RELATIONSHIP BETWEEN DERMATOGLYPHICS AND SENSITIVITY OF LEARNING

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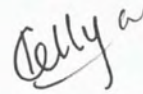@Tesis dimaksudkan sebagai tesis bagi Ijazah Doktor Falsafah dan Sarjana secara penyelidikan atau disertai bagi pengajian secara kerja kursus dan Laporan Projek Sarjana Muda (LPSM).

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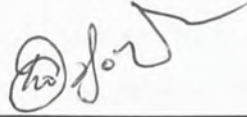
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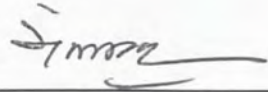
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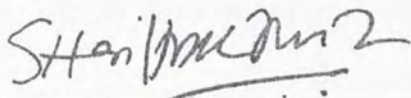
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ABSTRACT

The main objective of this study is to investigate the relationship between dermatoglyphics and sensitivity of learning. Only one aspect of dermatoglyphics will be tested in this study which is the atd angle. A group of 51 undergraduates taking Mathematics with Economics course in School of Science and Technology participated in this study. Their fingerprints and palm prints are collected with the help from Angsana Cemerlang Network Sdn. Bhd. Questionnaires are given out to these participants to collect relevant data. The academic achievement of participants in term of Cumulative Grade Point Average (CGPA) in four semesters is used to test the relationship with atd angle. Most of the atd angles of the participants fall in the range of normal sensitivity of learning. Only a small number of participants' atd angles fall in the category of high or low sensitivity of learning. The CGPA and atd angle show a weak and negative correlation among each other. The Wilcoxon rank-sum test shows significant difference between first semester of first year with second semester of first year, first semester of second year and second semester of second year. It shows that participants will have a higher CGPA in a particular semester. It does not show any effect of atd angle on the CGPA of all four semesters by carrying out the Kruskal-Wallis test. Finally, this study fails to prove the relationship between atd angle and sensitivity of learning.

ABSTRAK

PERHUBUNGAN ANTARA *DERMATOGLYPHICS* DENGAN
KECEKAPAN BELAJAR

Kajian ini adalah bertujuan untuk menguji kewujudan perhubungan antara *dermatoglyphics* dengan kecekapan belajar. Hanya satu sifat sahaja yang akan diuji dalam kajian ini iaitu sudut atd. Sebanyak 51 orang mahasiswa dan mahasiswi yang mengambil program Matematik dengan Ekonomi di Sekolah Sains dan Teknologi telah melibatkan diri dalam kajian ini. Cap jari dan kesan tapak tangan semua peserta telah dikumpulkan dengan bantuan daripada Angsana Cemerlang Network Sdn. Bhd. Soal selidik telah diberikan kepada para peserta yang terlibat untuk mengumpul data yang diperlukan. Pencapaian akademik semua peserta dalam bentuk PNGK selama empat semester digunakan untuk mengkaji perhubungan dengan sudut atd. Kebanyakan sudut atd para peserta terletak dalam kumpulan kecekapan belajar yang sederhana. Hanya sekumpulan kecil yang sudut atd terletak dalam kumpulan kecekapan belajar yang tinggi atau rendah. Perhubungan antara PNGK dengan sudut atd menunjukkan korelasi yang negatif dan lemah. Dengan menggunakan ujian *Wilcoxon rank-sum*, terdapat perbezaan yang signifikan antara semester pertama tahun satu dengan semester kedua tahun satu, semester pertama tahun dua dan semester kedua tahun dua. Ini menunjukkan bahawa para peserta mempunyai PNGK yang lebih tinggi dalam satu semester. Selain itu, sudut atd juga tidak menunjukkan kesan yang signifikan ke atas PNGK setiap semester dengan menjalankan ujian *Kruskal-Wallis*. Kajian ini telah gagal menunjukkan hubungan antara sudut atd dengan kecekapan belajar.

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LIST OF SYMBOLS

$<$	less than
$>$	more than
$\circ$	degree
$\sum$	summation
H_0	null hypothesis
H_1	alternative hypothesis
$=$	equal to
$\neq$	not equal to
β	beta
ε	error term
SSE	sum of squares error
σ	variance
μ	mean
$\%$	percent

unique and unalterable. Each individual has a different combination of fingerprints. Even forensic science uses fingerprints to identify criminals. Many researches had been carried out to prove that there is a direct correlation between fingerprints with an individual's medical and behavioural profile. Therefore fingerprints can be an excellent diagnostic tool for population studies, personal identification, morphological and genetic research.

Over seven thousand articles regarding dermatoglyphics have been published in medical journals around the world today. Many researchers have been conducting different kind of researches in the field of paediatrics medicine, genetic research, psychiatry and anthropology. Thousands of independent studies have proved that different diseases have different fingerprint patterns associated with them. For example, cancer, heart disease and Alzheimer's disease are correlated with fingerprint anomalies. Besides that, people with unusual patterns of behaviour, for example, autism, manic depression, schizophrenia, excessive shyness, retardation and alcoholism, have all shown fingerprint profiles which are similar to others with the same behaviour but highly different from the general population. Studies of infants and children also demonstrated correlation between behaviour and dermatoglyphic patterns. All these researches have proved that the hand analysis is a study worth doing and could reveal not only vital genetic and medical information about an individual but also something about the psychological uniqueness of each people.

The ridge formations of the skin of an individual begin to appear between four weeks and five months of embryogenesis, when the architecture of the major organ systems of a fetus is developing. After death, decomposition of the skin is the last to

identification for his employees. He made good use of the fingerprints to authenticate his employees' identity when collecting wage packets. Around the same time in Japan, Henry Faulds, a Scottish medical missionary, noticed the usage of fingerprints as a form of signature on pieces of pottery. He wrote on 'Nature Magazine' in 1880, suggesting that the uniqueness of fingerprints have a potential usefulness in criminal identification. In 1823, John E. Purkinje, a professor of Anatomy at the University of Breslau, is the first person who proposed the fingerprints classification system with nine print categories.

The Will West Case is one of the important happenings in expanding the usage of fingerprints. According to Olsen (1995), Will West was brought to Leavenworth, Kansas for incarceration. He denied being incarcerated before although a match was found in the prison records by using the Bertillon Measurement System which is a detailed facial measurement used to establish identification. The name of the prisoner was William West who looked just like Will West, but William West was already serving a life sentence for murder in prison. Fingerprints were taken and compared between Will West and William West. It proved that these two people were distinct individuals. It showed that fingerprint analysis is a more reliable identification system compared to name, photo and the Bertillon System.

Sir Francis Galton, the cousin of Sir Charles Darwin, was a scientist covering anthropology, geology, biology, heredity and eugenics. He conducted extensive research of skin ridge patterns to demonstrate the permanence and consequently usage as a means of identification. Besides these, he also wants to demonstrate the hereditary significance of fingerprints and to show the biological variations of

different fingerprint patterns amongst different racial groups. Sir Francis Galton collected vast numbers of fingerprints from all types of people and thereby classified a simpler fingerprint patterns than that proposed by Purkinje in 1892. He delineated only three main types of pattern which consists of arch, loop and whorl and identified the triradius as the significant indicator of a finger print pattern type. The three main types of fingerprint patterns classified by Sir Francis Galton will be the main guideline for identification of patterns. It has been adopted by police and dermatoglyphicists. Although this system may be sufficient for the purposes of criminal identification, it still leaves much to be desired in discriminating the different psychological qualities associated with each type. Sir Francis Galton is perhaps the single most influential figure in the whole study of the fingerprints patterns and many of his method for analysing fingerprints have been used in the work of genetic dermatoglyphic researches. His two works '*Fingerprints*' (1892) and '*Fingerprint Directories*' (1895) are considered as classics in the field of early dermatoglyphic research. Sir Francis Galton was the first person to carry out the research regarding twins. In 1897, Harris Hawthorne Wilder was the first American to study dermatoglyphics. He named the A, B, C and D triradii points and invented the Main Line Index. He also studied the thenar hypothenar eminencies, zones II, III and IV.

Through the usage of fingerprints, the Croatian Juan Vucetich had developed his own system of identification in Argentina. By 1981, the Argentina authorities had fully employed the usage. With the great efforts from Faulds and Herschel, fingerprinting became an established procedure in criminological investigation in England at 1901. Kristine Bonnevie carried out the first extensive genetic studies in 1923.

1.3   Fingerprints

1.3.1   Types of Fingerprints

Fingerprints are patterns formed by ridges and grooves in the skin. A friction ridge is a raised portion of the epidermis on the palmer (palm and fingers) or plantar (sole and toes) skin. These ridges are also known as dermal ridges. The three main types of fingerprint patterns classified by Sir Francis Galton will be the main guideline for identification of patterns. The three main types of fingerprint patterns are the simple arch with no triradius, the loop with one triradius and the whorl with two triradii as shown in Figure 1.1 (Reed *et al.*, 1990). There also exist eleven common types of fingerprints as shown in Figure 1.2 (YOUNG STAR Dermatoglyphics, 2005). The most common patterns are loops and whorls while arches are rarer (Reed *et al.*, 1990). The lines on the loop and whorl in Figure 1.1 connect the triradius and the core. These lines are used to calculate the ridges in a pattern.
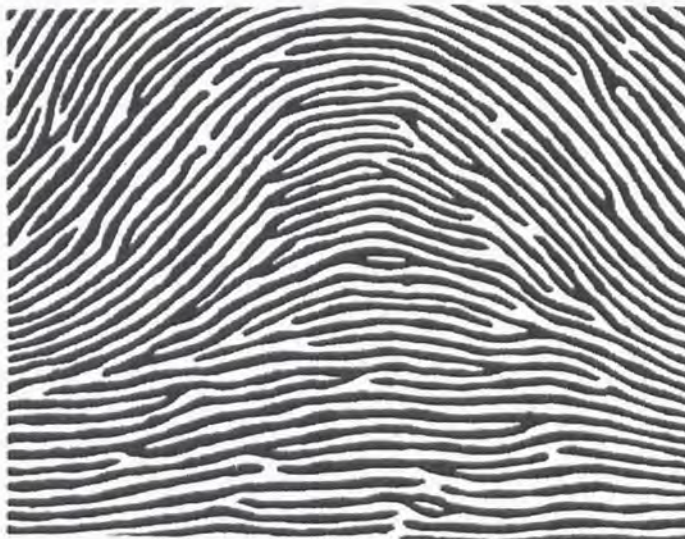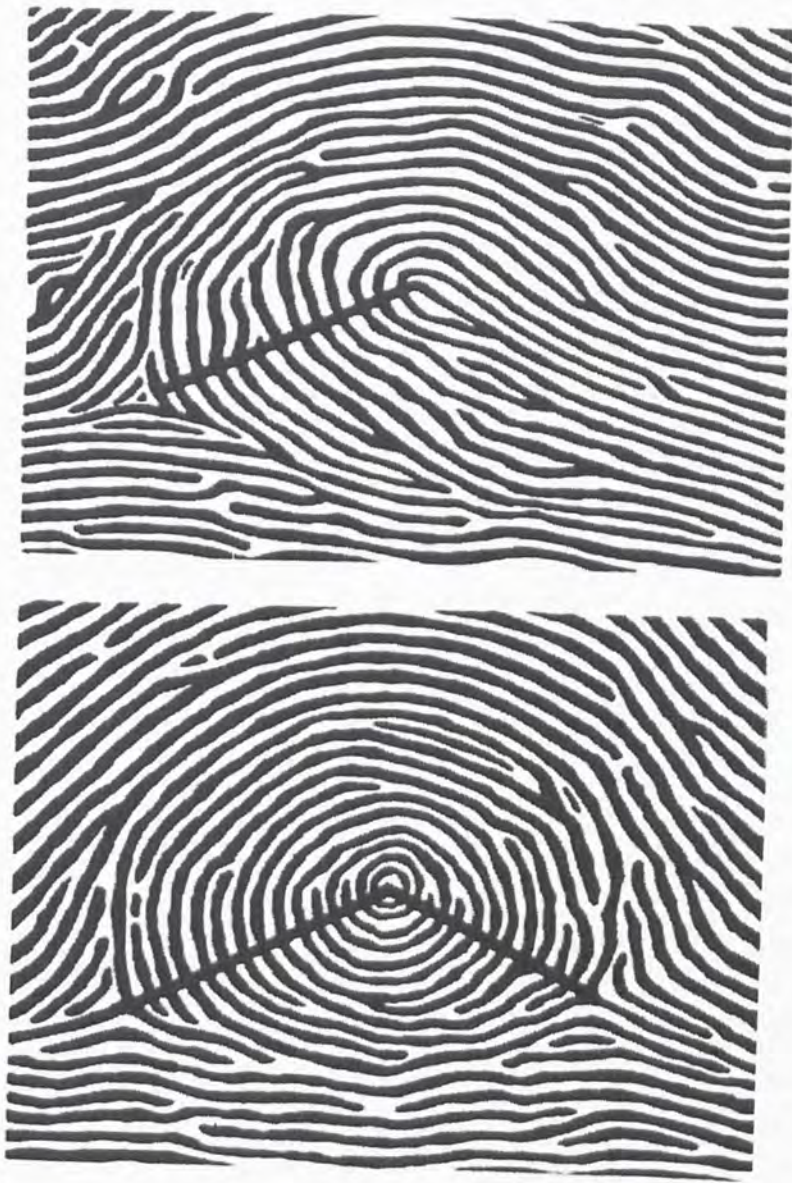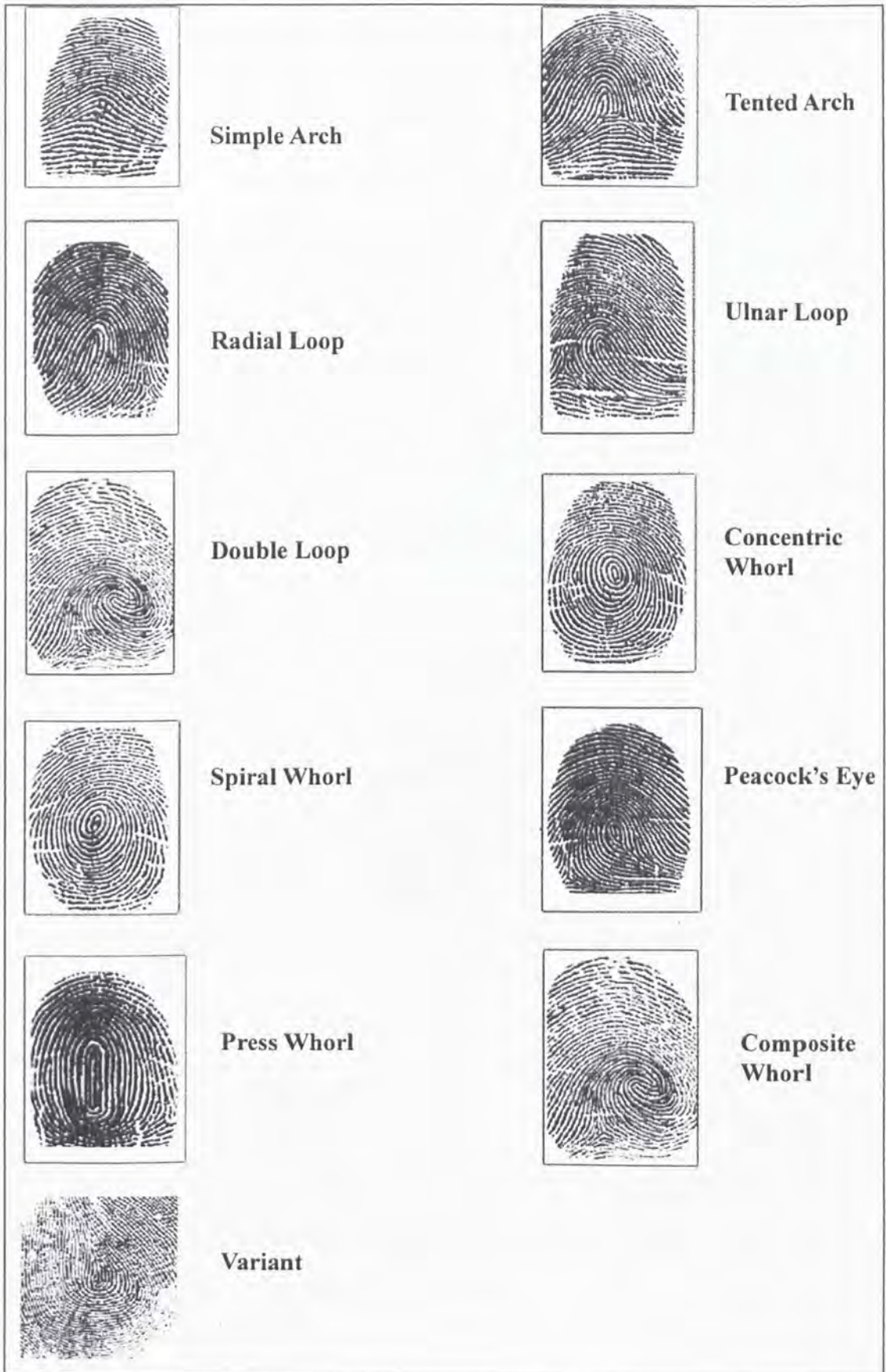

Figure 1.1   Arch.

Figure 1.2   Loop and whorl (from up to bottom).

Figure 1.3   The 11 types of fingerprints.

1.3.2 Triradius

The triradius will exists whenever three ridge systems meet at a localised region as shown in Figure 1.3 (Reed *et al.*, 1990) and Figure 1.4 (Campbell, 1998). Triradii are important in defining pattern types and for counting ridges.

Figure 1.4 Examples of triradii.

Figure 1.5 Enlarged fingerprint with triradius encircled.

1.3.3 Core

The core is the centre of the pattern. It is actually a ridge. The triradius and core are very important in forming the dermatoglyphic patterns. Figure 1.5 and Figure 1.6 (Reed *et al.*, 1990) are some examples of the core.

Figure 1.6   Examples of cores.

Figure 1.7   Enlarged fingerprint with core encircled.

1.4   Palm Prints

The line formations on the palm changes throughout a person's life and shown to be much more difficult to be categorised compared to fingerprints pattern. The study of lines has lagged behind the other dermatoglyphic research due to the disagreement upon the system for line classification (International Institute of Hand Analysis, 1985b).
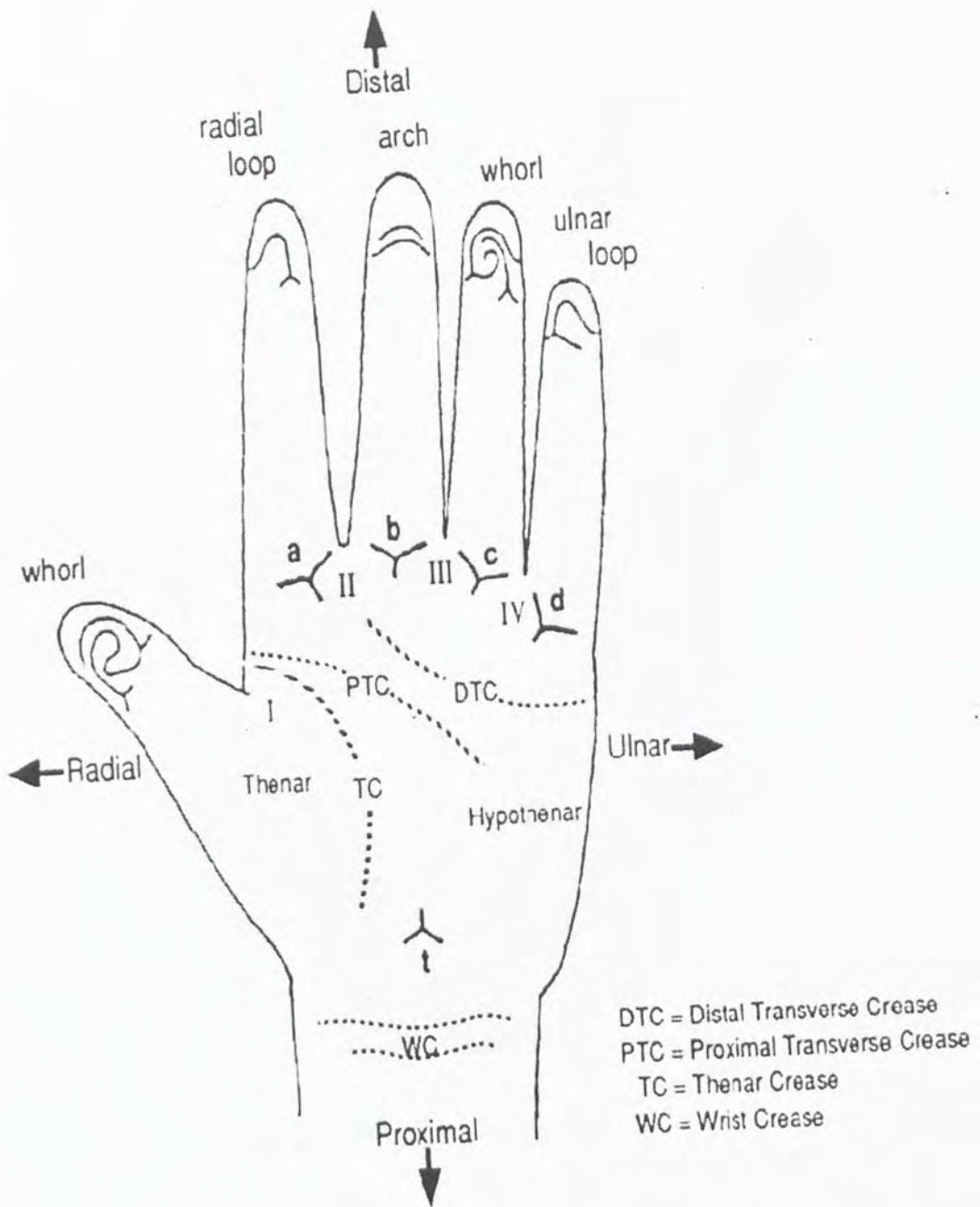
Figure 1.8   The pattern areas on the hand.

Figure 1.9   The triradii on the palm.

Beryl B. Hutchinson has explored the meaning of special palmer patterns as shown in Figure 1.9 (Campbell, 1998). She categorised each loop on the palm with a characteristic. The loop of humour (*a*) shows that a person could see the humorous side of life and had the sense of ridiculous. The loop (*b*) will be a person who vanity that do not care to be laughed at. The loop (*c*) is the loop of serious which tends to denote people who have a serious purpose in life. Hutchinson denote loop (*d*) as one

who was born with Royal blood and looked for personal magnetism or executive abilities. Loop (*e*) possesses qualities of good memory while loop (*f*) is related to physical courage. The (*g*) loop is related to green thumbs. The (*h*) loop is a more common one which reflects humanistic imagination, kindness or humanitarian aspect of personality. The loop (*j*) might reflect some ability of imagination or intuition. Hutchinson relates loops (*i*), (*k*) and (*l*) to music. Those with a strong emotional bond to music will have the loop (*k*) and those who love brass will have the (*l*) loop. Loop (*i*) is related to those who have passion with stringed instruments.
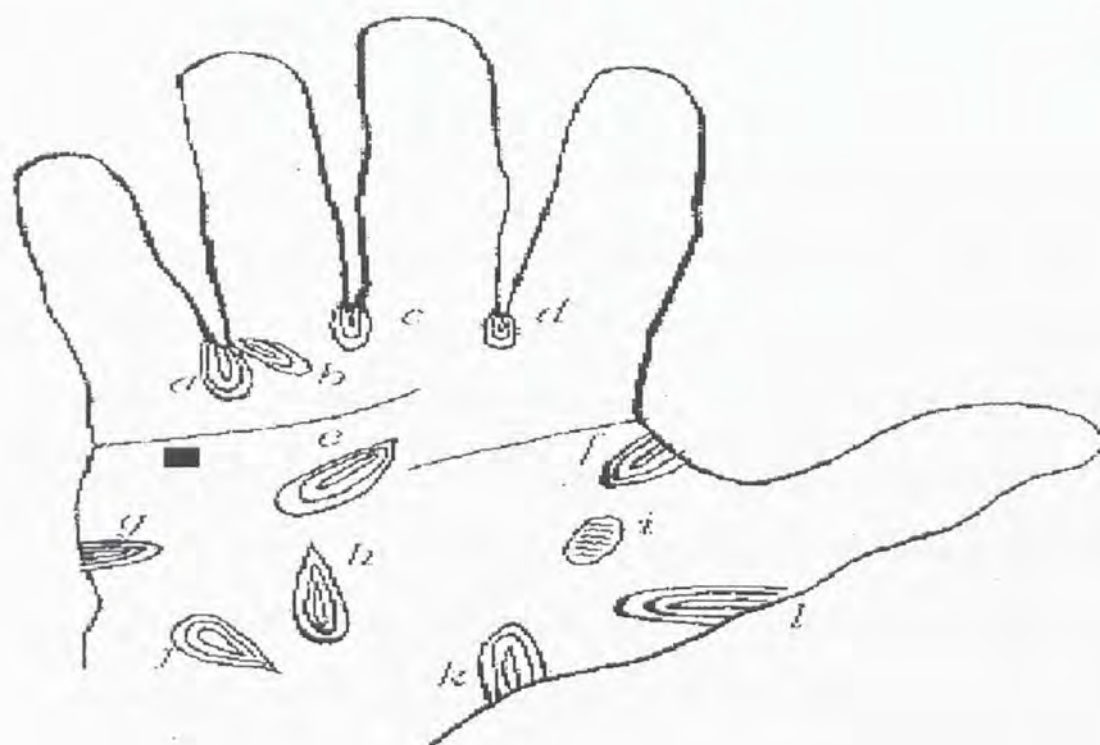
Figure 1.10   Loops of: *a* humour, *b* vanity, *c* serious intent, *d* Rajah, *e* memory, *f* courage, *g* nature, *h* humanism, *i* 'bee' (strings), *j* inspiration, *k* music and *l* brass music.

1.5   Objectives of Study

The objectives of this research are:

a.   To determine the relationship between the atd angles and the CGPA for four semesters.

b.   To estimate a model for the relationship between CGPA with atd angles and gender.

c.   To determine the effects of the atd angles on the CGPA of four semesters.

1.6   Scope of Study

The subjects of this research will consist of students from the course, HS08 Mathematics with Economics in the School of Science and Technology. Students from third year are more preferable. Due to time constraints and the problem of acquiring a large amount of data, this study will only include 50 to 100 subjects. It will be costful if too many subjects are included in this research. Fingerprints and palm prints of subjects will be collected by Angsana Cemerlang Network. Fingerprints will be collected by using scanner system while the palm prints will be collected by using ink. The collected data will include the age, gender, CGPA and the atd angle of each student. Names of students will not be revealed to protect the privacy of students. Each student will only be given a number as a code to fill in questionnaires. All the data will be kept by the university.

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