔታዎች ሲገጥሙህ/ሽ/ በዝምታ /በትዕግስት/ ከማሳለፍ ይልቅ መጋፈጥን ትመርጣለህ /ትመርጫለሽ/?		

No. ቁጥር	Questions /ጥያቄዎች/	Yes አዎ	No አይደለም
22.	Do you like mixing with people? ከሰዎች ጋር መሆንን ትወዳለህ/ትወጂያለሽ/?		
23.	Do you call yourself happy and lucky? ራስህን/ሽን/ ደስተኛና ዕድለኛ አድርገህ/ሽ/ ትገምታለህ /ትገምቺያለሽ/?		
24.	Do you like working alone? ብቻህን/ሽን/ መሥራት ትጠላለህ/ትጠያለሽ/?		
25.	Can you easily get some life into a rather dull party? አሰልቺ የሆነን ፓርቲ/ድግስ/ በቀላሉ ሞቅ እንዲል ወይም ነፍስ እንዲዘራ ማድረግ ትችላለህ/ትችያለሽ/?		
26.	Do you like practical jokes? የዘወትር ቀለዳ ቀልዶች ያስደስቱሃል/ሻል/?		
27.	Do you sometimes laugh at a dirty joke? አንዳንድ ጊዜ የብልግና ቀልድ ያስቅሃል/ያስቅሻል/?		
28.	When you get annoyed do you need someone friendly to talk to about it? በጣም በምትጨነቅበት/ቂበት/ ጊዜ ስለጭንቀትህ/ሽ/ የምታዋየው /ይው/ ሰው/ንደኛ/ ትፈልጋለህ/ትፈልጊያለሽ/?		
29.	Wouldn't you be too shy to ask strangers to give you money for some good causes? አንድ ጥሩ ነገር ለማከናወን ፈልገህ/ሽ/ ገንዘብ ቢቸግርህ/ሽ/ ከማታውቃቸው/ቂያቸው/ ሰዎች መጠየቅ አያስፈራህም/ሽም/?		
30.	Would you rather go to a boring party than be at home on your own? ብቻህን/ሽን/ እቤት ከመሆን ይልቅ አሰልቺ ወደሆነ ፓርቲ /ድግስ/ መሄድን ትመርጣለህ/ጠያለሽ/?		

No. ቁጥር	Questions /ጥያቄዎች/	Yes አዎ	No አይደለም
31.	do you often make up your mind to do things suddenly? አብዛኛውን ጊዜ በነገሮች ላይ ቅፅበታዊ ርምጃ ለመውሰድ ትወስናለህ/ትወስኒያለሽ/?		
32.	Can you do things better by talking to others than by figuring them out alone? አብዛኛውን ጊዜ የተሻለ ነገር የምትሠራው/ሪው ብቻህን/ሽን ሆነህ/ሽ/ ከመተለም ይልቅ ሰዎችን መጠየቅ ስትችል/ስትችይ/ ነው?		
33.	When you make new friends do you usually make the first move? አዲስ ጓደኝነት በምትመሠርትበት/ችበት ጊዜ በመጀመሪያ የምትቀርበው/ቢው/ ወይም ለመቅረብ ግፊት የምታደርገው /ጊው/ አንተ/አንቺ/ ነህ/ነሽ/?		
34.	Don't you keep yourself to yourself except with very close friends? በጣም ከምትቀርባቸው/ቢያቸው/ ጓደኞችህ/ች/ ጋር ባይሆንም ከሰዎች ጋር መሆንህን/ሽን/ ትፈልገዋለህ/ጊዋለሽ/?		
35.	Do you usually say things quickly without stopping to think? አብዛኛውን ጊዜ የምትናገረው/ሪው/ በፍጥነትና ለማሰብ ጊዜ ሳትወስድ/ጂ/ ነው?		
36.	Do you often get into trouble because you do things without thinking first? ነገሮችን በሚገባ ሳታስብባቸው/ቢባቸው/ በመሥራትህ/ሽ/ አብዛኛውን ጊዜ አስቸጋሪ ሁኔታ ውስጥ ትገባለህ/ትገቢያለሽ/?		
37.	Do you like telling jokes or funny stories to your friends? ቀልዶችንና አስቂኝ ታሪኮችን ለጓደኞችህ/ሽ/ መንገር ትወዳለህ/ትወጂያለሽ/?		

No. ቁጥር	Questions /ጥያቄዎች/	Yes አዎ	No አይደለም
38.	When the odds are against you, do you still think it worth taking a chance? አጋጣሚዎች መጥፎ ሲሆኑብህ/ሽ/ የሆነው ይሁን ብሎ እርምጃ መውሰድ ይጠቅማል ብለህ/ሽ/ ታስባለህ/ታስቢያለሽ/?		
39.	Don't you like to plan things carefully before you do anything? ማንኛውንም ነገር ከመሥራትህ/ሽ/ በፊት ነገሮችን በጥንቃቄ ማቀድ አትወድም/አትወጂም/?		
40.	Aren't you shy of speaking first when you meet new people? ከአዳዲስ ሰዎች ጋር ስትገናኝ/ኚ የመጀመሪያው ተናጋሪ መሆን አያስፈራህም/ሽም/?		
41.	Don't you prefer to have few but special friends? ጥቂት ግን በጣም የሚቀርቡህ/ሽ/ ጓደኞች ቢኖርህ/ሽ/ አትመርጥም/ጪም/?		
42.	Are you ordinarily a carefree individual? ስለምንም ነገር የማትጨነቅና/ቂና/ ግድየለሽ ሰው ነህ/ነሽ/?		
43.	Do you sometimes boast a little? አንዳንድ ጊዜ ትንሽ ጉራ ትጨምራለህ/ሪያለሽ/?		
44.	Don't you often need understanding friends to cheer you up? ብዙውን ጊዜ ስትከፋ/ፊ/ ወይም ሲከፋህ/ሽ/ የሚያቀርቡህ/ሽ/ ሊረዱህ/ሽ/ የሚችሉ/ጓደኞትህ/ሽ/ እንዲያፀናኑህ/ሽ/ አትሻም/አትሺም/?		
45.	Often do you do things on the spur of the moment? ብዙውን ጊዜ ነገሮችን የምትሠራው/ሪው/ በችኮላና ከመቅፅበት ነው/?		

No. ቁጥር	Questions /ጥያቄዎች/	Yes አዎ	No አይደለም
46.	Don't you stop and think things over before doing anything? ማንኛውንም ነገር ከመሥራትህ/ሽ/ በፊት ቆም ብለህ/ሽ/ ስለነገሩ አታስብም/ቢም/?		
47.	Do you do almost anything for a dare? ማንኛውንም ነገር የምትሠራው/ሪው/ ፈታኝና አስቸጋሪ ሁኔታዎች ጋር መጋፈጥ ስለሚያስደስትህ/ሽ/ ነው?		
48.	Do you sometimes talk about things you know nothing about? አንዳንዴ ምንም ስለማታውቀው/ቂው ነገር ትናገራለህ/ሪያለሽ/ አስተያየት ትሰጣለህ/ትሰጪያለሽ?		

**A-2: Reliability Coefficient Analysis for Subjects'
(both in the Science Faculty and the College
of Social Sciences) EPI Scores**

Statistical Data

$$\begin{aligned}n &= 48 \quad (\text{the number of items in the inventory}) \\m &= 21.7 \quad (\text{the mean score on the inventory for all respondents}) \\SD &= 6.6 \quad (\text{the standard deviation of all the respondents' scores}) \\r_{kR21} &= (\text{Reliability on Kuder-Richardson formula}) \\&= \frac{n}{n-1} \left(1 - \frac{m(n-m)}{n(SD)^2} \right) \\&= \frac{48}{47} \left(1 - \frac{21.7(48-21.7)}{48(6.6)^2} \right) \\&= 1.02 \times 0.7 \\&= \underline{\underline{0.71}}\end{aligned}$$

A-3: Subjects' Sex, Age and EPI Scores of the Two Campuses

Subjects' Code	Sex	Age	EPI Scores	Subjects' Code	Sex	Age	EPI Scores
01	M	19	29	41	F	19	18
02	"	18	22	42	M	24	18
03	"	20	17	43	"	19	18
04	"	20	14	44	"	19	18
05	"	20	24	46	F	18	25
06	"	19	10	47	M	20	23
07	"	19	16	48	"	18	20
08	"	18	28	49	F	20	18
09	"	20	22	51	"	18	21
10	"	19	27	52	M	18	24
11	"	21	25	53	F	18	33
12	"	18	26	56	M	18	18
13	"	19	26	57	"	19	19
14	"	20	22	58	"	20	17
15	"	19	27	59	"	19	21
16	"	20	20	60	"	19	23
17	"	20	18	61	F	18	26
18	F	17	24	62	M	21	20
19	M	20	32	63	"	18	33
20	"	20	20	64	"	19	20
21	"	24	23	65	"	19	29
22	"	19	25	66	"	17	21
23	"	22	31	67	"	18	20
24	"	19	19	68	"	20	18
25	"	19	22	69	F	19	11
26	"	19	24	70	F	18	22
27	"	19	15	71	M	20	31
28	"	19	35	72	M	20	16
29	"	20	44	73	M	17	19
30	"	21	22	74	M	18	31
31	"	21	27	75	M	17	24
32	"	20	33	76	M	20	23
33	"	20	29	77	M	20	11
34	"	21	13	78	M	19	15
35	"	22	21	79	M	19	4
36	"	20	21	80	M	19	9
37	"	18	21	81	F	18	17

Subjects' Code	Sex	Age	EPI Scores	Subjects' Code	Sex	Age	EPI Scores
82	M	19	20	93	M	19	22
83	"	20	3	94	"	18	17
84	"	19	12	95	"	20	20
85	F	18	18	96	"	18	26
87	M	18	19	97	"	18	18
88	"	20	22	98	"	21	23
89	"	19	27	99	"	18	15
90	"	18	24	100	F	19	22
91	"	20	31	102	M	20	14
92	"	17	13	103	"	19	32

A- 4: Frequency Distribution for EPI Scores

EPI Scores (X)	Frequency (F)	EPI Scores (X)	Frequency (F)
44	1	20	8
35	1	19	4
33	3	18	9
32	2	17	4
31	4	16	2
29	3	15	3
28	2	14	2
27	4	13	2
26	4	12	1
25	3	11	2
24	6	10	1
23	5	9	1
22	9	4	1
21	6	3	1
Total			94

Median = $\frac{94}{2}$ th Score

= 47th and 48th scores

47th score = 22, and the 48th score = 21

Therefore: Median = $\frac{22+21}{2} = \frac{43}{2} = \underline{21.5}$

* Scores above 21.5 refer to 'Extroversion tendency'.

* Scores below 21.5 refer to 'Introversion tendency'.

**A-5: Introvert and Extrovert Subjects in the Two
Campuses**

College of Social Sciences						Science Faculty					
Introverts			Extroverts			Introverts			Extroverts		
Subjects	Sex	Age	Subjects	Sex	Age	Subjects	Sex	Age	Subjects	Sex	Age
03	M	20	01	M	19	57	M	19	60	M	19
04	"	20	02	"	18	58	"	20	61	F	18
06	"	19	05	"	20	59	"	19	63	M	18
07	"	19	08	"	18	62	"	21	65	"	19
16	"	20	09	"	20	64	"	19	68	"	20
17	"	20	10	"	19	66	"	17	70	F	18
20	"	20	11	"	21	67	"	18	71	M	20
24	"	19	12	"	18	69	F	19	74	"	18
27	"	19	13	"	19	72	M	20	75	"	17
34	"	21	14	"	20	73	"	17	76	"	20
35	"	22	15	"	19	77	"	20	88	"	20
36	"	20	18	F	17	78	"	19	89	"	19
37	"	18	19	M	20	79	"	19	90	"	18
41	F	19	21	"	24	80	"	19	91	"	20
42	M	24	22	"	19	81	F	18	93	"	19
43	"	19	23	"	22	82	M	19	96	"	18
44	"	19	25	"	19	83	"	20	98	"	21
48	"	18	26	"	19	84	"	19	100	F	19
49	F	20	28	"	19	85	F	18	103	M	19
51	"	18	29	"	20	87	M	18			
56	M	18	30	"	21	92	"	17			
			31	"	21	94	"	18			
			32	"	20	95	"	20			
			33	"	20	97	"	18			
			46	F	18	99	"	18			
			47	M	20	102	"	20			
			52	"	18						
			53	F	18						

A-6: t-test Analyses for Subjects' Age

(1) Between Introverts of the Two Campuses

The Statistical Data

College of Social Sciences

$$\begin{aligned} n_1 &= 21 \\ \bar{X}_1 &= 19.6 \\ SD_1 &= 1.4 \\ (SD_1)^2 &= 2 \end{aligned}$$

Science Faculty

$$\begin{aligned} n_2 &= 26 \\ \bar{X}_2 &= 18.8 \\ SD_2 &= 1.1 \\ (SD_2)^2 &= 1.2 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{19.6 - 18.8}{\sqrt{\frac{21(1.4)^2 + 26(1.1)^2}{21 + 26 - 2} \left(\frac{1}{21} + \frac{1}{26} \right)}} = \frac{0.8}{0.4} = \underline{2.00} \end{aligned}$$

(2) Between Extroverts of the Two Campuses

The Statistical Data

College of Social Sciences

$$\begin{aligned} n_1 &= 28 \\ \bar{X}_1 &= 19.5 \\ SD_1 &= 1.4 \\ (SD_1)^2 &= 2 \end{aligned}$$

Science Faculty

$$\begin{aligned} n_2 &= 19 \\ \bar{X}_2 &= 18.9 \\ SD_2 &= 1.0 \\ (SD_2)^2 &= 1.0 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{19.5 - 18.9}{\sqrt{\frac{28(1.4)^2 + 19(1.0)^2}{28 + 19 - 2} \left(\frac{1}{28} + \frac{1}{19} \right)}} = \frac{0.6}{0.5} = \underline{1.20} \end{aligned}$$

(3) Between All Subjects' Age

The Statistical Data

College of Social Sciences

$$\begin{aligned} n_1 &= 49 \\ \bar{X}_1 &= 19.5 \\ SD_1 &= 1.4 \\ (SD_1)^2 &= 2 \end{aligned}$$

Science Faculty

$$\begin{aligned} n_2 &= 45 \\ \bar{X}_2 &= 18.8 \\ SD_2 &= 1.0 \\ (SD_2)^2 &= 1.0 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{19.5 - 18.8}{\sqrt{\frac{49(1.4)^2 + 45(1.0)^2}{49 + 45 - 2} \left(\frac{1}{49} + \frac{1}{45} \right)}} = \frac{0.7}{0.3} = \underline{2.33} \end{aligned}$$

t-test Analyses for Subjects' Age by Sex

a) Science Faculty

(1) Between Male and Female Introverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 23 \\ \bar{X}_1 &= 18.9 \\ SD_1 &= 1.1 \\ (SD_1)^2 &= 1.2 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 18.3 \\ SD_2 &= 0.6 \\ (SD_2)^2 &= 0.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{18.9 - 18.3}{\sqrt{\frac{23(1.2) + 3(0.3)}{23 + 3 - 2} \left(\frac{1}{23} + \frac{1}{3} \right)}} = \frac{0.6}{0.6} = \underline{\underline{1.00}} \end{aligned}$$

(2) Between Male and Female Extroverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 16 \\ \bar{X}_1 &= 19.1 \\ SD_1 &= 1.0 \\ (SD_1)^2 &= 1.0 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 18.3 \\ SD_2 &= 0.6 \\ (SD_2)^2 &= 0.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{19.1 - 18.3}{\sqrt{\frac{16(1.0) + 3(0.3)}{16 + 3 - 2} \left(\frac{1}{16} + \frac{1}{3} \right)}} = \frac{0.8}{0.6} = \underline{\underline{1.33}} \end{aligned}$$

(3) Between Introvert and Extrovert Males

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 23 \\ \bar{X}_1 &= 18.9 \\ SD_1 &= 1.1 \\ (SD_1)^2 &= 1.2 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 16 \\ \bar{X}_2 &= 19.1 \\ SD_2 &= 1.0 \\ (SD_2)^2 &= 1.0 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{18.9 - 19.1}{\sqrt{\frac{23(1.2) + 16(1.0)}{23 + 16 - 2} \left(\frac{1}{23} + \frac{1}{16} \right)}} = \frac{-0.2}{0.4} = \underline{\underline{0.50}} \end{aligned}$$

(4) Between Introvert and Extrovert Females

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 3 \\ \bar{X}_1 &= 18.3 \\ SD_1 &= 0.6 \\ (SD_1)^2 &= 0.3 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 18.3 \\ SD_2 &= 0.6 \\ (SD_2)^2 &= 0.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{18.3 - 18.3}{\sqrt{\frac{3(0.3) + 3(0.3)}{3 + 3 - 2} \left(\frac{1}{3} + \frac{1}{3} \right)}} = \underline{\underline{0}} \end{aligned}$$

b) College of Social Sciences

(1) Between Male and Female Introverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 18 \\ \bar{X}_1 &= 19.7 \\ SD_1 &= 1.4 \\ (SD_1)^2 &= 2 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 19.0 \\ SD_2 &= 1.0 \\ (SD_2)^2 &= 1.0 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{19.7 - 19.0}{\sqrt{\frac{18(2) + 3(1.0)}{18 + 3 - 2} \left(\frac{1}{18} + \frac{1}{3} \right)}} = \frac{0.7}{0.9} = \underline{\underline{0.80}} \end{aligned}$$

(2) Between Male and Female Extroverts

Statistical Data

Male

$$\begin{aligned} n_1 &= 25 \\ \bar{X}_1 &= 19.7 \\ SD_1 &= 1.3 \\ (SD_1)^2 &= 1.8 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 17.7 \\ SD_2 &= 0.6 \\ (SD_2)^2 &= 0.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{19.7 - 17.7}{\sqrt{\frac{25(1.8) + 3(0.3)}{25 + 3 - 2} \left(\frac{1}{25} + \frac{1}{3} \right)}} = \frac{2.0}{0.8} = \underline{\underline{2.50}} \end{aligned}$$

(3) Between Introvert and Extrovert Males

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 18 \\ \bar{X}_1 &= 19.7 \\ SD_1 &= 1.4 \\ (SD_1)^2 &= 2.0 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 25 \\ \bar{X}_2 &= 19.7 \\ SD_2 &= 1.3 \\ (SD_2)^2 &= 1.8 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{19.7 - 19.7}{\sqrt{\frac{18(1.4)^2 + 25(1.3)^2}{18 + 25 - 2} \left(\frac{1}{18} + \frac{1}{25} \right)}} = \underline{\underline{0}} \end{aligned}$$

(4) Between Introvert and Extrovert Females

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 3 \\ \bar{X}_1 &= 19.0 \\ SD_1 &= 1.0 \\ (SD_1)^2 &= 1.0 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 17.7 \\ SD_2 &= 0.6 \\ (SD_2)^2 &= 0.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{19.0 - 17.7}{\sqrt{\frac{3(1.0)^2 + 3(0.3)^2}{3 + 3 - 2} \left(\frac{1}{3} + \frac{1}{3} \right)}} = \frac{1.3}{0.8} = \underline{\underline{1.90}} \end{aligned}$$

(c) The Two Campuses Combined

(1) Between Male Introverts in the Two Campuses

Statistical Data

Science Faculty

$$\begin{aligned} n_1 &= 23 \\ \bar{X}_1 &= 18.9 \\ SD_1 &= 1.1 \\ (SD_1)^2 &= 1.2 \end{aligned}$$

College of Social Sciences

$$\begin{aligned} n_2 &= 18 \\ \bar{X}_2 &= 19.7 \\ SD_2 &= 1.4 \\ (SD_2)^2 &= 2.0 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{18.9 - 19.7}{\sqrt{\frac{23(1.2)^2 + 18(2.0)^2}{23 + 18 - 2} \left(\frac{1}{23} + \frac{1}{18} \right)}} = \frac{-0.8}{0.3} = \underline{\underline{2.70}} \end{aligned}$$

(2) Between Female Introverts in the Two Campuses

Statistical Data

Science Faculty

College of Social Sciences

$$n_1 = 3$$

$$n_2 = 3$$

$$\bar{X}_1 = 18.3$$

$$\bar{X}_2 = 19$$

$$SD_1 = 0.6$$

$$SD_2 = 1.0$$

$$(SD_1)^2 = 0.3$$

$$(SD_2)^2 = 1.0$$

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

$$= \frac{18.3 - 19}{\sqrt{\frac{3(0.3) + 3(1.0)}{3 + 3 - 2} \left(\frac{1}{3} + \frac{1}{3} \right)}} = \frac{-0.7}{0.8} = \underline{\underline{0.90}}$$

(3) Between Male Extroverts in the Two Campuses

Statistical Data

Science Faculty

College of Social Sciences

$$n_1 = 16$$

$$n_2 = 25$$

$$\bar{X}_1 = 19.1$$

$$\bar{X}_2 = 19.7$$

$$SD_1 = 1.0$$

$$SD_2 = 1.3$$

$$(SD_1)^2 = 1.0$$

$$(SD_2)^2 = 1.7$$

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

$$= \frac{19.1 - 19.7}{\sqrt{\frac{16(1.0) + 25(1.7)}{16 + 25 - 2} \left(\frac{1}{16} + \frac{1}{25} \right)}} = \frac{-0.6}{0.4} = \underline{\underline{1.50}}$$

(4) Between Female Extrovert Subjects in the Two Campuses

Statistical Data

Science Faculty

College of Social Sciences

$$n_1 = 3$$

$$n_2 = 3$$

$$\bar{X}_1 = 18.3$$

$$\bar{X}_2 = 17.7$$

$$SD_1 = 0.6$$

$$SD_2 = 0.6$$

$$(SD_1)^2 = 0.3$$

$$(SD_2)^2 = 0.3$$

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

$$= \frac{18.3 - 17.7}{\sqrt{\frac{3(0.3) + 3(0.3)}{3 + 3 - 2} \left(\frac{1}{3} + \frac{1}{3} \right)}} = \frac{0.6}{0.6} = \underline{\underline{1.00}}$$

- (5) Between Male Introverts and Extroverts of the Two Campuses
Combined

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 41 \\ \bar{X}_1 &= 19.2 \\ SD_1 &= 1.3 \\ (SD_1)^2 &= 1.7 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 41 \\ \bar{X}_2 &= 19.5 \\ SD_2 &= 1.3 \\ (SD_2)^2 &= 1.7 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{19.2 - 19.5}{\sqrt{\frac{41(1.7) + 41(1.7)}{41 + 41 - 2} \left(\frac{1}{41} + \frac{1}{41} \right)}} = \frac{-0.3}{0.1} = \underline{\underline{3.00}} \end{aligned}$$

- (6) Between Female Introverts and Extroverts of the Two Campuses
Combined

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 6 \\ \bar{X}_1 &= 18.7 \\ SD_1 &= 0.8 \\ (SD_1)^2 &= 0.7 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 6 \\ \bar{X}_2 &= 18 \\ SD_2 &= 0.6 \\ (SD_2)^2 &= 0.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{18.7 - 18}{\sqrt{\frac{6(0.7) + 6(0.3)}{6 + 6 - 2} \left(\frac{1}{6} + \frac{1}{6} \right)}} = \frac{0.7}{0.5} = \underline{\underline{1.40}} \end{aligned}$$

- (7) Between Introvert Males and Females of the Two Campuses
Combined

Statistical Data

Males

$$\begin{aligned} n_1 &= 41 \\ \bar{X}_1 &= 19.2 \\ SD_1 &= 1.3 \\ (SD_1)^2 &= 1.7 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 6 \\ \bar{X}_2 &= 18.7 \\ SD_2 &= 0.8 \\ (SD_2)^2 &= 0.7 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{19.2 - 18.7}{\sqrt{\frac{(41)(1.7) + (6)(0.7)}{41 + 6 - 2} \left(\frac{1}{41} + \frac{1}{6} \right)}} = \frac{0.5}{0.6} = \underline{\underline{0.83}} \end{aligned}$$

- (8) Between Extrovert Males and Females of the Two Campuses Combined

Statistical Data

Males

$$\begin{aligned} n_1 &= 41 \\ \bar{X}_1 &= 19.5 \\ SD_1 &= 1.3 \\ (SD_1)^2 &= 1.7 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 6 \\ \bar{X}_2 &= 18 \\ SD_2 &= 0.6 \\ (SD_2)^2 &= 0.4 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{19.5 - 18}{\sqrt{\frac{41(1.7) + (6)(0.4)}{41 + 6 - 2} \left(\frac{1}{41} + \frac{1}{6} \right)}} = \frac{1.5}{0.6} = \underline{\underline{2.50}} \end{aligned}$$

APPENDIX-B

EFL PROFICIENCY TEST AND VARIOUS RELATED TABLES AND ANALYSES

B-1: EFL Proficiency Test

Name: _____

I.D. No. _____

Department/Faculty _____

Instructions

This test contains three parts. Attempt the first two parts by yourself. Part 3 (the dictation part) is to be completed as you listen to a text that will be read out by the instructor.

Part One: Reading Comprehension

Read the following passage and then answer the questions that follow according to the information in the passage.

Before America became independent, Britain used to send its criminals (or convicts) there to work. In the eighteenth century, laws were very severe and people went to prison for very small crimes. As a result of this, the prisons in Britain were full of people. One way of dealing with this problem was to send prisoners out of the country to America. This was called transportation. The newly independent USA, however, decided that it did not want to receive British convicts any more.

The British government therefore decided in 1786 that it would start a new colony in southeast Australia, or New South Wales as they called it. So, on May 13th 1787, a fleet of 11 ships left Britain to make a journey half way round the world. The ships arrived at Botany Bay on January 20th 1788. The journey had been very difficult. The fleet of ships sailed under the command of captain Arthur Phillip. On board there were 1,030 people and 736 of these were convicts. Their job was to make a colony from nothing. (Adopted from: /David Fall, Kenneth Cripwell, Teresa O'Brien, 1987. Time for English. Book 3.p.47).

Section A: Reading Comprehension

Answer the following questions according to the passage.

1. The most suitable title for the above text is:
- a) prisons in Britain c) independent USA
b) convicts d) The fleet

2. Why were the prisons in Britain full of people?

3. According to the writer what was called transportation?

4. Rearrange the following in the order they occur in the above text by writing A,B,C,D in the space given.

_____ The fleet of ships sailed under the command of Captain Arthur Phillip.

_____ The British government decided that it would start a new colony in South-east Australia, or New South Wales.

_____ The ships arrived at Botany Bay.

_____ A fleet of 11 ships left Britain to make journey half way round the world.

Section B: Reference Questions

Answer the following questions by referring to the text. Line numbers are given for easy reference.

5. What does "... its ..." in (para-1-line 2) refers to?

6. What does "... there ..." in (para-1-line 2) refers to?

7. What does "... this ..." in (para-1-line 4) refers to?

8. What does "... this ..." in (para-1-line 5) refers to?

9. What does "... This ..." in (para-1-line 6) refers to?

Say True, false or don't know according to the passage above.

____10. People began to live in Australia because the USA did not want British criminals in their country.

____11. It took the ships less than six months to travel from Britain to Australia.

____12. More than half the people on the first ships were convicts.

____13. A group of ships that sail together is called a fleet.

Section C: Vocabulary

Match each of the words in column "A" with the most appropriate choice from "B" to indicate its meaning as used in the passage. Write the letters of your choice in the spaces provided.

Column A

- _____14. Convict
_____15. Journey
_____16. sailed
_____17. board
_____18. dealing
_____19. severe
_____20. colony

Column B

- A. harsh
B. travel
C. territory
D. soldier
E. Criminal
F. flat piece of wood with squared edges
G. coping
H. began a voyage
I. addict

Part 2: Grammar

1. Fill in each blank space with the most appropriate word(s) /expression/ from the list given below. Give your answers in the spaces provided at the end of the passage. Note that a single word can be used more than once.

- | | |
|-----------|--------------|
| - but | - so they |
| - and | - suddenly |
| - he | - that night |
| - in 1775 | - they |
| - so | - they also |
| - for | - and |

___1___ British soldiers in Boston wanted to go to concord to take away the colonists' guns. ___2___ wanted to arrest two colonial leaders, Samuel Adams and John Hancock.

___3___ the colonists found out about the British plans. ___4___ had just one problem: they didn't know which way the British would come by land or by sea?

___5___ agreed on a signal, one light in a Boston watch tower, if the British were coming by land, two if they were coming by sea.

___6___ a colonist was watching the church tower. His horse was

ready. 7 he saw two lights in the church tower. 8 got on his horse and rode through the night. He told the colonists that the redcoats were coming by sea. 9 the American soldiers were ready to meet the British at a small village called Lexington. Someone fired a shot and the American war of Independence began. The American soldiers did not fight for long 10 when the British arrived in concord they couldn't find any guns, nor the two men.

- | | |
|----------|-----------|
| 1. _____ | 6. _____ |
| 2. _____ | 7. _____ |
| 3. _____ | 8. _____ |
| 4. _____ | 9. _____ |
| 5. _____ | 10. _____ |

2. Put the verbs in brackets in the following passage in their correct form. Write your answers in the spaces provided next to the passage.

ABORIGINES These (1)_____ (be) the people who (2)____ (live) in Australia for thousands of years. They probably (3)_____ (originate) in South East Asia and migrated across land which (4)_____ (be) now under water. They (5)_____ (live) by hunting. When the Europeans arrived, they (6)_____ (kill) many of the aborigines and many more died because they (7)_____ (catch) European illnesses. The population decreased but it is now increasing. The aborigines are not happy about their political position. They (8)_____ (want) their own services and schools. The situation is slowly (9)_____ (get) better. There are many different Aboriginal languages and many places names in Australia are Aboriginal. They also (10)_____ (have) their own religion. They believe that life started in the Dream time and they have many stories about this time.

(Adopted from: David Foll, Teresa O'Brien, Kenneth Cripwell, Book 3, 1987. Time for English p.49)

Part Three

Listening

Listen carefully to the passage for dictation. Write the missing word in each of the following phrases.

Chinese Weddings

the (1) _____ 's and (2) _____ 's mothers comb the wedding (3) _____ hair. The bride and groom serve tea to the (4) _____ 's parents, (5) _____ and (6) _____. Then After that they go to (7) _____ to take photographs. They ride in a car with (8) _____, (9) _____ and (10) _____ ribbons. In the evening, there is a big dinner. The women wear pink or gold dresses because those are (11) _____.

Malay Weddings

Malay weddings last (12) _____ in the city and (13) _____ in the country. On the first day, (14) _____ evening, the bride and groom. (15) _____ the marriage certificates the paper that means they are really married. On (16) _____ morning, the (17) _____ greets (18) _____ who throw (19) _____ over the bride and groom.... Guests get a (2) _____ which is filled with hard-boiled eggs to take home.

(Adopted from: Marc Helgesen, Steven Brown, Ruth Venning. 1991;65)

B-2: Reliability coefficient analysis for subjects' (both in the Science Faculty and the College of Social Sciences) Overall English Proficiency Test Scores

Step 1:- Statistical Data for Pearson coefficient correlation

'X' (scores on the odd-numbered items) 'Y' (scores on the even-numbered items)

N_x	=	94	N_y	=	94
$\sum X$	=	2002	$\sum Y$	=	1992
$(\sum X)^2$	=	4008004	$(\sum Y)^2$	=	3968064
$\sum X^2$	=	43984	$\sum Y^2$	=	43648

$$\sum XY = 43519$$

$$\begin{aligned}
 r'_{xy} &= \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}} \\
 &= \frac{94(43519) - (2002)(1992)}{\sqrt{[94(43984) - 4008004][94(43648) - 3968064]}} \\
 &= \frac{102802}{130613} = \underline{\underline{0.80}} \text{ (Pearson } r')
 \end{aligned}$$

Step 2:- Reliability analysis using the Spearman-Brown correction formula:

$$\begin{aligned}
 r_{xy} &= \frac{2r'_{xy}}{1+r'_{xy}} \quad (\text{Where: } r_{xy} = \text{reliability}) \\
 &= \frac{2(0.80)}{1+0.80} = \frac{1.60}{1.80} = \underline{\underline{0.90}} \quad (r'_{xy} = \text{Pearson } r)
 \end{aligned}$$

B-3: EFL Proficiency Test Scores for Subjects in the Science Faculty

Introverts						Extroverts					
Subjects' Code	Sex	Reading Scores	Grammar Scores	Listening Scores	Total Scores	Subjects' Code	Sex	Reading Scores	Grammar Scores	Listening Scores	Total Scores
57	M	14	13	13	40	60	M	14	9	16	39
58	"	15	13	14	42	61	F	13	12	18	43
59	"	17	12	16	45	63	M	15	15	19	49
62	"	9	7	10	26	65	"	15	18	20	53
64	"	19	12	20	51	68	"	15	13	19	47
66	"	18	17	20	55	70	F	18	14	20	52
67	"	17	15	20	52	71	M	17	18	20	55
69	F	12	9	18	39	74	"	16	12	18	46
72	M	18	16	17	51	75	"	17	17	19	53
73	"	16	7	16	39	76	"	14	11	12	37
77	"	15	13	17	45	88	"	16	14	19	49
78	"	17	4	11	32	89	"	16	14	14	44
79	"	17	11	15	43	90	"	17	9	16	42
80	"	15	6	16	37	91	"	18	15	18	51
81	F	17	9	20	46	93	"	18	12	18	48
82	M	16	17	14	47	96	"	12	14	18	44
83	"	17	15	11	43	98	"	14	13	19	46
84	"	18	17	13	48	100	F	15	12	14	41
85	F	16	13	14	43	103	M	15	11	13	39
87	M	12	11	13	36						
92	"	13	11	18	42						
94	"	11	3	13	27						
95	"	13	9	6	28						
97	"	17	16	19	52						
99	"	16	14	18	48						
102	"	17	14	15	46						

B.3.1 (i) t-test analyses for subjects' averages for all variables in the Science Faculty

a) EPI

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 26 \\ \bar{X}_1 &= 15.7 \\ SD_1 &= 4.9 \\ (SD_1)^2 &= 24.3 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 19 \\ \bar{X}_2 &= 26.2 \\ SD_2 &= 3.8 \\ (SD_2)^2 &= 15.0 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{15.7 - 26.2}{\sqrt{\frac{26(24.3) + (19)(15.0)}{26 + 19 - 2} \left(\frac{1}{26} + \frac{1}{19} \right)}} = \frac{-10.5}{1.3} = \underline{\underline{7.50}} \end{aligned}$$

b) Age

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 26 \\ \bar{X}_1 &= 18.8 \\ SD_1 &= 1.0 \\ (SD_1)^2 &= 1.1 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 19 \\ \bar{X}_2 &= 18.9 \\ SD_2 &= 1.0 \\ (SD_2)^2 &= 1.0 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{18.8 - 18.9}{\sqrt{\frac{26(1.1) + (19)(1.0)}{26 + 19 - 2} \left(\frac{1}{26} + \frac{1}{19} \right)}} = \frac{-0.1}{0.3} = \underline{\underline{0.25}} \end{aligned}$$

c) Reading

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 26 \\ \bar{X}_1 &= 15.5 \\ SD_1 &= 2.4 \\ (SD_1)^2 &= 5.9 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 19 \\ \bar{X}_2 &= 15.5 \\ SD_2 &= 1.7 \\ (SD_2)^2 &= 2.8 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{15.5 - 15.5}{\sqrt{\frac{26(5.9) + 19(2.8)}{26 + 19 - 2} \left(\frac{1}{26} + \frac{1}{19} \right)}} = \underline{\underline{0.00}} \end{aligned}$$

d) Grammar

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 26 \\ \bar{X}_1 &= 11.6 \\ SD_1 &= 3.9 \\ (SD_1)^2 &= 15.8 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 19 \\ \bar{X}_2 &= 13.3 \\ SD_2 &= 2.5 \\ (SD_2)^2 &= 6.6 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{11.6 - 13.3}{\sqrt{\frac{26(15.8) + 19(6.6)}{26 + 19 - 2} \left(\frac{1}{26} + \frac{1}{19} \right)}} = \frac{-1.7}{1.0} = \underline{\underline{1.70}} \end{aligned}$$

e) Listening

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 26 \\ \bar{X}_1 &= 15.3 \\ SD_1 &= 3.4 \\ (SD_1)^2 &= 11.9 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 19 \\ \bar{X}_2 &= 17.4 \\ SD_2 &= 2.4 \\ (SD_2)^2 &= 5.8 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{15.3 - 17.4}{\sqrt{\frac{26(11.9) + 19(5.8)}{26 + 19 - 2} \left(\frac{1}{26} + \frac{1}{19} \right)}} = \frac{-2.11}{0.9} = \underline{\underline{2.30}} \end{aligned}$$

f) Total Proficiency

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 26 \\ \bar{X}_1 &= 42.5 \\ SD_1 &= 7.7 \\ (SD_1)^2 &= 59.5 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 19 \\ \bar{X}_2 &= 46.2 \\ SD_2 &= 5.1 \\ (SD_2)^2 &= 26.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{42.5 - 46.2}{\sqrt{\frac{26(59.5) + 19(26.3)}{26 + 19 - 2} \left(\frac{1}{26} + \frac{1}{19} \right)}} = \frac{-3.7}{2.1} = \underline{\underline{1.80}} \end{aligned}$$

B-3-1: (ii) t-test analyses for subjects' averages for all variables in the Science Faculty by Sex

(a) For EPI

1. Introverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 23 \\ \bar{X}_1 &= 15.8 \\ SD_1 &= 5.0 \\ (SD_1)^2 &= 25.2 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 15.3 \\ SD_2 &= 3.8 \\ (SD_2)^2 &= 14.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{15.8 - 15.3}{\sqrt{\frac{23(25.2) + (3)(14.3)}{23 + 3 - 2} \left(\frac{1}{23} + \frac{1}{3} \right)}} = \frac{0.5}{3.0} = \underline{\underline{0.20}} \end{aligned}$$

2. Extroverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 16 \\ \bar{X}_1 &= 26.8 \\ SD_1 &= 3.8 \\ (SD_1)^2 &= 14.4 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 23.3 \\ SD_2 &= 2.3 \\ (SD_2)^2 &= 5.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{26.8 - 23.3}{\sqrt{\frac{(16)(14.4) + (3)(5.3)}{16 + 3 - 2} \left(\frac{1}{16} + \frac{1}{3} \right)}} = \frac{3.5}{2.4} = \underline{\underline{1.50}} \end{aligned}$$

3. Males

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 23 \\ \bar{X}_1 &= 15.8 \\ SD_1 &= 5.0 \\ (SD_1)^2 &= 25.2 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 16 \\ \bar{X}_2 &= 26.8 \\ SD_2 &= 3.8 \\ (SD_2)^2 &= 14.4 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{15.8 - 26.8}{\sqrt{\frac{(23)(25.2) + (16)(14.4)}{23 + 16 - 2} \left(\frac{1}{23} + \frac{1}{16} \right)}} = \frac{-11}{1.8} = \underline{\underline{6.11}} \end{aligned}$$

4. Females

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 3 \\ \bar{X}_1 &= 15.3 \\ SD_1 &= 3.8 \\ (SD_1)^2 &= 14.3 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 23.3 \\ SD_2 &= 2.3 \\ (SD_2)^2 &= 5.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{15.3 - 23.3}{\sqrt{\frac{(3)(14.3) + (3)(5.3)}{3 + 3 - 2} \left(\frac{1}{3} + \frac{1}{3} \right)}} = \frac{-8}{3} = \underline{\underline{2.70}} \end{aligned}$$

b) For Age

1. Introverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 23 \\ \bar{X}_1 &= 18.9 \\ SD_1 &= 1.1 \\ (SD_1)^2 &= 1.2 \end{aligned}$$

Extroverts

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 18.3 \\ SD_2 &= 0.6 \\ (SD_2)^2 &= 0.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{18.9 - 18.3}{\sqrt{\frac{(23)(1.2) + (3)(0.3)}{23 + 3 - 2} \left(\frac{1}{23} + \frac{1}{3} \right)}} = \frac{0.6}{0.6} = \underline{\underline{1.00}} \end{aligned}$$

2. Extroverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 16 \\ \bar{X}_1 &= 19.1 \\ SD_1 &= 1.0 \\ (SD_1)^2 &= 1.0 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 18.3 \\ SD_2 &= 0.6 \\ (SD_2)^2 &= 0.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{19.1 - 18.3}{\sqrt{\frac{(16)(1.0) + (3)(0.3)}{16 + 3 - 2} \left(\frac{1}{16} + \frac{1}{3} \right)}} = \frac{0.8}{0.6} = \underline{\underline{1.30}} \end{aligned}$$

3. Males

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 23 \\ \bar{X}_1 &= 18.9 \\ SD_1 &= 1.1 \\ (SD_1)^2 &= 1.2 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 16 \\ \bar{X}_2 &= 19.1 \\ SD_2 &= 1.0 \\ (SD_2)^2 &= 1.0 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{18.9 - 19.1}{\sqrt{\frac{(23)(1.2) + (16)(1.0)}{23 + 16 - 2} \left(\frac{1}{23} + \frac{1}{16} \right)}} = \frac{-0.2}{0.4} = \underline{\underline{0.50}} \end{aligned}$$

4. Females

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 3 \\ \bar{X}_1 &= 18.3 \\ SD_1 &= 0.6 \\ (SD_1)^2 &= 0.3 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 18.3 \\ SD_2 &= 0.6 \\ (SD_2)^2 &= 0.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{18.3 - 18.3}{\sqrt{\frac{(3)(0.3) + (3)(0.3)}{3 + 3 - 2} \left(\frac{1}{3} + \frac{1}{3} \right)}} = \underline{\underline{0.00}} \end{aligned}$$

c) For Reading

1. Introverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 23 \\ \bar{X}_1 &= 15.5 \\ SD_1 &= 2.4 \\ (SD_1)^2 &= 6.0 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 15.0 \\ SD_2 &= 2.6 \\ (SD_2)^2 &= 7.0 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{15.5 - 15.0}{\sqrt{\frac{(23)(6.0) + (3)(7.0)}{23 + 3 - 2} \left(\frac{1}{23} + \frac{1}{3} \right)}} = \frac{0.5}{1.5} = \underline{\underline{0.30}} \end{aligned}$$

2. Extroverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 16 \\ \bar{X}_1 &= 15.6 \\ SD_1 &= 1.6 \\ (SD_1)^2 &= 2.5 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 15.3 \\ SD_2 &= 2.5 \\ (SD_2)^2 &= 6.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{15.6 - 15.3}{\sqrt{\frac{(16)(2.5) + (3)(6.3)}{16 + 3 - 2} \left(\frac{1}{16} + \frac{1}{3} \right)}} = \frac{0.3}{1.2} = \underline{\underline{0.30}} \end{aligned}$$

3. Males

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 23 \\ \bar{X}_1 &= 15.5 \\ SD_1 &= 2.4 \\ (SD_1)^2 &= 6.0 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 16 \\ \bar{X}_2 &= 15.6 \\ SD_2 &= 1.6 \\ (SD_2)^2 &= 2.5 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{15.5 - 15.6}{\sqrt{\frac{(23)(6.0) + (16)(2.5)}{23 + 16 - 2} \left(\frac{1}{23} + \frac{1}{16} \right)}} = \frac{-0.1}{0.8} = \underline{\underline{0.12}} \end{aligned}$$

4. Females

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 3 \\ \bar{X}_1 &= 15.0 \\ SD_1 &= 2.6 \\ (SD_1)^2 &= 7.0 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 15.3 \\ SD_2 &= 2.5 \\ (SD_2)^2 &= 6.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{15.0 - 15.3}{\sqrt{\frac{(3)(7.0) + (3)(6.3)}{3 + 3 - 2} \left(\frac{1}{3} + \frac{1}{3} \right)}} = \frac{-0.3}{2.4} = \underline{\underline{0.12}} \end{aligned}$$

d) For Grammar

1. Introverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 23 \\ \bar{X}_1 &= 11.9 \\ SD_1 &= 4.1 \\ (SD_1)^2 &= 16.5 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 10.3 \\ SD_2 &= 2.3 \\ (SD_2)^2 &= 5.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{11.9 - 10.3}{\sqrt{\frac{(23)(16.5) + (3)(5.3)}{23 + 3 - 2} \left(\frac{1}{23} + \frac{1}{3} \right)}} = \frac{1.6}{2.4} = \underline{\underline{0.70}} \end{aligned}$$

2. Extroverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 16 \\ \bar{X}_1 &= 13.4 \\ SD_1 &= 2.7 \\ (SD_1)^2 &= 7.2 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 12.7 \\ SD_2 &= 1.2 \\ (SD_2)^2 &= 1.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{13.4 - 12.7}{\sqrt{\frac{(16)(7.2) + (3)(1.3)}{16 + 3 - 2} \left(\frac{1}{16} + \frac{1}{3} \right)}} = \frac{0.7}{1.7} = \underline{\underline{0.40}} \end{aligned}$$

3. Males

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 23 \\ \bar{X}_1 &= 11.9 \\ SD_1 &= 4.1 \\ (SD_1)^2 &= 16.5 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 16 \\ \bar{X}_2 &= 13.4 \\ SD_2 &= 2.7 \\ (SD_2)^2 &= 7.2 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{11.9 - 13.4}{\sqrt{\frac{(23)(16.5) + (16)(7.2)}{23 + 16 - 2} \left(\frac{1}{23} + \frac{1}{16} \right)}} = \frac{-1.5}{1.4} = \underline{\underline{-1.10}} \end{aligned}$$

4. Females

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 3 \\ \bar{X}_1 &= 10.3 \\ SD_1 &= 2.3 \\ (SD_1)^2 &= 5.3 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 12.7 \\ SD_2 &= 1.2 \\ (SD_2)^2 &= 1.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{10.3 - 12.7}{\sqrt{\frac{(3)(5.3) + (3)(1.3)}{3 + 3 - 2} \left(\frac{1}{3} + \frac{1}{3} \right)}} = \frac{-2.4}{1.7} = \underline{\underline{1.41}} \end{aligned}$$

e) For Listening

1. Introverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 23 \\ \bar{X}_1 &= 15.0 \\ SD_1 &= 3.5 \\ (SD_1)^2 &= 12 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 17.3 \\ SD_2 &= 3.1 \\ (SD_2)^2 &= 9.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{15.0 - 17.3}{\sqrt{\frac{(23)(12) + (3)(9.3)}{23 + 3 - 2} \left(\frac{1}{23} + \frac{1}{3} \right)}} = \frac{-2.3}{2.1} = \underline{\underline{0.10}} \end{aligned}$$

2. Extroverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 16 \\ \bar{X}_1 &= 17.4 \\ SD_1 &= 2.4 \\ (SD_1)^2 &= 5.7 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 17.3 \\ SD_2 &= 3.1 \\ (SD_2)^2 &= 9.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{17.4 - 17.3}{\sqrt{\frac{(16)(5.7) + (3)(9.3)}{16 + 3 - 2} \left(\frac{1}{16} + \frac{1}{3} \right)}} = \frac{0.1}{1.7} = \underline{\underline{1.00}} \end{aligned}$$

3. Males

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 23 \\ \bar{X}_1 &= 15.0 \\ SD_1 &= 3.5 \\ (SD_1)^2 &= 12 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 16 \\ \bar{X}_2 &= 17.4 \\ SD_2 &= 2.4 \\ (SD_2)^2 &= 5.7 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{15.0 - 17.4}{\sqrt{\frac{(23)(12) + (16)(5.7)}{23 + 16 - 2} \left(\frac{1}{23} + \frac{1}{16} \right)}} = \frac{-2.4}{1.2} = \underline{\underline{2.00}} \end{aligned}$$

4. Females

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 3 \\ \bar{X}_1 &= 17.3 \\ SD_1 &= 3.1 \\ (SD_1)^2 &= 9.3 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 17.3 \\ SD_2 &= 3.1 \\ (SD_2)^2 &= 9.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{17.3 - 17.3}{\sqrt{\frac{(3)(9.3) + (3)(9.3)}{3 + 3 - 2} \left(\frac{1}{3} + \frac{1}{3} \right)}} = \underline{\underline{0.00}} \end{aligned}$$

d) For Total Proficiency

1. Introverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 23 \\ \bar{X}_1 &= 42.4 \\ SD_1 &= 8.1 \\ (SD_1)^2 &= 66.2 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 42.7 \\ SD_2 &= 3.5 \\ (SD_2)^2 &= 12.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{42.4 - 42.7}{\sqrt{\frac{(23)(66.2) + (3)(12.3)}{23 + 3 - 2} \left(\frac{1}{23} + \frac{1}{3} \right)}} = \frac{-0.3}{1.7} = \underline{\underline{0.10}} \end{aligned}$$

2. Extroverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 16 \\ \bar{X}_1 &= 46.4 \\ SD_1 &= 5.2 \\ (SD_1)^2 &= 26.7 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 45.3 \\ SD_2 &= 5.9 \\ (SD_2)^2 &= 34.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{46.4 - 45.3}{\sqrt{\frac{(16)(26.7) + (3)(34.3)}{16 + 3 - 2} \left(\frac{1}{16} + \frac{1}{3} \right)}} = \frac{1.1}{3.5} = \underline{\underline{0.30}} \end{aligned}$$

3. Males

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 23 \\ \bar{X}_1 &= 42.4 \\ SD_1 &= 8.1 \\ (SD_1)^2 &= 66.2 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 16 \\ \bar{X}_2 &= 46.4 \\ SD_2 &= 5.2 \\ (SD_2)^2 &= 26.7 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{42.4 - 46.4}{\sqrt{\frac{(23)(66.2) + (16)(26.7)}{23 + 16 - 2} \left(\frac{1}{23} + \frac{1}{16} \right)}} = \frac{-4.0}{2.7} = \underline{\underline{1.50}} \end{aligned}$$

4. Females

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 3 \\ \bar{X}_1 &= 42.7 \\ SD_1 &= 3.5 \\ (SD_1)^2 &= 12.3 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 45.3 \\ SD_2 &= 5.9 \\ (SD_2)^2 &= 34.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{42.7 - 45.3}{\sqrt{\frac{(3)(12.3) + (3)(34.3)}{3 + 3 - 2} \left(\frac{1}{3} + \frac{1}{3} \right)}} = \frac{-2.6}{4.6} = \underline{\underline{0.60}} \end{aligned}$$

B.3.2 Pearson Product-Moment correlation coefficient analyses for subjects in the Science Faculty.

Table 1: Introversion and Age

Subjects' Code	EPI Scores (X)	Age (Y)	XY
57	19	19	361
58	17	20	340
59	21	19	399
62	20	21	420
64	20	19	380
66	21	17	357
67	20	18	360
69	11	19	209
72	16	20	320
73	19	17	323
77	11	20	220
78	15	19	285
79	4	19	76
80	9	19	171
81	17	18	306
82	20	19	380
83	3	20	60
84	12	19	228
85	18	18	324
87	19	18	342
92	13	17	221
94	17	18	306
95	20	20	400
97	18	18	324
99	15	18	270
102	14	20	280

Statistical Data

<u>EPI (X)</u>	<u>Age (Y)</u>
N = 26	N = 26
$\Sigma X = 409$	$\Sigma Y = 489$
$(\Sigma X)^2 = 167281$	$(\Sigma Y)^2 = 239121$
$\Sigma X^2 = 7043$	$\Sigma Y^2 = 9225$

$$\Sigma XY = 7662$$

$$\begin{aligned}
 r_{xy} &= \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}} \\
 &= \frac{26(7662) - (409)(489)}{\sqrt{[26(7043) - 167281][26(9225) - 239121]}} \\
 &= \frac{-789}{3397.82} = \underline{\underline{-.23}}
 \end{aligned}$$

Table 2: Introversion and Reading

Subjects' Code	EPI Scores (X)	Reading Scores (Y)	XY
57	19	14	266
58	17	15	255
59	21	17	357
62	20	9	180
64	20	19	380
66	21	18	378
67	20	17	340
69	11	12	132
72	16	18	288
73	19	16	304
77	11	15	165
78	15	17	255
79	4	17	68
80	9	15	135
81	17	17	289
82	20	16	320
83	3	17	51
84	12	18	216
85	18	16	288
87	19	12	228
92	13	13	169
94	17	11	187
95	20	13	260
97	18	17	306
99	15	16	240
102	14	17	238

Statistical Data

<u>EPI (X)</u>	<u>Reading (Y)</u>
N = 26	N = 26
$\Sigma X = 409$	$\Sigma Y = 402$
$(\Sigma X)^2 = 167281$	$(\Sigma Y)^2 = 161604$
$\Sigma X^2 = 7043$	$\Sigma Y^2 = 6368$

$$\Sigma XY = 6295$$

$$\begin{aligned}
 r_{XY} &= \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}} \\
 &= \frac{26(6295) - (409)(402)}{\sqrt{[26(7043) - 167281][26(6368) - 161604]}} \\
 &= \frac{-748}{7923.2} = \underline{\underline{-.10}}
 \end{aligned}$$

Table 3: Introversion and Grammar

Subjects' Code	EPI Scores (X)	Grammar Scores (Y)	XY
57	19	13	247
58	17	13	221
59	21	12	252
62	20	7	140
64	20	12	240
66	21	17	357
67	20	15	300
69	11	9	99
72	16	16	256
73	19	7	133
77	11	13	143
78	15	4	60
79	4	11	44
80	9	6	54
81	17	9	153
82	20	17	340
83	3	15	45
84	12	17	204
85	18	13	234
87	19	11	209
92	13	11	143
94	17	3	51
95	20	9	180
97	18	16	288
99	15	14	210
102	14	14	196

Statistical Data

<u>EPI (X)</u>	<u>Grammar (Y)</u>
N = 26	N = 26
$\Sigma X = 409$	$\Sigma Y = 304$
$(\Sigma X)^2 = 167281$	$(\Sigma Y)^2 = 92416$
$\Sigma X^2 = 7043$	$\Sigma Y^2 = 3950$

$$\Sigma XY = 4799$$

$$\begin{aligned}
 r_{xy} &= \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}} \\
 &= \frac{26(4799) - (409)(304)}{\sqrt{[26(7043) - 167281][26(3950) - 92416]}} \\
 &= \frac{438}{12761.9} = \underline{\underline{0.03}}
 \end{aligned}$$

Table 4: Introversion and Listening

Subjects' Code	EPI Scores (X)	Listening Scores (Y)	XY
57	19	13	247
58	17	14	238
59	21	16	336
62	20	10	200
64	20	20	400
66	21	20	420
67	20	20	400
69	11	18	198
72	16	17	272
73	19	16	304
77	11	17	187
78	15	11	165
79	4	15	60
80	9	16	144
81	17	20	340
82	20	14	280
83	3	11	33
84	12	13	156
85	18	14	252
87	19	13	247
92	13	18	234
94	17	13	221
95	20	6	120
97	18	19	342
99	15	18	270
102	14	15	210

Statistical Data

<u>EPI (X)</u>		<u>Listening (Y)</u>	
N	= 26	N	= 26
ΣX	= 409	ΣY	= 397
$(\Sigma X)^2$	= 167281	$(\Sigma Y)^2$	= 157609
ΣX^2	= 7043	ΣY^2	= 6371

$$\Sigma XY = 6276$$

$$\begin{aligned}
 r_{xy} &= \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}} \\
 &= \frac{26(6276) - (409)(397)}{\sqrt{[26(7043) - 167281][26(6371) - 157609]}} \\
 &= \frac{803}{11281.9} = \underline{\underline{0.10}}
 \end{aligned}$$

Table 5: Introversion and Total Proficiency Scores

Subjects' Code	EPI Scores (X)	Total Proficiency Scores (Y)	XY
57	19	40	760
58	17	42	714
59	21	45	945
62	20	26	520
64	20	51	1020
66	21	55	1155
67	20	52	1040
69	11	39	429
72	16	51	816
73	19	39	741
77	11	45	495
78	15	32	480
79	4	43	172
80	9	37	333
81	17	46	782
82	20	48	960
83	3	43	129
84	12	48	576
85	18	43	774
87	19	36	684
92	13	42	546
94	17	27	459
95	20	28	560
97	18	52	936
99	15	48	720
102	14	46	644

Statistical Data

EPI (X) Total Proficiency Scores (Y)

N = 26 N = 26
 ΣX = 409 ΣY = 1104
 $(\Sigma X)^2$ = 167281 $(\Sigma Y)^2$ = 1218816
 ΣX^2 = 7043 ΣY^2 = 48424

ΣXY = 17390

$$r_{xy} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}}$$

$$= \frac{26(17390) - (409)(1104)}{\sqrt{[26(7043) - 167281][26(48424) - 1218816]}}$$

$$= \frac{604}{25234.4} = \underline{\underline{0.00}}$$

Table 6: Extroversion and Age

Subjects' Code	EPI Scores (X)	Age (Y)	XY
60	23	19	437
61	26	18	468
63	33	18	594
65	29	19	551
68	28	20	560
70	22	18	396
71	31	20	620
74	31	18	558
75	24	17	408
76	23	20	460
88	22	20	440
89	27	19	513
90	24	18	432
91	31	20	620
93	22	19	418
96	26	18	468
98	23	21	483
100	22	19	418
103	32	19	608

Statistical Data

<u>EPI (X)</u>	<u>Age (Y)</u>
N = 19	N = 19
$\Sigma X = 499$	$\Sigma Y = 360$
$(\Sigma X)^2 = 249001$	$(\Sigma Y)^2 = 129600$
$\Sigma X^2 = 13377$	$\Sigma Y^2 = 6840$

$$\Sigma XY = 9452$$

$$r_{xy} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}}$$

$$= \frac{19(9452) - (499)(360)}{\sqrt{[19(13377) - 249001][19(6840) - 129600]}}$$

$$= \frac{-52}{1363.2} = \underline{\underline{-.04}}$$

Table 7: Extroversion and Reading

Subjects' Code	EPI Scores (X)	Reading Scores (Y)	XY
60	23	14	322
61	26	13	338
63	33	15	495
65	29	15	435
68	28	15	420
70	22	18	396
71	31	17	527
74	31	16	496
75	24	17	408
76	23	14	322
88	22	16	352
89	27	16	432
90	24	17	408
91	31	18	558
93	22	18	396
96	26	12	312
98	23	14	322
100	22	15	330
103	32	15	480

Statistical Data

EPI (X) Reading Score (Y)

N = 19

N = 19

ΣX = 499

ΣY = 295

$(\Sigma X)^2 = 249001$

$(\Sigma Y)^2 = 87025$

ΣX^2 = 13377

ΣY^2 = 4633

$\Sigma XY = 7749$

$$\begin{aligned}
 r_{XY} &= \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}} \\
 &= \frac{19(7749) - (499)(295)}{\sqrt{[19(13377) - 249001][19(4633) - 87025]}} \\
 &= \frac{26}{2274.3} = \underline{0.01}
 \end{aligned}$$

Table 8: Extroversion and Grammar

Subjects' Code	EPI Scores (X)	Grammar Scores (Y)	XY
60	23	9	207
61	26	12	312
63	33	15	495
65	29	18	522
68	28	13	364
70	22	14	308
71	31	18	558
74	31	12	372
75	24	17	408
76	23	11	253
88	22	14	308
89	27	14	378
90	24	9	216
91	31	15	465
93	22	12	264
96	26	14	364
98	23	13	299
100	22	12	264
103	32	11	352

Statistical Data

EPI (X) Grammar Score (Y)

N = 19 N = 19

$\Sigma X = 499$ $\Sigma Y = 253$

$(\Sigma X)^2 = 249001$ $(\Sigma Y)^2 = 64009$

$\Sigma X^2 = 13377$ $\Sigma Y^2 = 3489$

$\Sigma XY = 6709$

$$r_{xy} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}}$$

$$= \frac{19(6709) - (499)(253)}{\sqrt{[19(13377) - 249001][19(3489) - 64009]}}$$

$$= \frac{1224}{3432.1} = \underline{\underline{0.35}}$$

Table 9: Extroversion and Listening

Subjects' Code	EPI Scores (X)	Listening Scores (Y)	XY
60	23	16	368
61	26	18	468
63	33	19	627
65	29	20	580
68	28	19	532
70	22	20	440
71	31	20	620
74	31	18	558
75	24	19	456
76	23	12	276
88	22	19	418
89	27	14	378
90	24	16	384
91	31	18	558
93	22	18	396
96	26	18	468
98	23	19	437
100	22	14	308
103	32	13	416

Statistical Data

<u>EPI (X)</u>	<u>Listening (Y)</u>
N = 19	N = 19
$\Sigma X = 499$	$\Sigma Y = 330$
$(\Sigma X)^2 = 249001$	$(\Sigma Y)^2 = 108900$
$\Sigma X^2 = 13377$	$\Sigma Y^2 = 5842$

$$\Sigma XY = 8688$$

$$r_{XY} = \frac{N \Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N \Sigma X^2 - (\Sigma X)^2][N \Sigma Y^2 - (\Sigma Y)^2]}}$$

$$= \frac{19(8688) - (499)(330)}{\sqrt{[19(13377) - 249001][19(5842) - 108900]}}$$

$$= \frac{402}{3290.9} = \underline{\underline{0.12}}$$

Table 10: Extroversion and Total Proficiency Scores

Subjects' Code	EPI Scores (X)	Total Proficiency Scores (Y)	XY
60	23	39	897
61	26	43	1118
63	33	49	1617
65	29	53	1537
68	28	47	1316
70	22	52	1144
71	31	55	1705
74	31	46	1426
75	24	53	1272
76	23	37	851
88	22	49	1078
89	27	44	1188
90	24	42	1008
91	31	51	1581
93	22	48	1056
96	26	44	1144
98	23	46	1058
100	22	41	902
103	32	39	1248

Statistical Data

EPI (X) Total Proficiency Score (Y)

N = 19

N = 19

$\Sigma X = 499$

$\Sigma Y = 878$

$(\Sigma X)^2 = 249001$

$(\Sigma Y)^2 = 770884$

$\Sigma X^2 = 13377$

$\Sigma Y^2 = 41072$

$\Sigma XY = 23146$

$$r_{xy} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}}$$

$$= \frac{19(23146) - (499)(878)}{\sqrt{[19(13377) - 249001][19(41072) - 770884]}}$$

$$= \frac{1652}{6996.9} = \underline{\underline{0.23}}$$

**B-4 EFL Proficiency test scores for subjects in the
College of Social Sciences**

Table 1: Introverts

Subjects' Code	Sex	Reading Scores	Grammar Scores	Listening Scores	Total Proficiency Scores
03	M	19	10	20	49
04	"	13	11	16	40
06	"	17	10	18	45
07	"	18	13	17	48
16	"	17	12	8	37
17	"	14	18	18	50
20	"	14	12	12	38
24	"	10	8	16	34
27	"	12	7	18	37
34	"	12	10	18	40
35	"	14	13	14	41
36	"	10	9	17	36
37	"	14	8	14	36
41	F	9	4	6	19
42	M	14	11	15	40
43	"	14	9	12	35
44	"	16	9	15	40
48	"	15	10	15	40
49	F	8	7	16	31
51	F	15	7	16	38
56	M	17	12	14	43

Table 2: Extroverts

Subjects' Code	Sex	Reading Scores	Grammar Scores	Listening Scores	Total Proficiency Scores
01	M	17	15	15	47
02	"	15	18	13	46
05	"	14	10	19	43
08	"	16	17	19	52
09	"	18	15	20	53
10	"	14	15	20	49
11	"	18	11	15	44
12	"	18	16	15	49
13	"	18	9	16	43
14	"	16	18	15	49
15	"	16	10	10	36
18	F	13	19	20	52
19	M	19	10	15	44
21	"	14	11	17	42
22	"	12	18	20	50
23	"	14	11	14	39
25	"	10	6	16	32
26	"	10	6	14	30
28	"	12	9	19	40
29	"	11	9	19	39
30	"	13	10	8	31
31	"	10	11	10	31
32	"	13	6	14	33
33	"	13	10	15	38
46	F	17	14	19	50
47	M	17	18	13	48
52	M	18	17	16	51
53	F	16	15	19	50

B-4.1 (i) t-test analyses for subjects' averages for all variables in the College of Social Sciences

a) EPI

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 21 \\ \bar{X}_1 &= 17.8 \\ SD_1 &= 2.8 \\ (SD_1)^2 &= 8.4 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 28 \\ \bar{X}_2 &= 26.9 \\ SD_2 &= 5.0 \\ (SD_2)^2 &= 25.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{17.8 - 26.9}{\sqrt{\frac{(21)(8.4) + (28)(25.3)}{21 + 28 - 2} \left(\frac{1}{21} + \frac{1}{28} \right)}} = \frac{-9.1}{1.3} = \underline{\underline{7.00}} \end{aligned}$$

b) Age

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 21 \\ \bar{X}_1 &= 19.6 \\ SD_1 &= 1.4 \\ (SD_1)^2 &= 2.0 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 28 \\ \bar{X}_2 &= 19.5 \\ SD_2 &= 1.4 \\ (SD_2)^2 &= 2.1 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{19.6 - 19.5}{\sqrt{\frac{(21)(2.0) + (28)(2.1)}{21 + 28 - 2} \left(\frac{1}{21} + \frac{1}{28} \right)}} = \frac{0.1}{0.4} = \underline{\underline{0.25}} \end{aligned}$$

c) Reading

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 21 \\ \bar{X}_1 &= 13.9 \\ SD_1 &= 2.9 \\ (SD_1)^2 &= 8.4 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 28 \\ \bar{X}_2 &= 14.7 \\ SD_2 &= 2.7 \\ (SD_2)^2 &= 7.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{13.9 - 14.7}{\sqrt{\frac{(21)(8.4) + (28)(7.3)}{21 + 28 - 2} \left(\frac{1}{21} + \frac{1}{28} \right)}} = \frac{-0.8}{0.9} = \underline{\underline{0.88}} \end{aligned}$$

- d) Grammar
Statistical Data

Introverts

$$\begin{aligned} n_1 &= 21 \\ \bar{X}_1 &= 10.0 \\ SD_1 &= 2.9 \\ (SD_1)^2 &= 8.5 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 28 \\ \bar{X}_2 &= 12.6 \\ SD_2 &= 4.0 \\ (SD_2)^2 &= 15.9 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{10.0 - 12.6}{\sqrt{\frac{(21)(8.5) + (28)(15.9)}{21 + 28 - 2} \left(\frac{1}{21} + \frac{1}{28} \right)}} = \frac{-2.6}{1.1} = \underline{\underline{2.36}} \end{aligned}$$

- e) Listening
Statistical Data

Introverts

$$\begin{aligned} n_1 &= 21 \\ \bar{X}_1 &= 15.0 \\ SD_1 &= 3.3 \\ (SD_1)^2 &= 10.7 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 28 \\ \bar{X}_2 &= 15.9 \\ SD_2 &= 3.2 \\ (SD_2)^2 &= 10.4 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{15.0 - 15.9}{\sqrt{\frac{(21)(10.7) + (28)(10.4)}{21 + 28 - 2} \left(\frac{1}{21} + \frac{1}{28} \right)}} = \frac{-0.9}{1.0} = \underline{\underline{0.90}} \end{aligned}$$

- f) Total Proficiency
Statistical Data

Introverts

$$\begin{aligned} n_1 &= 21 \\ \bar{X}_1 &= 38.7 \\ SD_1 &= 6.8 \\ (SD_1)^2 &= 46.5 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 28 \\ \bar{X}_2 &= 42.8 \\ SD_2 &= 7.0 \\ (SD_2)^2 &= 49.4 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{38.7 - 42.8}{\sqrt{\frac{(21)(46.5) + (28)(49.4)}{21 + 28 - 2} \left(\frac{1}{21} + \frac{1}{28} \right)}} = \frac{-4.1}{2.1} = \underline{\underline{1.95}} \end{aligned}$$

B-4.1 (ii) t-test analyses for subjects' averages for all variables in the College of Social Sciences by Sex

a) EPI

1. Introverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 18 \\ \bar{X}_1 &= 17.6 \\ SD_1 &= 2.9 \\ (SD_1)^2 &= 8.4 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 19.0 \\ SD_2 &= 1.7 \\ (SD_2)^2 &= 2.9 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{17.6 - 19.0}{\sqrt{\frac{(18)(8.4) + (3)(2.9)}{18 + 3 - 2} \left(\frac{1}{18} + \frac{1}{3} \right)}} = \frac{-1.4}{1.8} = \underline{\underline{0.80}} \end{aligned}$$

2. Extroverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 25 \\ \bar{X}_1 &= 26.9 \\ SD_1 &= 5.0 \\ (SD_1)^2 &= 25.3 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 27.3 \\ SD_2 &= 4.9 \\ (SD_2)^2 &= 24.0 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{26.9 - 27.3}{\sqrt{\frac{(25)(25.3) + (3)(24.0)}{25 + 3 - 2} \left(\frac{1}{25} + \frac{1}{3} \right)}} = \frac{-0.4}{3.2} = \underline{\underline{0.12}} \end{aligned}$$

3. Males

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 18 \\ \bar{X}_1 &= 17.6 \\ SD_1 &= 2.9 \\ (SD_1)^2 &= 8.4 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 25 \\ \bar{X}_2 &= 26.9 \\ SD_2 &= 5.0 \\ (SD_2)^2 &= 25.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{17.6 - 26.9}{\sqrt{\frac{(18)(8.4) + (25)(25.3)}{18 + 25 - 2} \left(\frac{1}{18} + \frac{1}{25} \right)}} = \frac{-9.3}{1.3} = \underline{\underline{7.15}} \end{aligned}$$

4. Females

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 3 \\ \bar{X}_1 &= 19.0 \\ SD_1 &= 1.7 \\ (SD_1)^2 &= 2.90 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 27.3 \\ SD_2 &= 4.9 \\ (SD_2)^2 &= 24.0 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{19.0 - 27.3}{\sqrt{\frac{(3)(2.90) + (3)(24.0)}{3 + 3 - 2} \left(\frac{1}{3} + \frac{1}{3} \right)}} = \frac{-8.3}{3.6} = \underline{\underline{2.30}} \end{aligned}$$

b) For Age

1. Introverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 18 \\ \bar{X}_1 &= 19.7 \\ SD_1 &= 1.4 \\ (SD_1)^2 &= 2.4 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 19.0 \\ SD_2 &= 1.0 \\ (SD_2)^2 &= 1.0 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{19.7 - 19.0}{\sqrt{\frac{(18)(2.4) + (3)(1.0)}{18 + 3 - 2} \left(\frac{1}{18} + \frac{1}{3} \right)}} = \frac{0.7}{0.9} = \underline{\underline{0.77}} \end{aligned}$$

2. Extroverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 25 \\ \bar{X}_1 &= 19.7 \\ SD_1 &= 1.3 \\ (SD_1)^2 &= 1.8 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 17.7 \\ SD_2 &= 0.6 \\ (SD_2)^2 &= 0.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{19.7 - 17.7}{\sqrt{\frac{(25)(1.8) + (3)(0.3)}{25 + 3 - 2} \left(\frac{1}{25} + \frac{1}{3} \right)}} = \frac{2.0}{0.8} = \underline{\underline{2.50}} \end{aligned}$$

3. Males

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 18 \\ \bar{X}_1 &= 19.7 \\ SD_1 &= 1.4 \\ (SD_1)^2 &= 2.4 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 25 \\ \bar{X}_2 &= 19.7 \\ SD_2 &= 1.3 \\ (SD_2)^2 &= 1.8 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{19.7 - 19.7}{\sqrt{\frac{(18)(2.4) + (25)(1.8)}{18 + 25 - 2} \left(\frac{1}{18} + \frac{1}{25} \right)}} = \underline{\underline{0.00}} \end{aligned}$$

4. Females

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 3 \\ \bar{X}_1 &= 19.0 \\ SD_1 &= 1.0 \\ (SD_1)^2 &= 1.0 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 17.7 \\ SD_2 &= 0.6 \\ (SD_2)^2 &= 0.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{19.0 - 17.7}{\sqrt{\frac{(3)(1.0) + (3)(0.3)}{3 + 3 - 2} \left(\frac{1}{3} + \frac{1}{3} \right)}} = \frac{1.3}{0.8} = \underline{\underline{1.62}} \end{aligned}$$

c) For Reading

1. Introverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 18 \\ \bar{X}_1 &= 14.4 \\ SD_1 &= 2.5 \\ (SD_1)^2 &= 6.1 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 10.7 \\ SD_2 &= 3.8 \\ (SD_2)^2 &= 14.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{14.4 - 10.7}{\sqrt{\frac{(18)(6.1) + (3)(14.3)}{18 + 3 - 2} \left(\frac{1}{18} + \frac{1}{3} \right)}} = \frac{3.7}{1.7} = \underline{\underline{2.17}} \end{aligned}$$

2. Extroverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 25 \\ \bar{X}_1 &= 14.6 \\ SD_1 &= 2.8 \\ (SD_1)^2 &= 7.8 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 15.3 \\ SD_2 &= 2.1 \\ (SD_2)^2 &= 4.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{14.6 - 15.3}{\sqrt{\frac{(25)(7.8) + (3)(4.3)}{25 + 3 - 2} \left(\frac{1}{25} + \frac{1}{3} \right)}} = \frac{-0.7}{1.7} = \underline{\underline{0.41}} \end{aligned}$$

3. Males

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 18 \\ \bar{X}_1 &= 14.4 \\ SD_1 &= 2.5 \\ (SD_1)^2 &= 6.1 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 25 \\ \bar{X}_2 &= 14.6 \\ SD_2 &= 2.8 \\ (SD_2)^2 &= 7.8 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{14.4 - 14.6}{\sqrt{\frac{(18)(6.1) + (25)(7.8)}{18 + 25 - 2} \left(\frac{1}{18} + \frac{1}{25} \right)}} = \frac{-0.2}{0.8} = \underline{\underline{0.25}} \end{aligned}$$

4. Females

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 3 \\ \bar{X}_1 &= 10.7 \\ SD_1 &= 3.8 \\ (SD_1)^2 &= 14.3 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 15.3 \\ SD_2 &= 2.1 \\ (SD_2)^2 &= 4.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{10.7 - 15.3}{\sqrt{\frac{(3)(14.3) + (3)(4.3)}{3 + 3 - 2} \left(\frac{1}{3} + \frac{1}{3} \right)}} = \frac{-4.6}{3.0} = \underline{\underline{1.53}} \end{aligned}$$

2. Extroverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 25 \\ \bar{X}_1 &= 14.6 \\ SD_1 &= 2.8 \\ (SD_1)^2 &= 7.8 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 15.3 \\ SD_2 &= 2.1 \\ (SD_2)^2 &= 4.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{14.6 - 15.3}{\sqrt{\frac{(25)(7.8) + (3)(4.3)}{25 + 3 - 2} \left(\frac{1}{25} + \frac{1}{3} \right)}} = \frac{-0.7}{1.7} = \underline{\underline{0.41}} \end{aligned}$$

3. Males

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 18 \\ \bar{X}_1 &= 14.4 \\ SD_1 &= 2.5 \\ (SD_1)^2 &= 6.1 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 25 \\ \bar{X}_2 &= 14.6 \\ SD_2 &= 2.8 \\ (SD_2)^2 &= 7.8 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{14.4 - 14.6}{\sqrt{\frac{(18)(6.1) + (25)(7.8)}{18 + 25 - 2} \left(\frac{1}{18} + \frac{1}{25} \right)}} = \frac{-0.2}{0.8} = \underline{\underline{0.25}} \end{aligned}$$

4. Females

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 3 \\ \bar{X}_1 &= 10.7 \\ SD_1 &= 3.8 \\ (SD_1)^2 &= 14.3 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 15.3 \\ SD_2 &= 2.1 \\ (SD_2)^2 &= 4.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{10.7 - 15.3}{\sqrt{\frac{(3)(14.3) + (3)(4.3)}{3 + 3 - 2} \left(\frac{1}{3} + \frac{1}{3} \right)}} = \frac{-4.6}{3.0} = \underline{\underline{1.53}} \end{aligned}$$

d) For Grammar

1. Introverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 18 \\ \bar{X}_1 &= 10.7 \\ SD_1 &= 2.4 \\ (SD_1)^2 &= 5.8 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 6.0 \\ SD_2 &= 1.7 \\ (SD_2)^2 &= 2.9 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{10.7 - 6.0}{\sqrt{\frac{(18)(5.8) + (3)(2.9)}{18 + 3 - 2} \left(\frac{1}{18} + \frac{1}{3} \right)}} = \frac{4.7}{1.5} = \underline{\underline{3.13}} \end{aligned}$$

2. Extroverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 25 \\ \bar{X}_1 &= 11.8 \\ SD_1 &= 4.5 \\ (SD_1)^2 &= 20.6 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 16.0 \\ SD_2 &= 2.6 \\ (SD_2)^2 &= 7.0 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{11.8 - 16.0}{\sqrt{\frac{(25)(20.6) + (3)(7.0)}{25 + 3 - 2} \left(\frac{1}{25} + \frac{1}{3} \right)}} = \frac{-4.2}{2.8} = \underline{\underline{1.50}} \end{aligned}$$

3. Males

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 18 \\ \bar{X}_1 &= 10.7 \\ SD_1 &= 2.4 \\ (SD_1)^2 &= 5.8 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 25 \\ \bar{X}_2 &= 11.8 \\ SD_2 &= 4.5 \\ (SD_2)^2 &= 20.6 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{10.7 - 11.8}{\sqrt{\frac{(18)(5.8) + (25)(20.6)}{18 + 25 - 2} \left(\frac{1}{18} + \frac{1}{25} \right)}} = \frac{-1.1}{1.2} = \underline{\underline{0.91}} \end{aligned}$$

4. Females

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 3 \\ \bar{X}_1 &= 6.0 \\ SD_1 &= 1.7 \\ (SD_1)^2 &= 2.9 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 16.0 \\ SD_2 &= 2.6 \\ (SD_2)^2 &= 7.0 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{6.0 - 16.0}{\sqrt{\frac{(3)(2.9) + (3)(7.0)}{3 + 3 - 2} \left(\frac{1}{3} + \frac{1}{3} \right)}} = \frac{-10.0}{2.2} = \underline{\underline{4.54}} \end{aligned}$$

e) For Listening

1. Introverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 18 \\ \bar{X}_1 &= 15.4 \\ SD_1 &= 2.8 \\ (SD_1)^2 &= 7.7 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 12.7 \\ SD_2 &= 5.8 \\ (SD_2)^2 &= 33.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{15.4 - 12.7}{\sqrt{\frac{(18)(7.7) + (3)(33.3)}{18 + 3 - 2} \left(\frac{1}{18} + \frac{1}{3} \right)}} = \frac{2.7}{2.2} = \underline{\underline{1.22}} \end{aligned}$$

2. Extroverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 25 \\ \bar{X}_1 &= 15.5 \\ SD_1 &= 3.2 \\ (SD_1)^2 &= 10 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 19.3 \\ SD_2 &= 0.6 \\ (SD_2)^2 &= 0.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{15.5 - 19.3}{\sqrt{\frac{(25)(10) + (3)(0.3)}{25 + 3 - 2} \left(\frac{1}{25} + \frac{1}{3} \right)}} = \frac{-3.8}{1.7} = \underline{\underline{2.00}} \end{aligned}$$

3. Males

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 18 \\ \bar{X}_1 &= 15.4 \\ SD_1 &= 2.8 \\ (SD_1)^2 &= 7.7 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 25 \\ \bar{X}_2 &= 15.5 \\ SD_2 &= 3.2 \\ (SD_2)^2 &= 10 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{15.4 - 15.5}{\sqrt{\frac{(18)(7.7) + (25)(10)}{18 + 25 - 2} \left(\frac{1}{18} + \frac{1}{25} \right)}} = \frac{-0.1}{0.9} = \underline{\underline{0.11}} \end{aligned}$$

4. Females

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 3 \\ \bar{X}_1 &= 12.7 \\ SD_1 &= 5.8 \\ (SD_1)^2 &= 33.3 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 19.3 \\ SD_2 &= 0.6 \\ (SD_2)^2 &= 0.3 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{12.7 - 19.3}{\sqrt{\frac{(3)(33.3) + (3)(0.3)}{3 + 3 - 2} \left(\frac{1}{3} + \frac{1}{3} \right)}} = \frac{-6.6}{4.1} = \underline{\underline{1.60}} \end{aligned}$$

f) For Total Proficiency

1. Introverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 18 \\ \bar{X}_1 &= 40.5 \\ SD_1 &= 4.7 \\ (SD_1)^2 &= 21.7 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 28.0 \\ SD_2 &= 9.5 \\ (SD_2)^2 &= 91 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{40.5 - 28.0}{\sqrt{\frac{(18)(21.7) + (3)(91)}{18 + 3 - 2} \left(\frac{1}{18} + \frac{1}{3} \right)}} = \frac{12.5}{3.6} = \underline{\underline{3.47}} \end{aligned}$$

2. Extroverts

Statistical Data

Males

$$\begin{aligned} n_1 &= 25 \\ \bar{X}_1 &= 42.0 \\ SD_1 &= 7.0 \\ (SD_1)^2 &= 48.4 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 50.0 \\ SD_2 &= 0.0 \\ (SD_2)^2 &= 0.0 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{42.0 - 50.0}{\sqrt{\frac{(25)(48.4) + (3)(0.0)}{25 + 3 - 2} \left(\frac{1}{25} + \frac{1}{3} \right)}} = \frac{-8.0}{4.1} = \underline{\underline{1.95}} \end{aligned}$$

3. Males

Statistical Data

Introverts

$$\begin{aligned} n_1 &= 18 \\ \bar{X}_1 &= 40.5 \\ SD_1 &= 4.7 \\ (SD_1)^2 &= 21.7 \end{aligned}$$

Extroverts

$$\begin{aligned} n_2 &= 25 \\ \bar{X}_2 &= 42.0 \\ SD_2 &= 7.0 \\ (SD_2)^2 &= 48.4 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{40.5 - 42.0}{\sqrt{\frac{(18)(21.7) + (25)(48.4)}{18 + 25 - 2} \left(\frac{1}{18} + \frac{1}{25} \right)}} = \frac{-1.5}{1.9} = \underline{\underline{0.79}} \end{aligned}$$

4. Females

Statistical Data

Males

$$\begin{aligned} n_1 &= 3 \\ \bar{X}_1 &= 28.0 \\ SD_1 &= 9.5 \\ (SD_1)^2 &= 91 \end{aligned}$$

Females

$$\begin{aligned} n_2 &= 3 \\ \bar{X}_2 &= 50.0 \\ SD_2 &= 0.0 \\ (SD_2)^2 &= 0.0 \end{aligned}$$

$$\begin{aligned} t &= \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1)(SD_1)^2 + (n_2)(SD_2)^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \\ &= \frac{28.0 - 50.0}{\sqrt{\frac{(3)(91) + (3)(0.0)}{3 + 3 - 2} \left(\frac{1}{3} + \frac{1}{3} \right)}} = \frac{-22.0}{6.7} = \underline{\underline{3.28}} \end{aligned}$$

B-4.2: Pearson Product-Moment Correlation Coefficient
Analyses for Subjects in the College of Social
Sciences

Table 1: Introversion and Age

Subjects' Code	EPI Scores (X)	Age (Y)	XY
03	17	20	340
04	14	20	280
06	10	19	190
07	16	19	304
16	20	20	400
17	18	20	360
20	20	20	400
24	19	19	361
27	15	19	285
34	13	21	273
35	21	22	462
36	21	20	420
37	21	18	378
41	18	19	342
42	18	24	432
43	18	19	342
44	18	19	342
48	20	18	360
49	18	20	360
51	21	18	378
56	18	18	324

Statistical Data

<u>EPI (X)</u>	<u>Age (Y)</u>
N = 21	N = 21
$\Sigma X = 374$	$\Sigma Y = 412$
$(\Sigma X)^2 = 139876$	$(\Sigma Y)^2 = 169744$
$\Sigma X^2 = 6828$	$\Sigma Y^2 = 8124$
	$\Sigma XY = 7333$

$$r_{xy} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2] [N\Sigma Y^2 - (\Sigma Y)^2]}}$$

$$= \frac{21(7333) - (374)(412)}{\sqrt{[21(6828) - 139876] [21(8124) - 169744]}}$$

$$= \frac{-95}{1739} = \underline{\underline{-.05}}$$

Table 2: Introversion and Reading

Subjects' Code	EPI Scores (X)	Reading Scores (Y)	XY
03	17	19	323
04	14	13	182
06	10	17	170
07	16	18	288
16	20	17	340
17	18	14	252
20	20	14	280
24	19	10	190
27	15	12	180
34	13	12	156
35	21	14	294
36	21	10	210
37	21	14	294
41	18	9	162
42	18	14	252
43	18	14	252
44	18	16	288
48	20	15	300
49	18	8	144
51	21	15	315
56	18	17	306

Statistical Data

<u>EPI (X)</u>	<u>Reading (Y)</u>
N = 21	N = 21
$\Sigma X = 374$	$\Sigma Y = 292$
$(\Sigma x)^2 = 139876$	$(\Sigma Y)^2 = 85264$
$\Sigma X^2 = 6828$	$\Sigma Y^2 = 4236$

$$\Sigma XY = 5178$$

$$r_{xy} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}}$$

$$= \frac{21(5178) - (374)(292)}{\sqrt{[21(6828) - 139876][21(4236) - 85264]}}$$

$$= \frac{-470}{3603.2} = \underline{\underline{-.13}}$$

Table 3: Introversion and Grammar

Subjects' Code	EPI Scores (X)	Grammar Scores (Y)	XY
03	17	10	170
04	14	11	154
06	10	10	100
07	16	13	208
16	20	12	240
17	18	18	324
20	20	12	240
24	19	8	152
27	15	7	105
34	13	10	130
35	21	13	273
36	21	9	189
37	21	8	168
41	18	4	72
42	18	11	198
43	18	9	162
44	18	9	162
48	20	10	200
49	18	7	126
51	21	7	147
56	18	12	216

Statistical Data

<u>EPI (X)</u>	<u>Grammar (Y)</u>
N = 21	N = 21
$\Sigma X = 374$	$\Sigma Y = 210$
$(\Sigma X)^2 = 139876$	$(\Sigma Y)^2 = 44100$
$\Sigma X^2 = 6828$	$\Sigma Y^2 = 2270$

$$\Sigma XY = 3736$$

$$\begin{aligned}
 r_{xy} &= \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}} \\
 &= \frac{21(3736) - (374)(210)}{\sqrt{[21(6828) - 139876][21(2270) - 44100]}} \\
 &= \frac{-84}{3543.1} = \underline{\underline{-.02}}
 \end{aligned}$$

Table 4: Introversion and Listening

Subjects' Code	EPI Scores (X)	Listening Scores (Y)	XY
03	17	20	340
04	14	16	224
06	10	18	180
07	16	17	272
16	20	8	160
17	18	18	324
20	20	12	240
24	19	16	304
27	15	18	270
34	13	18	234
35	21	14	294
36	21	17	357
37	21	14	294
41	18	6	108
42	18	15	270
43	18	12	216
44	18	15	270
48	20	15	300
49	18	16	288
51	21	16	336
56	18	14	252

Statistical Data

<u>EPI (X)</u>	<u>Listening (Y)</u>
N = 21	N = 21
$\Sigma X = 374$	$\Sigma Y = 315$
$(\Sigma X)^2 = 139876$	$(\Sigma Y)^2 = 99225$
$\Sigma X^2 = 6828$	$\Sigma Y^2 = 4949$

$$\Sigma XY = 5533$$

$$r_{XY} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}}$$

$$= \frac{21(5533) - (374)(315)}{\sqrt{[21(6828) - 139876][21(4949) - 99225]}}$$

$$= \frac{-1617}{4067.1} = \underline{\underline{-.39}}$$

Table 5: Introversion and Total Proficiency Scores

Subjects' Code	EPI Scores (X)	Total Proficiency Scores (Y)	XY
03	17	49	833
04	14	40	560
06	10	45	450
07	16	48	768
16	20	37	740
17	18	50	900
20	20	38	760
24	19	34	646
27	15	37	555
34	13	40	520
35	21	41	861
36	21	36	756
37	21	36	756
41	18	19	342
42	18	40	720
43	18	35	630
44	18	40	720
48	20	40	800
49	18	31	558
51	21	38	798
56	18	43	774

Statistical Data

EPI (X) Total Proficiency (Y)

N = 21

N = 21

$\Sigma X = 374$

$\Sigma Y = 813$

$(\Sigma X)^2 = 139876$

$(\Sigma Y)^2 = 660969$

$\Sigma X^2 = 6828$

$\Sigma Y^2 = 32449$

$\Sigma XY = 14375$

$$r_{xy} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}}$$

$$= \frac{21(14375) - (374)(813)}{\sqrt{[21(6828) - 139876][21(32449) - 660969]}}$$

$$= \frac{-2187}{8482.2} = \underline{\underline{-.25}}$$

Table 6: Extroversion and Age

Subjects' Code	EPI Scores (X)	Age (Y)	XY
01	29	19	551
02	22	18	396
05	24	20	480
08	28	18	504
09	22	20	440
10	27	19	513
11	25	21	525
12	26	18	468
13	26	19	494
14	22	20	440
15	27	19	513
18	24	17	408
19	32	20	640
21	23	24	552
22	25	19	475
23	31	22	682
25	22	19	418
26	24	19	456
28	35	19	665
29	44	20	880
30	22	21	462
31	27	21	567
32	33	20	660
33	29	20	580
46	25	18	450
47	23	20	460
52	24	18	432
53	33	18	594

Statistical DataEPI (X)Age (Y)

N = 28

N = 28

 $\Sigma X = 754$ $\Sigma Y = 546$ $(\Sigma X)^2 = 568516$ $(\Sigma Y)^2 = 298116$ $\Sigma X^2 = 20986$ $\Sigma Y^2 = 10704$ $\Sigma XY = 14705$

$$r_{xy} = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}}$$

$$= \frac{28(14705) - (754)(546)}{\sqrt{[28(20986) - 568516][28(10704) - 298116]}}$$

$$= \frac{56}{5521.1} = \underline{\underline{0.01}}$$

Table 7: Extroversion and Reading

Subjects' Code	EPI Scores (X)	Reading Scores (Y)	XY
01	29	17	493
02	22	15	330
05	24	14	336
08	28	16	448
09	22	18	396
10	27	14	378
11	25	18	450
12	26	18	468
13	26	18	468
14	22	16	352
15	27	16	432
18	24	13	312
19	32	19	608
21	23	14	322
22	25	12	300
23	31	14	434
25	22	10	220
26	24	10	240
28	35	12	420
29	44	11	484
30	22	13	286
31	27	10	270
32	33	13	429
33	29	13	377
46	25	17	425
47	23	17	391
52	24	18	432
53	33	16	528

Statistical Data

<u>EPI (X)</u>		<u>Reading (Y)</u>	
N	= 28	N	= 28
ΣX	= 754	ΣY	= 412
$(\Sigma X)^2$	= 568516	$(\Sigma Y)^2$	= 169744
ΣX^2	= 20986	ΣY^2	= 6266

$$\begin{aligned}
 & \Sigma XY = 11029 \\
 r_{xy} &= \frac{N \Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N \Sigma X^2 - (\Sigma X)^2] [N \Sigma Y^2 - (\Sigma Y)^2]}} \\
 &= \frac{28(11029) - (754)(412)}{\sqrt{[28(20986) - 568516] [28(6266) - 169744]}} \\
 &= \frac{-1836}{10437.5} = \underline{\underline{-.17}}
 \end{aligned}$$

Table 8: Extroversion and Grammar

Subjects' Code	EPI Scores (X)	Grammar Scores (Y)	XY
01	29	15	435
02	22	18	396
05	24	10	240
08	28	17	476
09	22	15	330
10	27	15	405
11	25	11	275
12	26	16	416
13	26	9	234
14	22	18	396
15	27	10	270
18	24	19	456
19	32	10	320
21	23	11	253
22	25	18	450
23	31	11	341
25	22	6	132
26	24	6	144
28	35	9	315
29	44	9	396
30	22	10	220
31	27	11	297
32	33	6	198
33	29	10	290
46	25	14	350
47	23	18	414
52	24	17	408
53	33	15	495

Statistical DataEPI (X)Grammar (Y)

N = 28

N = 28

 $\Sigma X = 754$ $\Sigma Y = 354$ $(\Sigma X)^2 = 568516$ $(\Sigma Y)^2 = 125316$ $\Sigma X^2 = 20986$ $\Sigma Y^2 = 4922$ $\Sigma XY = 9352$ $r_{xy} =$

$$\frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}}$$

$$= \frac{28(9352) - (754)(354)}{\sqrt{[28(20986) - 568516][28(4922) - 125316]}}$$

$$= \frac{-5060}{15451.2} = \underline{\underline{-.3274}}$$

Table 9: Extroversion and Listening

Subjects' Code	EPI Scores (X)	Listening Scores (Y)	XY
01	29	15	435
02	22	13	286
05	24	19	456
08	28	19	532
09	22	20	440
10	27	20	540
11	25	15	375
12	26	15	390
13	26	16	416
14	22	15	330
15	27	10	270
18	24	20	480
19	32	15	480
21	23	17	391
22	25	20	500
23	31	14	434
25	22	16	352
26	24	14	336
28	35	19	665
29	44	19	836
30	22	8	176
31	27	10	270
32	33	14	462
33	29	15	435
46	25	19	475
47	23	13	299
52	24	16	384
53	33	19	627

Statistical Data

EPI (X) Listening (Y)

N = 28

N = 28

$\Sigma X = 754$

$\Sigma Y = 445$

$(\Sigma X)^2 = 568516$

$(\Sigma Y)^2 = 198025$

$\Sigma X^2 = 20986$

$\Sigma Y^2 = 7363$

$\Sigma XY = 12072$

$$r_{xy} = \frac{N \Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N \Sigma X^2 - (\Sigma X)^2] [N \Sigma Y^2 - (\Sigma Y)^2]}}$$

$$= \frac{28(12072) - (754)(445)}{\sqrt{[28(20986) - 568516] [28(7363) - 198025]}}$$

$$= \frac{2486}{12467.9} = \underline{\underline{0.19}}$$

Table 10: Extroversion and Total Proficiency Scores

Subjects' Code	EPI Scores (X)	Total Proficiency Scores (Y)	XY
01	29	47	1363
02	22	46	1012
05	24	43	1032
08	28	52	1456
09	22	53	1166
10	27	50	1350
11	25	44	1100
12	26	41	1066
13	26	43	1118
14	22	49	1078
15	27	36	972
18	24	50	1200
19	32	44	1408
21	23	42	966
22	25	49	1225
23	31	39	1209
25	22	32	704
26	24	30	720
28	35	40	1400
29	44	37	1628
30	22	31	682
31	27	31	837
32	33	33	1089
33	29	38	1102
46	25	50	1250
47	23	48	1104
52	24	51	1224
53	33	50	1650

Statistical Data

<u>EPI (X)</u>	<u>Total Proficiency (Y)</u>
N = 28	N = 28
$\Sigma X = 754$	$\Sigma Y = 1199$
$(\Sigma X)^2 = 568516$	$(\Sigma Y)^2 = 1437601$
$\Sigma X^2 = 20986$	$\Sigma Y^2 = 52725$

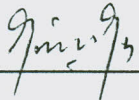
$$\Sigma XY = 32111$$

$$\begin{aligned}
 r_{xy} &= \frac{N \Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N \Sigma X^2 - (\Sigma X)^2][N \Sigma Y^2 - (\Sigma Y)^2]}} \\
 &= \frac{28(32111) - (754)(1199)}{\sqrt{[28(20986) - 568516][28(52725) - 1437601]}} \\
 &= \frac{-4938}{27186.8} = \underline{\underline{-.18}}
 \end{aligned}$$

DECLARATION

I, the undersigned, declare that this thesis is my work and that all sources of materials used for this thesis have been duly acknowledged.

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