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Gender, The Internet And New Technologies: Theoretical And Analytical Investigations Into Genderisation Processes And Their Application To The Introduction Of New Technologies And Social Structures

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ABSTRACT

GENDER, THE INTERNET AND NEW TECHNOLOGIES:

THEORETICAL AND ANALYTICAL INVESTIGATIONS INTO GENDERISATION PROCESSES AND THEIR APPLICATION TO THE INTRODUCTION OF NEW TECHNOLOGIES AND SOCIAL STRUCTURES

A comprehensive review of the literature concerning the biological determination of sex and genderised behaviours, theoretical accounts of the development of gender role identity and the debatable extent of gender differences in a wide range of physical, intellectual, emotional, moral, linguistic and occupational areas is presented. A brief history of the development of the computer and Internet is outlined. Demographic data on Internet users are discussed and historical, educational, media, employment and financial factors which may contribute to the current female underrepresentation on the Internet are examined.

A theoretical framework is presented which accounts for the genderisation of activities, occupations and technologies. This mechanism is then applied to new technologies and the Internet in particular.

The results of six experimental and investigative studies are presented. Study (A) examined the ability of 126 subjects to identify the gender of the authors of on-screen texts. The results indicate that the subject identification scores are compatible with the scores expected from random guessing. Study (B) examined age and gender differences in perceived risk-taking strategies adopted by 354 subjects when participating in a computerised card game. The results showed that males took greater risks than females and older subjects took more optimal risks than younger subjects. Study (C) involved a re-examination of Jean Piaget's 1932 data on reciprocity in revenge. The results confirmed that male subjects took more perceived risks than female subjects. Study (D) examined the effects of labelling on participation rates in two optional tests. No gender or age effects were found in the test participation rates. Study (E) involved a selective analysis of statistical data reported in eight GVU WWW user surveys. Study (F) examined the gender bias found in samples of Internet and male and female oriented magazines. A male gender bias was found in the Internet magazines.

1. INTRODUCTION

The technological advances of the so called 'Information Society' are already having a major impact on social, cultural, economical and political structures worldwide. Computer Mediated Communication (CMC) is the major growth area of this decade and it is leading rapidly to the so-called 'global village' (McLuhan 1964). Among the emerging 'Information Society' technologies, the Internet is growing in importance as a means of communication, publication and commerce. This has resulted in social and cultural changes that are affecting our society in much the same way as the telephone and television did in previous decades. It is therefore a cause of concern to find that currently only one in three Internet users are female. Because of the exponential growth rate of the Internet (See Appendix A), and its increasing economic significance within the market place, the author feels that the causes of this gender imbalance in Internet participation rates are worth investigating.

New technologies are being developed and produced on a daily basis and many of these technologies lead to dramatic changes in life styles and work patterns. It is estimated for example, that the future jobs of 90% of the children currently in pre-school have not been invented yet (Women and Work 1996). For this reason, a study of the Internet which provides us with an example of an 'emerging' technology that has already become 'genderised', could help to shed light on how technologies of the future could be introduced to the public in a more gender egalitarian manner. The purpose of this thesis therefore is to investigate the various variables that have contributed to the genderisation of technologies and in particular to the genderisation of the Internet.

The terms 'gender' and 'sex' tend to be used interchangeably to describe both biological and psychological sex. Therefore before investigating the causes of genderisation and gender differences in participation rates on the Internet, it was first necessary to review the present state of knowledge in the areas of biological sex, gender and gender differences in order to discern exactly how these terms are used from a biological, psychological and theoretical point of view.

Chapter 2 discusses how sex is defined from a biological point of view and the significance of anomalous sexual development research in contributing to our overall understanding of sex and gender. A schematic diagram is presented which outlines the basic factors concerned with genetic and non-genetic sex dimorphism within humans and other animals.

Chapter 3 discusses the concept of gender role identity, how gender role identity can result in genderised behaviours and the ways in which the four main groups of theories (namely: the sociobiological, psychoanalytical, cognitive developmental and social learning theories) account for its development. A schematic diagram outlines the similarities and differences in theoretical approaches adopted by the biological theories discussed in Chapter 2 and the four main theories of gender role identity development.

Chapter 4 examines the debatable extent of gender differences in a range of physical, intellectual, emotional, moral, linguistic and occupational areas, which may help to shed light on current gender differences within scientific, technological and computing areas and on the Internet.

Chapter 5, Volume 11, traces the historical development of the computer and the Internet and discusses possible historical, educational, employment, financial and linguistic factors that could contribute to gender differences on the Internet.

Following this examination of literature in the field of gender and gender differences, the author found that there were a number of areas that needed clarification or further investigation. It was therefore decided to adopt a multi-pronged approach by carrying out a series of studies that would examine a range of research issues. The main research issues, aims and conclusions of each these studies are described briefly as follows:

Chapter 6: Study (A): Researchers have claimed that it is possible to identify the gender of the author of texts on-line even when these texts are posted anonymously. If this is so, then the easy identification of the gender of participants in on-line communications could lead to stereotyped gender interactions that may contribute, in some cases, to the isolation and/or intimidation of females on the Internet. This in turn could have consequential affects on female Internet participation rates.

The aims of this study were to carry out an experiment to test the ability of subjects to identify the gender of the authors of texts randomly chosen by computer from a database of texts written by females and males.

In analysing the texts it was found that there were gender differences in various aspects of textual style. However the subjects showed that without prior knowledge of the sex of the authors of texts, they were unable to determine the gender of the authors.

Study (B): Some inconclusive findings have been reported in the area of risk-taking research, although in general research indicates that males take greater actual and perceived risks than females. However, previous risk-taking research has tended to concentrate on particular age ranges and failed to investigate across all age groups. Research indicates that males, more than females, are likely to see themselves as 'innovators', 'risk-takers' and to be 'excited by' new technologies. It is proposed by the author that new technologies such as the Internet represent perceived risk-taking activities. Since the Internet is a technology that is potentially available to users of all age groups, it would be important to establish whether males of all age groups take greater perceived risks than females, as this could help to explain the current male hegemony on the Internet.

The aims of this study were to carry out an experiment to investigate age and gender differences in the adoption of perceived risk-taking strategies (RTS) while participating in a computerised card game.

The findings confirmed that males took greater perceived risks than females although both females and males took significantly less than the optimal level of risk. Older subjects of both sexes, as opposed to younger subjects, adopted strategies that were closer to the optimal strategy level.

Study (C): Arising out of a literature review of moral development, it became clear to the author that perceived risk taking strategies could account for gender differences reported by Jean Piaget (1932) in the area of reciprocity in revenge. A re-examination of the original data was therefore undertaken.

The aims of this study were to analyse basic data on reciprocity in revenge presented by Jean Piaget in his 1932 book, *The Moral Development of the Child* in order to establish whether these data confirmed gender differences in perceived risk-taking strategies among school children.

The results of the re-examination confirmed gender differences in perceived risk taking strategies (RTS).

Study (D): Extensive literature has highlighted the gender differentiation effects of labelling. The author (Connolly 1997) has investigated gender differences in student enrolment rates for two Dublin City University (DCU) computer courses that have similar computational student requirements. One course is labelled 'Computational Linguistics' and has a majority of female students while the other is called 'Computer Applications' and attracts a majority of male students. It was therefore proposed that the gender imbalance occurring in enrolment figures for these courses could be affected by stereotyped assumptions that 'linguistic' activities are more suitable for or are of greater interest to females. If this could be proved then it could help to explain gender imbalances on the Internet which has historically been associated with masculinity.

The aims of this study were to study the effects that labelling has on subject participation rates for two optional tests.

The results of this experiment show that similar proportions of both females and males elected to participate in the two different tests, thereby showing that labelling in this situation did not result in sex differentiated choices. It is therefore assumed that factors other than simple labelling are affecting continuing gender differences in these DCU computer course choices.

Study (E): Many problems in surveying the number of users on the Internet have been identified by researchers. While surveys have been carried out on the Internet they have often been one-offs, inconsistent, limited or have researched an area of the Internet that is outside the scope of this research project. The author has found that the World Wide Web (WWW) surveys carried out by the Georgia Institute of Technology's Graphic, Visualization and Usability Center World Wide Web (GVU) provide consistent and generally comprehensive information (with the exception of Surveys 1 and 2) that are of direct relevance to this research project. An analysis of these selected areas of information could help to explain current gender differences on the Internet worldwide.

The aims of this study were to collect and analyse selective data that were of relevance to this research project from eight GVU WWW user surveys carried out between January 1994 and November 1997 in order to shed light on factors affecting gender differences on the Internet.

The findings show that the average Internet user is American, male, aged around 38 years is employed within the area of computing or education and earns a relatively high income of $50,000 or more. The trends shown in the surveys are in line with the theoretical framework presented by the author in this thesis. (See Chapter 7) While overall participation rates in a male genderised technology or activity are low (less than 1% of the total population) female participation rates remain low at between 5%-

10% of that 1%. However, when the participation rates increase, the relative percentage of participating females will also increase. This is demonstrated by figures from the United States which show that at the moment the general participation among the population at large is 10% and female participation levels there have now risen to 40% of that 10%.

Study (F): The media affect perceptions and influence the market within specialist areas such as the Internet. Personal observations of the author have led to the conclusion that a male bias permeates the content of Internet magazines. These magazines are designed to provide potential and current Internet users with information on the latest developments in Internet technology or content and help to maintain and increase interest in this technology. It is therefore obvious that if it is found that Internet magazines in effect exclude a potential female readership by appealing more directly to males, then this could help to explain gender imbalances in Internet user rates.

The aims of this study were to carry out a comparative analysis of gender bias found in the proportions of photographic models used in a sample of Internet magazines, and female and male interest magazines.

It is clear from an analysis of these magazines that Internet magazines are designed to appeal mainly to the male purchaser, thereby commercially verifying that the Internet is a male genderised technology.

A disk containing the software for Studies A, B and D is located on the inner back cover of Volume 11.

In Chapter 7 the author presents a theoretical framework that explains genderisation processes in new technologies, occupations and activities. This theory offers an explanation that accounts for the current masculinisation of the Internet. A schematic

diagram is presented which outlines the pattern of initialisation, classification and maintenance which it is proposed has led to the current masculinisation of the Internet.

A general discussion is presented in Chapter 8 and this is followed in Chapter 9 by general conclusions and general recommendations in Chapter 10 that highlight issues which should be taken into account when examining or attempting to rectify genderisation processes.

CHAPTER 2. REVIEW OF CURRENT BIOLOGICAL THEORIES OF GENETIC AND NON-GENETIC FACTORS CONTRIBUTING TO SEXUAL DIMORPHISM

2.1 WHAT IS THE BIOLOGICAL DIFFERENCE BETWEEN FEMALES AND MALES?

2.1.1 Introduction

Human beings are a product of their genetics and their social and physical environment. and the same can be said of the other organisms on this planet. The human genome consists of approximately 3,000 million nucleotides, which make up approximately 100,000 genes. From a genetic point of view, humans are almost identical. We share 99.7-99.9% of our genes with every other human being on the planet.

Humans are the least genetically diverse of all the primates. Modern genetic fingerprinting has shown that there is less genetic diversity between all the human races, be they Eskimos or Pygmies, than between any two neighbouring families of gorillas in Africa. From a genetic point of view, the differences between humans and other organisms are not very large. We share 98% of our genes with our close relatives the bonobos, chimpanzees, gorillas and orang utangs. Even the most primitive unrelated bacterium on the planet shares approximately 40% of its genes with humans.

Male and female humans are genetically almost identical, and in fact, since males have an X chromosome, they carry all of the genetic makeup of females. Of the approximately 100,000 genes that make up the human genome, only one gene, the Sry on the Y chromosome, determines male sexuality. Experiments in mice have shown that if the Sry gene is grafted onto the X chromosome of a female, the animal develops morphologically as a male. (See Section 2.1.2.1.1.) What is important in the determination of the morphology of an organism, is not so much what genes are present, but how and when they are expressed. The cloning of Dolly the sheep (Kolata 1997) from the differentiated udder cell of an adult sheep, has shown that the complete genome is present in all cells, even though the genes may not be expressed.

A wide range of research has been carried out into the sexual development and behaviour of an extensive variety of animals including: fruit-flies, fish, reptiles, rats, mice, hamsters, guinea pigs, gerbils, and monkeys. One of the first questions that we must ask if we are investigating sex and gender issues is, 'What is sex?'. Our answer will differ depending on the species of animal that we are considering. If we are looking at mammals we may say that there are two sexes, those who have XX or female sex chromosomes and those with XY or male sex chromosomes. However this is not necessarily so for other animals. In the case of whiptail lizards we may say that there is just one sex, since all whiptail lizards are female. (See Section 2.1.2.2.3) However, our simplistic theories would really have to be abandoned if we examined those species of fish who are capable of changing sex within minutes from male to female or visa versa. (See Section 2.1.2.2.2)

Because of the large overlap between the human genome and that of other animals, a review of sexual and behavioural development in other animal species can throw considerable light on human sexual and behavioural development. In this chapter we will examine the factors that trigger sexual differentiation in animals and look at the range of sexual, aggressive and parental behaviours which animals display. Schematic Diagram 2.1 provides a broad outline of the genetic and non-genetic factors which lead to sexual dimorphism.

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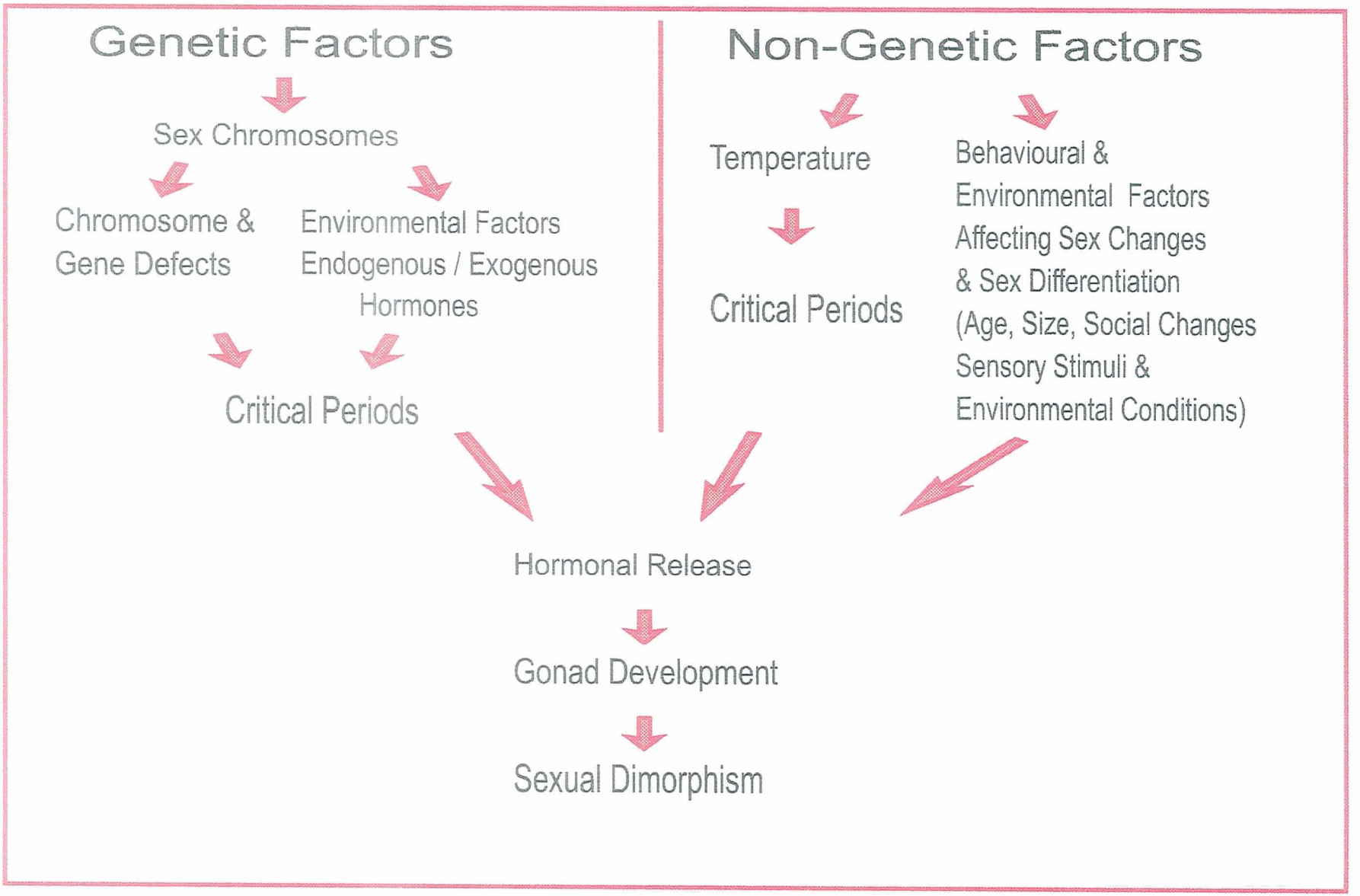

Schematic Diagram 2.1

2.1.2 The nature of sex

In an attempt to understand the nature of sex, researchers have divided the triggers for sexual dimorphism into two categories:

- Genetic triggers of sexual dimorphism
- Nongenetic triggers of sexual dimorphism

2.1.2.1 Genetic triggers of sexual dimorphism

In mammals, sex is determined at fertilisation by the presence of sex chromosomes. Females have two X chromosomes, one contributed by the biological father and one by the mother, while males have XY chromosomes, the Y contributed by the biological father and the X by the mother. The X chromosome is much larger than the Y and contains over 300 genes for human characteristics. The Y chromosome contains just a few genes that are concerned with the development of the male sex organs in the embryo (Rollins 1996). In mammals, the female is referred to as the 'homogametic' sex, as she produces two similar X chromosomes, and the male is referred to as the 'heterogametic' sex since he produces two distinct types of spermatozoa, those with X bearing chromosomes and those with Y bearing chromosomes.

In the case of birds, butterflies, moths and some fish, amphibians, and reptiles, the female is the heterogametic sex, releasing at ovulation an X or Y chromosome bearing egg (referred to as Z and W). The male is the homogametic sex producing two XX chromosomes (referred to as ZZ).

2.1.2.1.1 Gonad differentiation

For many vertebrates and all mammals, there are three types of sex organs:

(1) The gonads: namely–the testes or ovaries, which produce either ova or sperms

(2) The internal sex organs, which, in the case of male mammals, include the vas deferens, seminal vesicles and prostate and, in the case of female mammals, include the fallopian tubes, uterus and inner two-thirds of the vagina

(3) The external sex organs, which, for male mammals include the penis and scrotum, and for female mammals, include the outer vagina, the labia minor, labia majora, and clitoris.

The gonads are the first sexual organs to develop. At first, the mammalian embryo has an undefined mass of primordial tissue with two rudimentary gonads, precursors of both a testis and an ovary. Genetic information determines the development of a testis. A gene on the Y chromosome named Sry, releases an enzyme called the 'testis-determining factor' that triggers the development of a testis from the primordial gonads. If the Sry gene is placed on one of the X sex chromosomes of a female (XX) mouse embryo, the embryo will develop into a male (Koopman *et al.* 1991, cited in Carlson 1994).

While it is not clear exactly how the Sry gene turns the 'master switch' for masculinization, research indicates that the Sry gene appears to make a protein that binds to DNA (Cohen 1996). This in turn triggers at least three genes to assist actively in this masculinization process. In B6 mice (i.e. mice which carry a faulty version of Sry), genetic male mice can develop ovarian tissue, become hermaphrodites, or even females (Cohen 1996).

The internal sex organs of the embryo are undifferentiated and are capable of developing into male or female sex organs. The precursor of the female sex organs is called the Müllerian system and it can eventually develop into fimbriae, fallopian tubes, uterus and an inner vagina. The precursor of the male sex organs is called the Wolffian system and it is capable of developing into the epididymis, vas deferens, seminal vesicles and the prostate.

As the testis cells grow they begin to produce two different types of hormones that circulate to other parts of the embryo. Each of these hormones has different types of effects:

- The first type of hormone is a peptide hormone called the Müllerian-inhibiting hormone, which has a defeminizing effect on the embryo. The Müllerian system has receptors for the Müllerian-inhibiting hormone. When this hormone binds with the receptors, the Müllerian system begins to wither and degenerate, leaving just a small vaginal rudiment.

- The second type of hormones are called androgens. These have a masculinizing effect on the embryo. In order for the hormones to have this masculinizing effect, two androgens are required. The first is testosterone, and the second is derived through the action of an enzyme called 5-α *reductase* that converts testosterone into dihydrotestosterone (Carlson 1994),

  The Wolffian system has androgen receptors connected to cellular mechanisms that promote cell growth and division. When molecules of testosterone bind with these receptors, the male sex organs develop.

The Müllerian system does not require any hormonal stimulus in order to develop. In the absence of low levels of testosterone and the testis-determining factor, ovaries develop. The ovaries begin to produce hormones, principally oestrogen and

progesterone, and the Müllerian system develops, while the Wolffian system begins to degenerate, eventually leaving just a small vestige of the Wolffian duct.

Along with the sexual dimorphism of the internal and external sex organs, the critical levels of androgens that cause masculinization or feminization of the embryo, also trigger the following sexual differentiation processes:

The 'organisation' of the hypothalamus into female cyclical or male acyclical hormone functioning patterns. The hypothalamus is a region of the lower brain that produces hormones in response to sensory and other signals, sends them to be stored in the pituitary gland (which is a small appendage at the base of the hypothalamus), and controls the release of hormones by the pituitary gland.

The development of neural circuits in the medial preoptic area (MPA), and sexually dimorphic nucleus (SDN) area of the brain, which are particularly responsive to androgens in the case of males, and the ventromedial nucleus area of the hypothalamus (VMH), which is particularly responsive to oestrogens and progesterones in the case of females.

From puberty onwards, the reproductive and sex related functioning areas of the brain, the gonads, and pituitary glands form an interconnected and interdependent feedback system that controls the development of secondary sex characteristics, reproductive functioning and sexual behaviour. Errors that occur, arising either from genetic or environmental factors, affecting either the reproductive and sex related functioning areas of the brain, the gonads or pituitary glands, can have knock-on effects on sexual development and behaviour resulting in anomalous development, which will be discussed further. (See Section 2.2)

2.1.2.1.2 Experimental hormonal sex reversal effects on genetic determination

David Dixon (1994) reports on research on a species of fish commonly called the Nile tilapia, *Oreochromis niloticus.* These tilapias have sex chromosomes with females having XX chromosomes and males XY chromosomes. Scientists have used hormones to change the sex of male tilapia. These fish which are 'female' but genetic males, were mated with males, and their offspring tested to see if any YY fish developed. By a process of sex-reversal and progeny testing over five generations, 16 YY males have been raised. When these YY fish mate with normal females they have 95% male progeny. Farms of all-male fish grow faster and bigger and so these YY fish are of commercial interest.

While functional gonadal sex reversal can take place in fish and other animals due to steroid hormones (See Section 2.1.2.3.2) and behaviour dependent circumstances (See Sections 2.1.2.2.2; 2.1.2.2.3) and a partial sex-reversal can take place in the freemartin condition in cattle, which will be discussed further (See Section 2.1.2.3.1), for mammals in general, gonadal sex is immutable.

2.1.2.2 Nongenetic triggers of sexual differentiation

In the case of species of animals who do not have sex chromosomes, various determining factors influence the gender of the embryo. These include:

2.1.2.2.1 Temperature-dependent sex determination

The gender of many species of crocodiles, alligators, turtles, lizards and tortoises is determined by the incubation temperature of the eggs during a critical period of embryotic development. However this applies only to those animals who lack sex chromosomes. Those lizards and turtles for example, who do have heteromorphic sex chromosomes, are unaffected by temperature.

The temperature changes which affect sex determination are very slight and usually involve fluctuations of just 2-4 degrees C. The eggs of many turtles and tortoises produce only males at incubation temperatures between 16-28 degrees C and females at temperatures above 32 degrees C. Lizards who do not have heteromorphic sex chromosomes, produce only females at temperatures up to 26 degrees C, and all males at temperatures above 28 degrees C. Intermediate temperatures result in an evenly balanced distribution sex ratio. For geckos however, low and high incubation temperatures produce females and intermediate temperatures produce males (Crews 1994). The critical period for this process of sex determination occurs in the middle of the embryological development, coinciding with gonad development. David Crews (1994) found that temperature appears to act by modifying the distribution of enzymes and hormone receptors, including oestrogen and androgen receptors in the embryo. Once set, the gender of these animals remains permanent.

2.1.2.2.2 Behaviour and environment-dependent sex determination

Many animals whose gender is behaviour and environment dependent are hermaphrodites, which means they have both male and female gonads. Hermaphrodites may be:

Sequential hermaphrodites which means that an individual animal reverses its sex during its lifetime but expresses only one gonadal sex at any given time. Some sequential hermaphrodites are 'protogynous', which means they are born female, and others are born 'protandrous', which means they are born male. An example of a protandrous sequential hermaphrodite is the clownfish or anemone fish that lives in coral reefs. The dominant male within a group of fishes becomes a female and the next dominant male becomes its mate. If, however, the female dies or is swept away, the remaining male mate changes sex and replaces her as a functioning female, and so repeats the cycle again.

Age, size and dominance appear to be important in triggering sex reversal in protogynous fish such as wrasses or species of sea basses. The biggest and usually the oldest and most dominant female in the female harem will change sex to become male if the male leader of the harem dies or is swept away. The research of Karel Liem (1993, cited in Campbell 1993) would suggest that in the case of one species of protogynous mud eel, *Monopterus albus*, environmental factors trigger sex reversal. In this case, adverse conditions within ponds that are drying out, appear to trigger the sex change from females to males. Other ponds experiencing more favourable conditions will retain their all female eels. During the rainy season when ponds overflow, eels of both sexes are then able to intermix and so reproduce.

Simultaneous hermaphrodites which means that they can change sex, sometimes within minutes, depending on sensory stimuli coming from the environment and social changes among the surrounding fish. An example of this type of hermaphrodite can be seen in the butter hamlet fish which alternate between male and female sex roles in successive matings (Crews 1994).

2.1.2.2.3 Parthenogenesis or self-cloning

Parthenogenesis is a form of asexual reproduction in which an egg develops into an embryo without fertilization. It occurs either exclusively or in certain circumstances among species of bees, wasps, ants, fish, amphibians and lizards. One interesting example can be found in the desert grassland whiptail lizard which is an all-female species. While it might be assumed that these species of animals do not need to engage in any sexual behaviour, David Crews (1994) in his study of whiptail lizards has found that this is not the case. Every two to three weeks during the breeding season, the lizards adopt pseudosexual behaviours alternating between male and female behaviours that are controlled by hormones. When oestrogen levels are high and its ovary is growing, a lizard is more likely to behave in a 'female' way. After ovulation when the oestrogen levels drop and the levels of progesterone increases, the lizard is more likely to behave in a 'male' way. These pseudosexual interactions have

an important biological function since they encourage the animals to lay more eggs than they would when they are alone (Crews 1994; Campbell 1993).

2.1.2.3 Sex Hormones

The so called 'sex hormones', that is the 'female' hormones oestrogen and progesterone and the 'male' hormones androgens, primarily testosterone, are secreted by the testes in males and the ovaries in females and by the adrenal glands in both sexes. Although it is often believed that only males secrete 'male' hormones and only females secrete 'female' hormones, both sexes produce testosterone, oestrogen and progesterone. It is just the proportions of these hormones that vary from individual to individual and between males and females depending on daily, monthly and life stage circumstances and experiences.

In one experiment, amniotic fluid in human female and male foetuses between the 14th and 20th week of pregnancy was analysed (Finegan *et al.* 1989, cited by Rollins1996). The researchers found that although there were significant differences overall between the female and male levels of testosterone, 25% of the males and 9% of the females fell into the overlap range. Levels of testosterone, oestrogen and progesterone in males and females have also been examined (Hoyenga and Hoyenga 1993, cited by Rollins 1996). Female levels of these hormones varied depending on the menstrual stage and so high and low levels of each of these hormones were recorded. Following puberty there were no overlaps in male and female testosterone levels. Male ranges went from 5,140-6,460 picograms per millilitre of blood while females ranged at their lowest levels from 200-400 to between 285-440 at their highest levels. In the case of oestrogen, female oestrogen levels varied at their lowest levels from 35-50 picograms per millilitre of blood and at their highest levels from 193-400. Male ranges went from 19-56, which falls within the low levels of the female range. Male ranges for progesterone also fell within the low range for females, and so males were found to range from 200-500 while females ranged at the lowest level from 200-500 and at the highest level reached as high as 14,000.

In the area of sexual development, timing is very important. There are critical periods that vary from species to species during prenatal, postnatal and pubertal development when the timing of the interaction between particular levels of hormones and an individual is crucial. For example, if critical levels of particular hormones are not present at the right time, the heterogametic sex will fail to develop and the homogametic sex will develop in spite of contradictory genetic information from the sex chromosomes. In a similar way, if an individual is exposed to abnormal levels of endogenous or exogenous hormones, the homogametic sex may develop into the heterogametic sex, again, regardless of contradictory genetic information from the sex chromosomes.

Sex hormones have two types of effects:

(a) During prenatal development they have organizational effects which mean that, depending on the heterogametic sex, and the presence or absence of particular hormones, they influence the masculinization or feminization of an individual's internal and external sex organs and the reproductive and sex functioning areas of the brain.

(b) From puberty onwards, they have activational effects which activate secondary sex characteristics, sperm and ova production, reproductive functioning and sexual behaviour.

2.1.2.3.1 The effects of hormones on sexual dimorphism

Sometimes a genetic defect may result in the development of a gonad that is at variance with genetic make-up. The hormones produced by the gonad however, depend on the type of gonad and not on the genetic make-up of the individual. Generally speaking, the heterogametic sex is the dominant one. Therefore, in the case of mammals, sex hormones, produced by the testis, will result in masculinization and defeminization of the embryo, while a lack of these testis-produced sex hormones at

this critical stage, will result in the automatic development of a female embryo. In the case of birds however, where the heterogametic sex is female, a lack of ovary-produced sex hormones at a critical period, results in the automatic development of the masculine embryo.

The effects of foetal hormones on the development of sex organs have been widely studied. One interesting example of the effects of foetal hormones can be seen in the freemartin condition that occurs in cattle. In this case, twins of opposite sexes share a common placental circulation. The genetic female twin is exposed to high levels of testosterone and so varying degrees of masculinization of the female's genitalia occurs, along with sterility.

2.1.2.3.2 Synthetic hormones and their effects on sexual dimorphism and reproduction

There is a growing body of evidence that indicates that synthetic hormones, principally synthetic oestrogens in the environment, are causing abnormal sexual and reproductive development. However, while many chemicals have been linked with abnormalities, hard evidence that proves these associations beyond doubt, is still not available. Gail Vines lists some of these 'suspect' chemicals:

> *"industrial chemicals and products of petrol combustion such as polycyclic aromatic hydrocarbons (PAHs) polychlorinated biphenyls (PCBs) and dioxins: phthalates which are added as plasticisers in plastics and used as ingredients in paints, inks and adhesives: alkyl phenolic substances (such as octyl and nonyl phenol), which are breakdown products of alkylphenol polyethoxylates (APEs) used as surfactants in industrial detergents and also found in paints, herbicides and some plastics: and organochlorine pesticides such as DDT, aldrin and dieldrin." (Vines 1995, p. 24)*

Some sexual and reproductive anomalies have been reported (Vines 1993; 1995; Davis and Bradlow 1995; Colborn *et al.* 1996) and these anomalies have included:

- Male fish living near the outlets of sewer systems who behave physiologically like females by producing vitellogenin, a female protein that is the precursor of yolk.

- An epidemic of infertile eggs laid by western gulls, and common and roseate terns on the Pacific coast of the United States and recently attributed to oestrogenic effects of DDT and PCBs.

- Abnormally small penises in male alligators hatched in Lake Apopka Florida, following a spill of Kelthane, a pesticide that at the time contained DDT as an inert ingredient.

- Incompletely descended testes in panthers living in regions of south central Florida in which soil or water contained high concentrations of heavy metals and persistent chlorinated organic substances.

- Death of embryos, deformities and abnormal nesting behaviours in fish-eating birds living in the Great Lakes regions contaminated by chlorinated organic compounds.

2.1.2.3.3 The effects of sex hormones on brain organisation

As already explained (See Section 2.1.2.1.1), prenatal sex hormones influence the sexual differentiation of the internal and external sex organs of an individual. They also play an important role in the organization of the brain in those areas that control sex hormonal release and which subsequently affects reproductive and sexual behaviour. For males, sex hormone release occurs in a noncyclic manner, while for the female, it occurs in a cyclic manner, as a menstrual cycle in the case of female primates, and for other species of mammals, as an estrous cycle.

A wide range of experiments have been carried out on animals in order to see the effects of sex hormones on sex development and sexual behaviour and the critical periods that activate these hormonal effects. These experiments have involved

(1) Castration of males

(2) Ovariectomization of females

(3) Administration of androgens to females

(4) Administration of oestrogens and gestagens to males

(5) Administration of various hormones to pregnant females.

The findings from these experiments have shown that there is a critical time when:

(a) exposure of the foetus to androgens results in sexual behavioural masculinization and defeminization in the adult animal, and

(b) nonexposure to androgens results in sexual behavioural feminization in the adult animal.

These critical periods vary from species to species and in the case of the rat which has been intensively studied, the critical period occurs immediately after birth.

The importance of the critical period has been shown in experiments in which gonadectomies have been carried out on rats at different stages of development. If a gonadectomy is carried out on an adult male rat and it is subsequently injected with oestrogen followed by progesterone (which mimics the pattern of female hormonal

experience), it will not demonstrate lordosis[1] but will instead adopt male sexual behaviour with a receptive female. In this case, the critical period for androgenization of the rat's brain having passed, subsequent gonadectomy and exposure to 'female' hormones have no effect. However, if a neonatal gonadectomy is carried out (before the critical stage for androgenization) and the rat is treated with oestrogen and progesterone, it will demonstrate lordosis and will be indifferent to any receptive female. Neonatal gonadectomy followed immediately by an injection of testosterone will result in normal male sexual behaviour, even if oestrogen and progesterone injections are administered in adulthood (Alcock 1993).

If androgenization of the embryo occurs in mammals at a critical stage of development, the androgens suppress the development of neural circuits in the brain that control female hormonal release and female sexual behaviour. All embryos have receptors that are sensitive to androgens and oestrogens. The receptors that are particularly sensitive to androgens, testosterone in particular, attract the hormone into their target cells, where it is carried to the nucleus. New proteins are produced which affect the biochemical activity within the cell and its cellular development (Alcock 1993). At this stage the embryo is committed to a pattern of masculine sexual development and sexual behaviour.

In one set of experiments, new-born female rats were injected with testosterone and subsequently failed to develop estrous cycles after puberty (Short 1982). Experiments have also shown that if a female rodent is ovariectomized and given an injection of testosterone immediately after birth, she will not respond sexually as an adult to a male rat, even if she is injected with estradiol and progesterone (Carlson 1988). If however, she is given an injection of testosterone as an adult she will adopt male

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[1] Lordosis is a female sexual posturing position in which the female moves her tail away (if she has one) and stands rigidly.

sexual behaviour, and will mount and attempt to copulate with a receptive female (Carlson 1988). Evidence for the growth of male nuclei in females is reported by David Crews (1994) who reports on experiments that show that male gerbils have a nucleus in their brains that is embedded in an area controlling sexual behaviour. Female gerbils do not have this nucleus, but if androgenized at birth, they develop this nucleus and adopt some male sexual behaviours.

In the absence of androgenization at a critical stage of development, the progenitor cells of the ovaries develop and produce oestrogen and progesterone. These hormones are drawn to target cells in oestrogen receptors in the brain, where they influence cellular development. Female neural circuits develop which commit the embryo to cyclical hormonal releases (in the case of genetic females) and female sexual behaviour from puberty onwards.

The critical period when a rat embryo is sensitive to testosterone occurs between 18 and 27 days after conception (Alcock 1993). Experiments have shown that without testosterone at this crucial period, a genetic male will adopt female sexual behaviour. Philip Blumstein and Pepper Schwartz (1989, cited in Brannon 1996) castrated male rats immediately after birth. The rats were therefore not exposed to androgens at a critical period of their development. When these rats were given injections of estradiol and progesterone in adulthood, they displayed typical female sexual behaviour with pseudolordosis mannerisms.

The ability of hormones to affect brain structures can be seen in some species of songbirds who have sexually dimorphic brain structures that appear to be associated with male courtship behaviours (Crews 1994). In the case of male and female canaries for example, research has shown that in the males, nuclei in the song-control regions of the brain are larger than in the case of females. Male canaries begin to sing in the springtime when they have high levels of androgen and this singing helps them to establish their territories and attract females. Females are unable to sing, but experiments have shown that if injected with androgens at a critical stage in

development, they can be induced to sing (Crews 1994). Similar findings have been found in the study of zebra finches where their song system[2] is larger in males than in females. John Alcock (1993) found however that in the case of many songbirds, a critical period for song learning exists which can override genetic and hormonal inputs, if for example, a male bird is reared in isolation.

2.1.2.4 Aspects of animal behaviour

2.1.2.4.1 Sexual behaviours

2.1.2.4.1.1 Factors affecting sexual behaviour

A lot of research has been carried out into the role played by hormones in the sexual behaviour of animals, mainly mice, rats and monkeys. Sexual behaviour within a particular species of animal is usually rigidly defined. Mammalian animals for example, have a standard repertoire of sexual behaviours. An adult male will usually be responsive to females in estrus, i.e. when they are 'in heat'. He will mount a receptive female and carry out the normal sexual behaviour of males with intromission, pelvic thrusting and ejaculation. A receptive female will adopt the lordosis female sexual posturing position, move her tail away (if she has one) and stand rigidly.

Five main factors have been identified which affect the appropriate adoption of sexual behaviour in animals. These include: (A) Hormonal organisational and activational effects on areas of the brain affecting sexual behaviour (B) Critical periods in brain development which affect hormonal sensitivity (C) Prenatal hormonal effects on

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[2] The song system is a chain of distinct neural elements running from the front of the brain to its connection with the spinal cord.

sexual behaviour (D) Temperature incubation effects on sexual behaviour (E) Stress effects on hormonal release

2.1.2.4.1.1.1 Hormonal organisational and activational effects on areas of the brain affecting sexual behaviour

Neil Carlson (1988) has described the organisational and activational effects which hormones have on areas of the brain affecting sexual behaviour. These areas include:

- the medial preoptic area, a forebrain region just above the hypothalamus
- the ventromedial nucleus of the hypothalamus

2.1.2.4.1.1.1.1 The medial preoptic area

The medial preoptic area (MPA) is located rostral to the hypothalamus. (See Section 4.4.1.2.1) Research has shown that this area of the brain plays an important role in male sexual behaviour. If the medial preoptic area is electrically stimulated, it triggers male sexual behaviour, copulation increases the metabolic activity of this region and if the MPA is destroyed, male sexual behaviour ceases permanently (Carlson 1988). If male rats are castrated on the day they are born, their medial preoptic nuclei are reduced in size, while new-born females who were injected with testosterone had increased nucleus volumes (Short 1982).

Research by Gorski *et al.* (1978, cited in Carlson 1994) identified a particular nucleus within the MPA that is sexually differentiated. This area is called the sexually dimorphic nucleus (SDN) and its size is controlled by the amount of androgens present during foetal development. In the case of the male rat, its SDN is 3-7 times larger than the female's. Prenatal stress, and levels of sexual activity, have in addition, been found to affect the size of this nucleus (Anderson *et al.* 1986, cited in

Carlson 1994). Lesions in the SDN have been found to decrease levels of masculine sexual behaviour.

2.1.2.4.1.1.2 The ventromedial nucleus of the hypothalamus

The ventromedial nucleus of the hypothalamus (VMH) (especially the anterior third of the VMH) has in experiments been shown to play a crucial role in female sexual behaviour. Females with lesions in the VMH do not display lordosis, electrical stimulation of the VMH encourages female sexual behaviour, and injections of estradiol followed by progesterone, will activate sexual behaviour in ovariectomized females (Carlson 1988).

Neurons in the VMH send outgrowths or axons that carry nerve impulse messages to the periaqueductal gray matter (PAG) in the midbrain. The connection between the VMH and the PAG has been demonstrated by Sakuma and Pfaff (1980a; 1980b, cited by Carlson 1994) who found that injections of estradiol or electrical stimulation of the VMH, increase the firing rate of neurons in the PAG (Carlson 1988). The PAG area appears to also have an important role to play in female sexual behaviour. Electrical stimulation of the PAG area triggers lordosis displays in females, while lesions in the PAG eliminate this behaviour (Carlson 1988).

2.1.2.4.1.1.2 Critical periods in brain development which affect hormonal sensitivity

As already discussed (See Sections 2.1.2.3.3; 2.1.2.4.1.1.1) animal experiments have established that there are critical periods in brain organisation development that affect sensitivity to particular sex hormones and subsequent adult sexual behaviour.

2.1.2.4.1.1.3 Prenatal hormonal effects on sexual behaviour

2.1.2.4.1.1.3.1 The intrauterine position phenomenon

Studies have been carried out on animals who produce large litters of young in each pregnancy, such as rats, mice, and gerbils. Experiments carried out by vom Saal and Bronson (1980, cited by Colborn *et al.* 1996) and vom Saal (1984, cited by Colborn *et al.* 1996) discovered that the position which an individual foetus has in the womb can have effects on the animal's sexual development and sexual behaviour. This is referred to as the 'intrauterine position phenomenon' or the 'wombmate' effect.

The female mouse has a womb that has two separate compartments or 'horns'. Mice embryos lie in these two horns 'like peas in a pod'. Vom Saal and Bronson (1980, cited by Colborn *et al.* 1996) found that a female lying between two males (known as a 2M female) is exposed to higher concentrations of testosterone than a female mouse who is not in contact with a male (known as an 0M female). After birth the 2M female will have more masculine anatomy, will take longer to reach puberty, have shorter and fewer reproductive cycles, will be less attractive and less sexually arousing to males (due to differences in pheromones), and will behave more aggressively towards other females.

Very surprisingly, when the development of 2F males (i.e. males who lie between two females) was investigated it was found that following increased exposure to oestrogen in the womb, 2F males were more sexually active, had larger prostates with three times the number of testosterone receptors, they were more sensitive to testosterone in adulthood and were more likely to attack and kill young mice than 0F male mice. In this situation the oestrogen appears to act by enhancing the effects of testosterone (Colborn *et al.* 1996). The masculinization effects of oestrogen have also been confirmed by research into a wide range of female animals including rats, hamsters, guinea pigs, amphibians, songbirds, rodents, dogs, cattle, sheep and rhesus monkeys (Colborn *et al.* 1996).

OM females, i.e. females surrounded by females, and OF males, i.e. males surrounded by males, showed pronounced characteristics of maleness or femaleness, with OF males showing the greatest aggressiveness towards other adult males. While it may be tempting to project these findings onto humans, ethical considerations obviously prohibit experimentation in this way with human foetuses. Further long term analysis of multiple births could however be ethically carried out to see if these hormonal effects apply to humans. One possible example of hormonal effects in human multiple births is reported by Mc Fadden (1993, cited by Colborn *et al.* 1996) who found evidence that in the case of male and female co-twins, girls showed a male pattern response in an auditory test.

2.1.2.4.1.1.3.2 Masculinization of the spotted hyena

Another example of the effect of foetal hormones can be seen in the development of the spotted hyena, a nocturnal carnivore from Africa. Research has shown that the female hyena is exposed to very high levels of androstenedione in its mother's bloodstream, which can be converted into either oestrogen or testosterone. In this case, the androstenedione is mainly converted into testosterone and this causes a masculinization of the female hyena. As a result, the female is larger and heavier than the male, it dominates in access to food, in social activities and frequently becomes involved in aggressive disputes. The female also has external genitalia that have a masculinized morphology, with a large erectile clitoris and fused labia that form a scrotal sac with two bulging pads of fat that resemble testes (Crews 1994).

2.1.2.4.1.1.4 Temperature factors affecting sexual behaviour

As already discussed (See Section 2.1.2.2.3), David Crews (1994) has found that in animals whose sex determination is temperature-dependent, temperature affects enzyme and hormone receptors (including androgen and oestrogen receptors) in the embryo. He has carried out extensive research into leopard geckos where females develop from low and high incubation temperatures, and males from intermediate

temperatures. Not only are these temperatures sex determining, they also have been found to affect sexual behaviour. For example, females who develop from relatively cool incubation temperatures (a) mature faster (b) have higher levels of androgens (c) lower levels of oestrogens and (d) develop pubic glands which have patent pores similar to those found in males, in comparison to those who are incubated at warmer, more male-biased incubation temperatures. These factors appear to affect the sexual desirability of females (from male-biased incubation temperatures) who have been found to be less attractive to males than females (incubated at female-biased temperatures) (Crews 1994).

2.1.2.4.1.1.5 Stress effects on hormonal release

Stress appears to play a part in determining adult sexual behaviour by affecting hormonal release. In one experiment, pregnant rats were subjected to stress by keeping them in an enclosed area and shining a bright light on them (Ward 1972, cited by Carlson 1988). This stress appears to have suppressed androgen production in male foetuses, with the result that they were more likely than control mice, to display female sexual behaviour if injected with estradiol and progesterone, than control mice. In an experiment carried out by vom Saal *et al.* (1990, cited by Colborn *et al.* 1996) pregnant mice were stressed during the later parts of their pregnancies and it was found that females who were subsequently born were less attractive to males, had fewer reproductive cycles, matured faster and were more aggressive than females born to non-stressed mothers.

2.1.2.4.1.2 Variations in homotypical and heterotypical sexual behaviour

Adults in most vertebrate species usually exhibit sexual behaviours that are homotypical, i.e. behaviours that are characteristic of their own gonadal sex. Some animals however will demonstrate sexual behaviours that are heterotypical, i.e. associated with the opposite sex.

In a wide range of experiments, heterotypical sexual behaviour has been triggered in animals such as rodents or monkeys through surgical or hormonal interventions. Environmental factors such as maternal stress in the case of rats (Ward 1972, cited by Carlson 1988) or social isolation in the case of rhesus monkeys (Harlow and Harlow 1962, cited in Sylva and Lunt 1986) have also been shown to affect sexual behaviour including the display of heterotypical sexual behaviour.

Sometimes heterotypical sexual behaviour is associated with dominance struggles within a group, as in the case of mounting among rhesus monkeys (Crews 1994) or some species of animals. Heterotypical sexual behaviour even appears to play an important biological role as in the case of cows who frequently mount other cows, a behaviour that appears to synchronise the reproductive cycles of the whole herd (Crews 1994).

Some animals move freely from homotypical to heterotypical sexual behaviours. As David Crews has pointed out,

> *"Even though embryonic hormones direct neuronal development, it seems that the brain never completely loses the dual circuitry that permits both homotypical and heterotypical sexual behavior." (Crews 1994, p. 99)*

An interesting study of this 'dual circuitry' was carried out by Konrad Lorenz (1967), in his study of 'homosexual' greylag geese. He reported that since there are few observable sexual differences between males and females, ganders often make 'triumph-rite proposals' to other males instead of to females. If the proposal is accepted, the pair can bond for life. They will attempt to mount each other each springtime but appear to accept the inconclusive outcomes of these attempted matings. "In a manner of speaking, each takes the other for a female, but the fact that 'she' is a little frigid and simply will not be mated scarcely interferes with the great love." (Lorenz 1967, p. 169).

Sometimes an unpaired female will 'fall in love' with one of the males and eventually through persistence, may even become part of a triangular marriage. She may begin to take part in the triumph ceremonies of the two males and eventually one or both males may copulate with the female and combine together to care for any offspring. Konrad Lorenz reports that among families of wild pink-footed geese observed in Iceland, a considerable percentage consisted of two males and one female.

Evidence to support this 'dual circuitry' also comes from Frans de Waal, who studied a group of animals who practise both homotypical and heterotypical sexual behaviours across age and sex divisions as a means of social cohesion. The animal in question is the bonobo, who shares: "98% of our genetic profile, making it as close to a human as, say, a fox is to a dog" (de Waal 1995, p. 58).

Bonobos become sexually aroused very easily, as, for example, when they see food or find a new play item. Before they eat, both juveniles and adults will engage in various types of genital rubbings, tongue kissing, hugging, copulations and pseudocopulations in a relaxed and casual way. If any accidental or intentional aggressive event occurs, sex is used as a conciliatory gesture. Frans de Waal (1995) believes that this type of behaviour helps the group to avoid conflict, divert attention and diffuse tension and so it forms an integral part of the social life of the bonobo.

2.1.2.4.2 Aggressive behaviour

According to Neil Carlson (1988; 1994), there are three basic forms of aggressive behaviours among animals, namely: offense, defense and predation behaviours. These types of behaviours are controlled by different brain mechanisms, with the particular movements that an animal makes in attacking or defending itself already programmed by neural circuits in the midbrain. These neural circuits appear to be controlled by the hypothalamus and limbic system, especially the amygdala and are dependent on stimuli that the animal receives from the environment and the animal's previous experience.

- Offensive behaviours

These behaviours involve physical assaults on other animals. In experiments carried out by Adams (1986, cited by Carlson 1994), lesions in the ventral tegmental area (VTA) of rats were found to disrupt offensive attacks, injections of excitatory drugs into the anterior hypothalamus were found to produce offensive attacks, while, Koolhaas *et al.* (1990, cited by Carlson 1994) reports that vasopressin injected into the medial amygdala increased offensive behaviour in rats.

- Defensive behaviours

These behaviours can include attacks on another animal, threat behaviours that consist of warning postures or gestures performed to warn off an adversary, or submissive behaviours that show that the threatened animal will not challenge the other animal. Neural control of these behaviours seems to be located in the periaqueductal gray matter (PAG). Stimulation of different parts of the PAG with excitatory amino acids or electricity, produces defensive behaviours. Lesions in the amygdala have a taming effect on animals and, for example, eliminate defensive attacks in wild rhesus monkeys, while cats who showed high levels of defence behaviours recorded high levels of neural activity in the amygdala (Adamec 1991, cited by Carlson 1994).

- Predation

In this case a predator animal attacks another animal in order to eat it. Stimulation of various parts of the PAG with electricity or excitatory amino acids, and stimulation of the lateral hypothalamus produces predation in animals. Lesions in the PAG interfere with aspects of predation behaviours preventing the killing bite of a predator but not the stalking and lunging towards a prey (Waldbillig 1979, cited by Carlson 1994).

Apart from self defence and predation, most examples of aggressive behaviours among animals are related to reproduction in its widest sense, including behaviours arising from care of the young, mate finding and defence of territories. Males and females can be aggressive depending on the circumstances and these behaviours have been shown in experiments to be affected by hormones. Neil Carlson (1994) has described the main areas of research into aggression in animals.

As already discussed (See Section 2.1.2.3.3), androgenization has an organizational effect on the development of testosterone-sensitive neural circuits in the brain. Androgens have been experimentally shown to be associated with levels of aggression in animals. If rats are castrated immediately after birth, they show low levels of adult aggression, but this aggression can be restored by testosterone implants in the medial preoptic area (MPA) of adult castrated rats. Ovariectomized female rats who were given testosterone injections for fourteen days, showed increased aggressiveness, while injections of estradiol decreased levels of aggressiveness. Research into increased levels of maternal stress and the intrauterine position phenomenon has already shown the modifying effects of hormones on behaviour including aggressive behaviour (van de Poll *et al.* 1988, cited by Carlson 1994; vom Saal and Bronson 1980, cited by Colborn *et al.*1996; vom Saal 1984, cited by Colborn *et al.* 1996; Ward 1972, cited by Carlson 1988).

Depending on hormonal levels and particular circumstances, mothers will defend their young and attack any intruders. Until mother rats have suckled their young for 48 hours, they are completely docile and will not attack intruders. At this stage the mother has high levels of oestradiol and is ready to mate. After that period she will defend and savagely attack any intruder. It is probably very appropriate that females develop this strategy after mating, because vom Saal (1985, cited by Carlson 1988), has shown that following copulation, a male mouse is more likely to kill any pups he comes in contact with for a period of nineteen days, by which stage his own pups would be likely to be born. From nineteen to fifty days after the male copulates (by which stage his pups would be weaned) he is docile with, and will take care of pups.

Seasonal variations in hormonal levels affect aggressive behaviours. In the case of red deer who breed in the autumn, testosterone levels are at their highest in the autumn when the stags are most aggressive (Rollins 1996). Social positions within a group also appear to have an effect on aggressive levels. In experiments with cynomolgus monkeys who were injected with testosterone, the greatest levels of aggression were recorded among those monkeys who were highest in the dominance hierarchy, and the lowest levels were recorded among those who held a low dominance position (Rejeski *et al.* 1988, cited by Rollins 1996).

2.1.2.4.3 Parental behaviours

Animals adopt a wide variety of parental strategies in order to ensure that at least some of their offspring survive. Here are some examples which indicate the variety of practices that are adopted by animals:

2.1.2.4.3.1 Absent parents

There are many examples of animals who produce young and leave them to fend for themselves. Many of these animals combine low parental involvement with the production of hundreds of eggs at one time, thereby increasing the likelihood that at least one or two will survive. Examples of this type of approach can be seen in egg-scatterer fish like characins, who will often eat some of their own eggs. Common frogs provide another example. They lay hundreds of eggs in a jelly-like substance that provides food for the developing eggs. Those eggs that survive will hatch out into tadpoles and some of these tadpoles will develop into frogs. Most of the eggs and tadpoles however will be eaten by fish, ducks and insects. To be successful however, each frog just needs to be succeeded by at least one offspring.

2.1.2.4.3.2 Intensive parenting by both parents

For other animals a high level of attention is given to relatively small numbers of offspring, as in the case of many songbirds. After nest-building, parent birds will take

turns patiently sitting on eggs for many days or even weeks. These birds have altrical young which means that when they hatch out they are very helpless, blind, naked or almost naked, unable to stand and totally dependent on their parents. During daylight hours in the breeding season, each parent typically makes over one hundred trips to the nest with items of food for the young. They work almost non-stop without resting. Some birds living in hot dry regions, such as the black vulture, carry water in their beaks back to the nest for their young to ensure that they do not dehydrate. Bird parents work hard keeping the nest tidy, removing droppings from the young birds, and disposing of waste away from the nest. They also have to guard the nest and frighten away or act as decoys to distract any likely predator.

2.1.2.4.3.3 Co-operative parenting

Female lions form co-operative crèches in order to share the burden of cub care. The young lion cubs are born in secluded locations and cared for by the mother until they are quite mobile. At this stage the females band together to form a crèche, sharing responsibility for all the cubs and guarding them from attack. The mothers also hunt together and will bring all the cubs to the meat if it is nearby. Craig Packer and Ann Pusey (1997) in their study of over a dozen crèches, found that every cub was allowed to nurse from each of the mothers. When they analysed the milk from the mothers they found that the amount of milk produced by each teat depended on food intake rather than on litter size. Therefore co-operation among the mothers through forming hunting packs, sharing feeding and guarding helps to ensure the survival of the young.

2.1.2.4.3.4 Paternal care of offspring

In the case of the three-spined stickleback fish, it is the father who looks after the young. These fish live socially in shoals for most of the year. However, in spring, the adult males leave the shoal and establish their own territories. Each male stickleback makes a complicated nest using sticky secretions from his kidneys in order to glue pieces of algae and weeds together. After this he entices a female to lay her eggs in

this nest. He fertilises the eggs with his milt, drives the female away and looks after the eggs by himself. While he waits for the eggs to hatch, he guards them jealously, carries out repairs on the nest and using his pectoral fins, he fans a constant current of well-oxygenated water over the eggs to keep them clean and to aerate them. After the eggs hatch the father protects them until they are ready to fend for themselves.

2.1.2.4.3.5 Maternal care of offspring

The young of mammals are born helpless and depend on milk from their mothers, with the result that the mother generally cares for the young, without any significant help from the father. For example, the rat mother builds a brood nest during gestation. When the pups are born, she licks them clean, nurses them and because they are unable to release their own urine and faeces spontaneously, she regularly licks their anogenital area thereby triggering urination and defecation. If any of the pups leave the nest, she picks them up with her teeth and returns them to the nest. The pups make different types of ultrasonic sounds that let the mother know if they are cold or are being treated roughly (Carlson 1988). The mother cares for the pups for about 16-18 days by which stage they are able to fend for themselves.

2.1.2.4.3.5.1 Mechanisms which trigger maternal behaviour

Although different styles of parenting exist, maternal care has been extensively studied, largely because it can be easily observed in laboratories using small mammals such as rats or mice. There are five main aspects of maternal behaviour that have been investigated. These include:

- Nest building
- Olfaction
- Maternal responses to auditory signals

- The neural basis for maternal behaviour

- The effects of hormones on maternal behaviour

2.1.2.4.3.5.2 Nest building

During gestation, a female rat, for example, will build a brood nest that is constructed from any suitable materials available, such as rope, paper, cardboard, cloth, etc. She shreds the materials and weaves them into a nest shape, with an access hole to the center of the nest. Increased levels of progesterone during pregnancy appear to trigger this nest-building. If a pellet of progesterone is implanted under the skin of a non-pregnant female, she will make a brood nest (Lisk *et al.* 1969, cited by Carlson 1988). When the female has given birth, she will continue to build new nests for her pups if it is necessary, and at this stage, when progesterone levels are low, prolactin[3] appears to trigger this nest-building. When progesterone and prolactin implants were placed in the hypothalamus of mice they started to build nests (Voci and Carlson 1973, cited by Carlson 1994).

2.1.2.4.3.5.3 Olfaction

Rats are very sensitive to strange odours. When a rat for example, gives birth, she spends time licking her pups and becoming familiar with the odours of each of them. If a mother is prevented from licking a pup she will not respond maternally to that pup. Pups who are removed from the mother and raised temporarily by another mother for five days often will not be cared for on their return. It appears that the changed odour of the pups affects the mother's responses (Alcock 1993).

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[3] Prolactin is a hormone which is produced by the anterior pituitary gland and is responsible for milk production.

Research with mice has found that virgin female mice are repelled by the odour of young pups and so do not instinctively care for pups who are nearby. However they can become 'sensitised' and following this sensitisation process, they will permanently respond to, and look after young pups. This sensitisation process can be triggered by repeated exposure to young pups over several days. It can also be initiated if the mouse cannot smell the pups, which enables other triggers, such as sound and tactile cues, to initiate maternal behaviours. Neil Carlson (1988) has described the experimental methods used to interfere with a virgin female mouse's natural aversion to pups. This has been achieved:

1. By treating the mouse with a zinc sulphate treatment that affects olfactory sensitivity.

2. By making lesions in the medial amygdala area of the brain that receives olfactory information.

3. By making lesions in the stria terminalis that connects the medial amygdala with the medial preoptic area (MPA).

2.1.2.4.3.5.4 Maternal response to auditory signals

Rat pups, and other pups such as mouse and hamster pups, make ultrasonic calls that are heard by the mother but cannot be heard by humans. Neil Carlson (1988) has described the two kinds of sounds that the pup makes.

(a) Calls that let the mother know that it is cold. This situation will usually arise if the pup has fallen or moved out of the nest. When the mother hears this characteristic call, she locates the pup and picks it up in her teeth and returns it to the nest where it will get warm again.

(b) Calls that let the mother know that it is being treated roughly. Usually it is the mother who is mishandling the pup. When she hears this characteristic sound she stops suddenly and in this way she appears to learn gradually how to treat the pups more appropriately.

2.1.2.4.3.5.5 The neural basis for maternal behaviour

According to Neil Carlson (1988) there are two main areas in the brain that appear to be critical for the instigation and maintenance of maternal behaviour.

(a) The medial preoptic area. Lesions in the MPA disrupt nest building and affect the mother's care of the pups leading her to ignore them (Numan 1974, cited by Carlson 1994).There are oestrogen receptors in the MPA and the concentration of these receptors appears to increase during pregnancy. In experiments, implants of estradiol in the MPA facilitated maternal behaviour.

(b) The ventral tegmental area (VTA). The MPA sends axons to the VTA of the midbrain and lesions in the VTA have been found to affect maternal behaviour (Numan and Smith 1984, cited by Carlson 1994).

Maternal behaviours can be activated experimentally in virgin female rats or can occur naturally through the triggering action of hormones released during pregnancy and lactation. Only a limited range of maternal behaviours, such as nest-building, retrieval and guarding can be activated in non-pregnant females, since they cannot of course lactate.

2.1.2.4.3.5.6 The effects of hormones on maternal behaviour

While it has been shown that hormones are not essential to initiate at least a limited range of maternal behaviours in virgin female rats and mice, it is also true that

hormones play an important role in triggering and facilitating maternal behaviours in pregnant and lactating females.

Neil Carlson (1988) has described the effects of these hormones and suggests that it is the interactions between the three hormones involved, namely, estradiol, progesterone and prolactin, which appears to be crucial. For this reason although a pregnant rat, for example, is exposed to each of these hormones, variations in levels and interactions between these hormones affect her behaviour. As a result, a pregnant rat will not automatically care for foster pups but she will do so once she has given birth to her own pups. Close to parturition, estradiol levels begin to rise, progesterone levels fall dramatically and prolactin levels increase sharply. If estradiol and progesterone are given to ovariectomized virgin female rats in patterns that duplicate these pre-parturition levels, they become very quickly sensitised (Bridges *et al.* 1990, cited by Carlson 1994). Prolactin appears to depend on interaction with the other two hormones in order to facilitate maternal behaviour. This has been shown in experiments which Bridges *et al.* (1990, cited by Carlson 1994) carried out, where maternal behaviour was activated in virgin female rats if minute quantities of prolactin were placed in their MPA's, but only if the rats were previously injected with estradiol and progesterone.

2.1.3 Conclusions

- The normal development of sexual dimorphism in different animal species can be triggered by environmental factors such as temperature and behaviour, or by genetic factors. In mammals, the development of the X and Y chromosome has led to an increased role for genetic factors in normal sexual development.

- Critical period research in animals has some limited relevance for human development. However, many animals tend to develop standard repertoires of sexual and other behaviours that remain established for the duration of their lives. Most humans have more flexible patterns of sexual and other behaviours that are

amenable to cognitive change throughout their lives. This is one reason, why, as Ruth Bleier, points out, extrapolating data from animal research by leaping "from rodents to humans" (1984, p. 82) is of questionable value.

- Many human societies stereotypically associate aggression with males, and associate concern for offspring solely with females and mothers. The findings from animal research however, indicate that neither sex holds a monopoly on these behaviours. For example, among the two primate species closest to human beings – the bonobo and the chimpanzee, it is the female bonobo who is the dominant more aggressive sex, while in the case of the chimpanzee, the male is the more aggressive and dominant sex.

2.2 ANOMALOUS SEXUAL DEVELOPMENT

2.2.1 Introduction

Studies of individuals with anomalous sexual development provide researchers with a valuable tool to investigate the relative effects of nature and nurture. One important issue that this research investigates, is the development of gender role identity within individuals who have a mismatch between their physical and chromosomal make-up. Another important issue is the feasibility of 'correcting' anomalous development and the ability of socialization mechanisms to 'change' early genderisation processes. This section discusses the range of contributing factors that lead to anomalous sexual development and the results and limitations of research studies that have investigated the process of gender identity in these individuals.

2.2.2 Origins of hormonal imbalances leading to anomalous development

Within the human population, the majority of individuals follow a normal pattern of foetal sexual development within the womb and at birth are unambiguously and correctly identified as being either female or male. However, for a small percentage of individuals problems arise that may result in physical, emotional, psychological

and social difficulties throughout their childhood and adult life and especially at puberty. These problems arise from hormonal imbalances that may occur due to:

- Chromosomal abnormalities within the foetus.
- Gene defects within the foetus.
- Abnormal endogenous exposure to hormones produced by the mother during pregnancy.
- Abnormal exogenous exposure to hormones arising either from medical intervention or environmental factors.

These hormonal imbalances lead to various degrees of primary or secondary level sex features which are at variance with the individual's genetic makeup or which may be ambiguous.

2.2.2.1 Chromosomal abnormalities within the foetus

Although it only occurs approximately once in every 5,000 births, the chromosomal abnormality that has been most widely studied is Turner's Syndrome. People with this syndrome have just one X chromosome, usually described as an XO sex chromosome, and they are classified as 'female' based on their external female genitalia. However, they have under-developed internal reproductive structures, do not develop secondary sexual features at puberty, and are sterile.

A more frequent chromosomal abnormality, occurring once in every 2000 live births, is Klinefelter's Syndrome. People with Klinefelter's Syndrome have at least one extra X chromosome. Usually they have XXY sex chromosomes although there are cases of individuals with XXYY, XXXY, XXXXY and XXXXXY sex chromosomes. Those

with Klinefelter's Syndrome appear to be functioning males although they have an underdeveloped penis, abnormally small testes and are actually sterile. At puberty, secondary female features occur, including feminization of the hips and breast development.

2.2.2.2 Gene defects within the foetus

In the case of Androgen Insensitivity Syndrome (AIS), the individual is a genetic male, but as a result of a recessive autosomal gene defect, becomes insensitive to androgens at a critical stage in development. As a result, a person with Androgen Insensitivity Syndrome has internal male structures with apparent external female genitalia, and is usually classified as female. The syndrome is usually discovered later, when what appears to be a hernia is found to be a testis. People with this syndrome develop feminization of the hips and breast development at puberty, which is assumed to be due to the action of oestrogens produced by the testis and adrenal glands. However, since individuals with Androgen Insensitivity Syndrome do not have a uterus, they are sterile.

Adrenogenital Syndrome may occur due to genetic defects that cause the adrenal gland to secrete excessive amounts of adrenal androgens. Males with this syndrome develop normally, have normal external genitals, although the excessive amount of androgens results in premature puberty, and short adult height. Females with Adrenogenital Syndrome have internal female sexual organs, but their external genitalia will, to varying degrees, be masculinized and ambiguous. Nowadays, in cases where infants are born with ambiguous genitalia it is possible to find out the genetic makeup of the infant and carry out corrective surgery or treatment to enable the child to be reared in agreement with its genetic sex. Prior to modern chromosome identity techniques, mistakes were often made in sex assignment at birth. If the syndrome is not recognised however, the female with Adrenogenital Syndrome will develop further masculinization at puberty, with facial hair and the development of a deep voice.

2.2.2.3 Abnormal endogenous exposure to hormones

Adrenogenital Syndrome may develop if a genetic female is exposed in the womb to excessive levels of androgens produced by her mother during pregnancy, provided such exposure occurs at a critical stage of development. This could occur for example if the mother had a tumour in her adrenal gland.

2.2.2.4 Abnormal exogenous exposure to hormones

Adrenogenital Syndrome may also arise if a genetic female is exposed in the womb at a critical stage of development, to high levels of androgens as a result of progesterone or steroids administered medically to prevent miscarriage.

Various abnormalities of the reproductive tract can also occur in males and females who are prenatally exposed to high levels of oestrogens, either (a) because they were prescribed medically for the mother or (b) because they occur in the environment.

(a) An example of medical factors can be seen in the administration of diethylstilboestrol or DES. Over the last forty years, synthetic sex hormones have been administered to women who had threatened miscarriages. Gail Vines (1995) reports that between the 1940's and later 1970's, 2.3 million pregnant women worldwide were prescribed DES. This synthetic oestrogen drug has subsequently been implicated in cancers of the reproductive systems, infertility and reproductive anomalies occurring in the adult children of women prescribed DES. At one time however DES was recommended to all pregnant women who wanted 'bigger and stronger babies', as a 'morning after' contraceptive, to suppress milk production after childbirth and among many other uses, it was recommended for girls who were growing too tall (Colborn *et al.* 1996). Female offspring of women prescribed DES have developed reproductive tract abnormalities, while males have experienced underdeveloped and undescended testicles, stunted penises and abnormal sperm production (Colborn *et al.* 1996).

(b) There is a growing belief that synthetic oestrogen mimicking chemicals in our environment are causing sexual and reproductive abnormalities not only in animals (See Section 2.1.2.3.2), but also within the human population. According to Gail Vines (1993; 1995) people can be exposed to oestrogens through foods such as milk and soya beans, pollutants such as PCBs, dioxins and detergents, and traces of drugs such as contraceptive pills in drinking water. Algae and fish can 'take up' these chemicals from rivers, lakes and the sea where they can "become multiplied thousands of times in food" (Vines 1995, p. 25). Synthetic hormones can also be stored in human fat where they are likely to be broken down in early pregnancy. All of these factors have led some scientists to conclude that we now live in "a virtual sea of oestrogens" (Vines 1993, p.5). Increases in testicular abnormalities, including cancer, malformations of the penis, undescended testicles and low sperm counts have recently been linked to rising levels of oestrogens in the environment. Pinning blame on any particular chemical however is very complex and Gail Vines (1995) reports on estimates that a complete study of synthetic hormonal effects may require fifty years of research.

2.2.3 Gender identity in cases of anomalous sexual development

One of the central arguments in gender studies and within the area of gender identity in particular, is the nature/nurture debate. If we accept the somewhat debatable point that there are certain behavioural, emotional and psychological differences between women and men, we then have to ask are these differences mainly biological/genetic or environmental? A study of people who have discrepancies between their genetic sex and primary and/or secondary sexual characteristics would therefore help to settle these debates. The main researcher, and the most cited in this field, is John Money (1969; 1970; 1972; 1974; 1975, cited by Hargreaves and Colley 1987). The main findings of John Money and his colleagues are that the most reliable predictor of gender identity is the sex of assignment and rearing. In cases such as Turner's syndrome where an individual does not have gonads and has only one X chromosome, the female assignment at birth leads to the development of a normal female gender

identity. Genetic males with female genitalia or genetic females with masculine genitalia have been found to develop normal gender identities in line with the sex of assignment and rearing. There have been cases in which ambiguous external genitalia were assigned as female although the individuals concerned had 'large and functional phalluses', while others were assigned as male who had only 'rudimentary phalluses' (Kocher Adkins 1980). In spite of these obvious problems and any sexual or emotional problems which may have ensued, the core identity that 'I am a girl' or 'I am a boy' as the case may be, was firmly established, provided consistent sex assignment rearing patterns were practised.

The effects of abnormal exposure to hormones at critical stages of development have been investigated primarily by Ehrhardt and Money (1967, cited by Kocher Adkins 1980) Ehrhardt *et al.* (1968, cited by Kocher Adkins 1980) and Ehrhardt and Baker (1974, cited by Bleier 1984). In general, studies have shown that: (a) androgenization of females at a critical stage of development, results in slightly higher levels of 'tomboyism' in behaviour and interests than that shown by control groups (b) males exposed to lower than normal levels of androgens at a critical stage of development demonstrate slightly more feminization of behaviours and interests than control groups.

There have been problems however with the data from research in this area. First of all, the number of individuals with Turner's Syndrome, Adrenogenital Syndrome or Androgen Insensitivity Syndrome who are prepared to take part in research programmes at a particular stage of time and falling within particular age group spans are generally limited. Ehrhardt and Money (1967, cited by Kocher Adkins 1980) in their first study, carried out research on just 10 girls, a second study (Ehrhardt *et al.* 1968, cited by Kocher Adkins 1980) involved fifteen subjects with Adrenogenital Syndrome, while their 1974 study (Ehrhardt and Baker (1974, cited by Bleier 1984) had seventeen Adrenogenital Syndrome subjects. Criticisms made of these studies have involved sample size reliability, inadequate control of variables, lack of sufficiently matched control groups, and high reliance on self-reports (Kocher Adkins

1980; Bleier 1984). As Elizabeth Kocher Adkins has concluded, research into abnormal hormonal effects on sexual development and gender identity: "should be regarded as suggestive rather than conclusive" (Kocher Adkins 1980, p. 394).

2.2.4 Conclusions

- In general, research from studies of individuals with anomalous sexual development indicates that nurture appears to be more important than nature in the development of gender identity.

- However, due to the limited number of children and adults who experience anomalous sexual development, the data base on which these findings are based is small, leading to questionable reliability.

3. THEORETICAL EXPLANATIONS FOR THE DEVELOPMENT OF GENDER ROLE IDENTITY

3.1 INTRODUCTION

In theoretical discussions in this thesis a distinction is made between the *biological sex* and the *gender* of an individual. Biological sex is taken to refer to the chromosomal, physiological, hormonal and reproductive attributes that define females and males. Gender on the other hand is used to describe the behaviours, attitudes, interests, roles and capabilities that are culturally regarded in a specific society as being more appropriate to females and males. However, within the literature and society in general, no consensus has been reached on the use of the terms 'sex' and 'gender' which tend to be used interchangeably. Reflecting this lack of consistency within original literature sources, some overlapping of these terms will occur in this discussion.

Most people develop a gender identity that is consistent with their biological sex. Sometimes however, anomalies occur which can result in emotional and sexual difficulties leading at times to drastic measures such as sex change operations. The two terms gender and sex however are not independent of each other since: "notions of sex influence gender expectations, and visa versa" (Desai 1995, p. 1180).

All societies in the world perpetuate social differences between the sexes, with customs, clothes, work-roles and pastimes that differentiate and define what constitutes a 'female's world' and a 'male's world'. "Sex roles mark the limits of permissible behavior for individuals who have been categorized as members of a given sex" (Unger 1979, p. 13). These customs and differentiated 'sex-roles' vary from place to place and across time.

Related to the adoption of particular 'sex roles', is the degree of 'sex-typing' which an individual displays. Sex-typing is the process by which a person incorporates the behaviours, traits and characteristics viewed as appropriate for their sex by their particular culture and society. In general, research indicates that from an early age, males are more rigidly sex-typed than females, who are still socially accepted if they

engage in tom-boyish behaviours (Maccoby 1980).This greater flexibility of female sex-typing appears to facilitate the movement of females into 'male designated occupations', while males tend to avoid the reverse movement into 'female' occupations. A report by Demos has identified a group of men whom they call 'resistors' who lose out in the 'battle for work' by rejecting 'women's work', expecting high salaries, and refusing to retrain. "Young men, particularly the unskilled, are becoming the weaker sex as they are unwilling to adapt" (Demos 1997, cited by Norton and Woods 1997, p. 1.9).

Variations in the degrees of sex-typing and the adoption of sex-roles world-wide leads to culture-specific gender identification of occupations and activities. For example, 88% of medical graduates in Denmark are female, while females represent only 44% of medical graduates in Italy (Eurostat 1995). (See Figure 3.1) Bricklayers are predominantly women in Russia, while in Ireland you will only find male bricklayers. In many western societies men dominate public affairs, while among the Kanjar of Pakistan and northern India, girls and women mainly support their families, dominate public and private affairs and are socialised to be aggressive and independent (Cronk 1993).

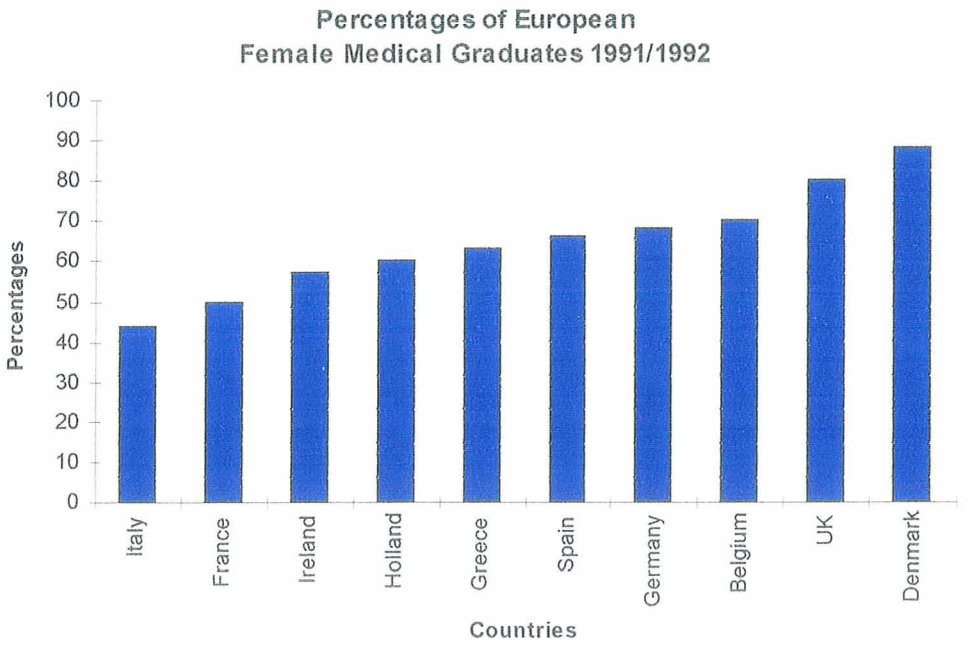


Figure 3.1

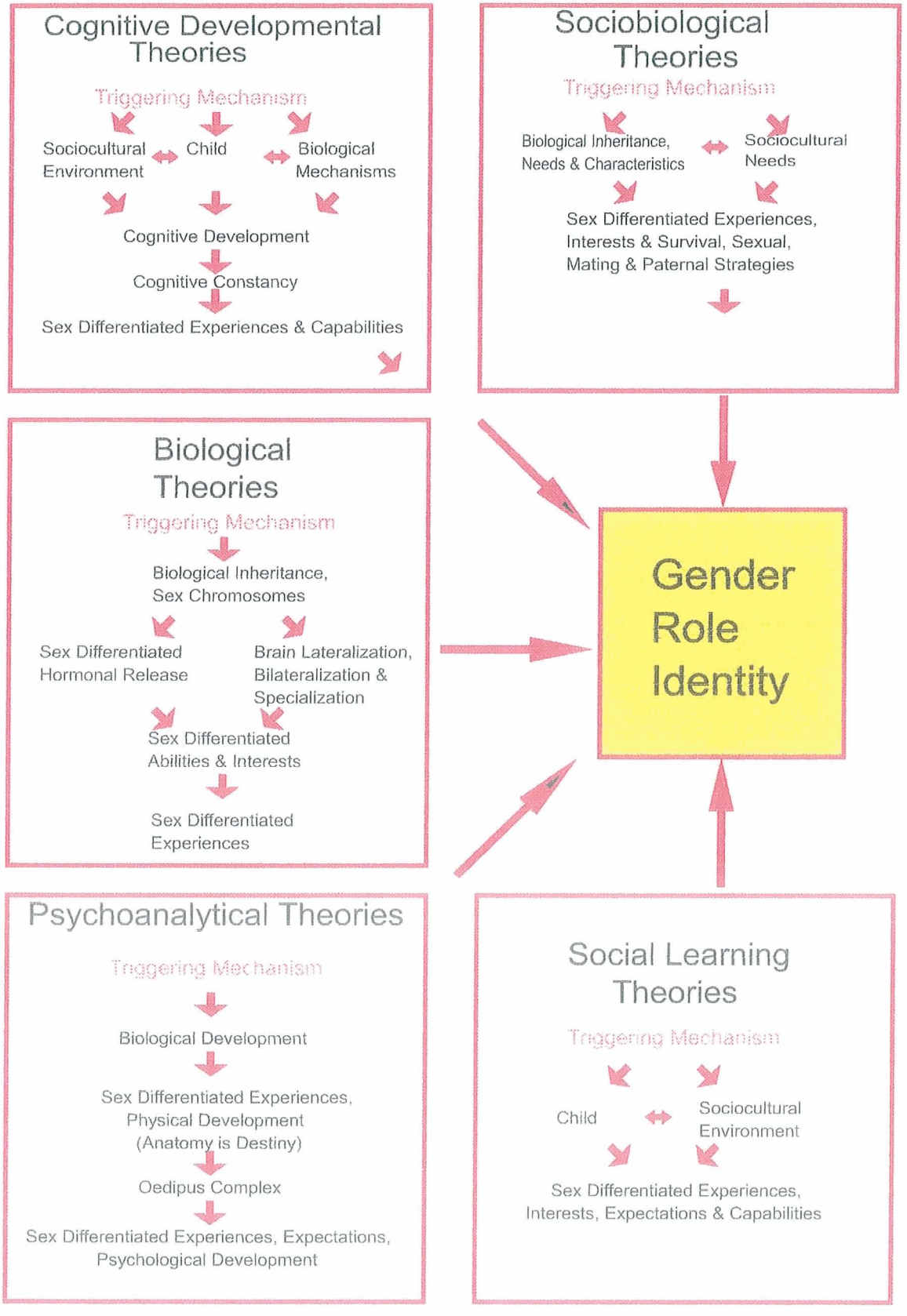
There are, however, two areas where persistent and traditional gender differences occur world-wide, and these are in the areas of child care and warfare. Females are biologically equipped to undertake the nursing of their young babies and so it is easy to see that once this role has been established as a 'female role', gender differentiation is likely to occur within the area of child care. Results from a wide range of research by, for example (Maccoby and Jacklin 1980) have concluded that, in general, males are more aggressive than females. This tendency towards aggressiveness, combined with the greater physical strength of males over females and the vulnerability of pregnant and lactating females, helps to explain why males in all societies predominately engage in warfare. Warfare is understood to be part of a 'man's world'. Once a successful pattern of activity has been established, it is understandable that this pattern could be reproduced from generation to generation and from society to society.

If we take a world-wide view of jobs and activities, we find that at some stage in history or in some location in the world, both women and men have carried out every

type of job and occupation imaginable, including pottery, mining, farming, cookery, tailoring, etc. This even applies to areas of activity that is almost universally 'sex-typed' such as child care and warfare. With regard to child care, Adrienne Burgess (1997, cited by Whitehorn 1997) reports on the Aka pygmy tribe where it is the fathers who take care of the babies. Meanwhile, in the case of warfare, Gill Kirkup and Laurie Smith Keller (1992a) present data on countries where women fighters have been combatants in revolutionary armies and civil wars between 1975 and 1985. These countries include: Nicaragua, Guatemala, El Salvador, Ethiopia, Guinea-Bissau, Mozambique, Angola, Namibia, Iran, Philippines, Vietnam and Zimbabwe.

'Sex–roles' are therefore unreliable indicators of 'masculinity' or 'femininity'. In order to understand how society and the individual concerned recognises that they are either 'male' or 'female', we must first examine the processes that influence the development of a gender role identity and how this affects the sex typing of behaviours. This chapter will first discuss general theories that attempt to explain the processes involved in gender role identity and secondly will focus on the four main theories that attempt to explain these developmental processes, namely: sociobiology, psychoanalytical, cognitive developmental and social learning theories. Schematic Diagram 3.1 presents a broad outline of the main 'triggering mechanisms' or factors which proponents of these four main theories and the biological theories (discussed in Chapter 2) have hypothesised contribute to the development of a gender role identity.

Schematic Diagram 3.1



3.2 FACTORS ASSOCIATED WITH THE DEVELOPMENT OF GENDER ROLE IDENTITY

3.2.1 Stages in the development of gender-role identity

Drawing on ideas taken from different theories of gender development, gender identity and sex-typing, a range of maturational stages have been identified on the developmental path to the establishment of a gender role identity (Newman and Newman 1995; Mussen *et al.* 1990).

1. Developing an understanding of gender identity.

2. Acquiring gender-role standards.

3. Identifying with the same-sex parent.

4. Establishing a gender-role preference.

The eventual outcome of this development course depends on the characteristics of the child's parents or carers and their approach to gender-role socialisation, the child's personal capacities and preferences and the cultural and familial values placed on one gender or the other.

3.2.1.1 Development of an understanding of gender identity

Gender identity refers to an individual's self-concept of being either male or female. While it is usually a simple matter to determine the biological sex of an infant, it is generally accepted that children are born psychosexually neutral. Physiological, cognitive and social factors contribute to the early establishment of a core identity and this identity is modified and expanded by social factors as the child matures.

The concept that 'I am a girl' or 'I am a boy' is generally established by the time a child reaches three years of age. Most of the evidence for the development of a gender identity comes from cases where the biological sex was ambiguous at birth and errors in sexing were made. (See Section 2.2) Gender reassignment, with or without surgery, has been found to be successful if it is carried out before the age of 18 months and if the reassignment is supported by the parents (Money and Ehrhardt 1972, cited by Hargreaves and Colley 1987; Money and Tucker 1975, cited by Hargreaves and Colley 1987). However, almost all attempts at gender re-assignment made after the age of three years have been unsuccessful. In these cases the child either retains his or her original gender identity or becomes extremely confused and ambivalent (Kessler and Mc Kenna 1978, cited by Bleier 1984).

3.2.1.2 Acquiring gender-role standards

Gender-role standards are culturally accepted behavioural expectations for girls and boys, women and men. Children learn as they grow older that certain behaviours, gender roles and characteristics are associated with one sex or the other and they receive rewards, incentives or sanctions as the case may be, depending on their compliance with these standards. As the child grows older, its gender-role standards become more similar to those of the adults in that society. In general, gender-role standards tend to be more rigidly defined in the case of males, the lower social classes and the less educated (Wolman *et al.* 1982).

The Sex-Role Learning Index is used to test children's understanding of gender-role standards and consists of twenty drawings of objects traditionally associated with gender roles, such as a hammer, a fire helmet, an oven and dishes (Newman and Newman 1995). By seven years of age most children are able to achieve 100% scores in this test which shows that they know how their society connects sex with various activities and jobs (Serbin *et al.* 1993).

The main enforcers of these standards are parents, peers, the school system and the media and the main operating tools used in the transfer of genderised information are (a) stereotyping (b) modelling and (c) labelling.

3.2.1.2.1 Stereotyping

The term 'stereotype' was first used in the 18th century in the printing industry, to describe the printing of pâpier maché copies using a printing block. In 1922 Walter Lippmann used this term in his book 'Political Opinion' (1922, cited by Harding 1968) to refer to culturally determined 'pictures' in the mind which are rigidly adhered to and affect the individual's view of the world. The term 'stereotype' has subsequently been widely used, especially within sociology. It is now generally accepted that a concept can be referred to as a stereotype if:

> *"(1) it is simple rather than complex or differentiated; (2) it is erroneous rather than accurate; (3) it has been acquired secondhand rather than through direct experience with the reality it is supposed to represent; and (4) it is resistant to modification by new experience." (Harding 1968, p. 259)*

World-wide research has found evidence of sex-stereotyped roles, activities and perceived characteristics. Females, for example have been found to be stereotyped as being emotional, subjective, tactful and aware of the feelings of others, while males were seen to be leaders, aggressive, dominant, objective, independent and competitive (Broverman *et al.* 1972, cited by Aries 1997). In one cross-cultural study (Whiting and Edwards 1997, cited by Brannon 1996) evidence was found of pancultural similarities in gender stereotyping. Cross-culturally they found that males were associated with being adventurous, dominant, forceful, independent and strong, while females were associated with being sentimental, submissive and superstitious. These stereotypes have been found to change very little over the last twenty years in spite of increased awareness of the need for sex equality (Bergen and Williams 1991, cited by Aries 1997). When Paul Werner and Georgina LaRussa compared a 1958 and 1978 study of stereotypes, they found that although some adjectives were replaced by more

modern versions of these adjectives: "in no case did an adjective change sexes over the two decades" (Werner and LaRussa 1985, cited by Lott 1987, p. 242).

A wide range of research by Inge Broverman and her associates has identified sex-stereotyping of personality traits by female and male college-student subjects (Rosenkrantz *et al.* 1968, cited by Unger 1979). Using a series of bipolar pairs of words such as 'dependent-not dependent', and 'passive-active', the researchers found a high level of agreement on stereotypes for females and males which was independent of age, sex, religion, education level, or marital status of the subject (Unger 1979). 90% of US sixth-grade children tested in an experiment were also able to identify sex-typed personality traits such as being gentle, self-confident or adventurous with femininity or masculinity (Serbin *et al.* 1993).

Family circumstances can influence the degree of gender-stereotyping experienced. Children of single parents for example, have been found to show less gender stereotyping than children who come from intact families (Brenes *et al.* 1985, cited by Vasta *et al.* 1992). The children of working mothers have been found to hold less stereotyped attitudes, preferences and behaviours than children of mothers who do not work outside the home (Katz and Boswell 1986, cited by Vasta *et al.* 1992). A study of children of counterculture parents (Weisner and Wilson-Mitchell 1990, cited by Vasta *et al.* 1992) found that they displayed less gender stereotyping regarding occupations and the sex-typing of specific objects than children from conventional homes. However, when their toy and activity preferences were analysed, it was found that they showed conventional gender stereotyping patterns (Vasta *et al.* 1992).

Sex stereotypes can affect how we interpret information by: (a) biasing our perceptions in the direction of expectations (b) 'shaping' behaviour by dictating how females and males 'should' behave (c) serving as self-fulfilling prophecies so that people begin to act in ways which support the stereotype, and (d) by having a critical effect on the interpretation of information so that for example, females and males could display the same behaviour but be evaluated differently (Aries 1997).

3.2.1.2.2 Modelling

Children model the behaviour of their parents and wider family and acquaintances. (See Sections 3.6.1;3.6.1.2) They also learn about social practices and behaviours by imitating TV, film and video models (Liebert and Sprafkin 1988, cited by Vasta *et al.* 1992). Experiments have shown that child observers attend more closely to same sex models and are more likely to recall and imitate their behaviours (Bussey and Bandura 1984, cited by Vasta *et al.* 1992). Boys are particularly sensitive to the 'appropriateness' of the behaviours modelled and will not imitate behaviour labelled as 'female', even if it is modelled by a male.

3.2.1.2.3 Labelling

Parents initially, and later members of the child's social environment, provide many sex-typed labels to the child. (See Section 3.5.1.2.2) Children tend to prefer to use items that are labelled sex-appropriate and avoid cross-sex ones (Ruble *et al.* 1981, cited by Vasta *et al.* 1992). Labelling also influences children's performance on a task. Research findings have shown that children will perform better on a task that is labelled sex-appropriate (Montemayor 1974).

3.2.1.3 Identifying with the same-sex parent

When someone identifies with a person, they incorporate the values and beliefs of that person. Through a process of identification, most children begin to internalise their parents' values, attitudes and worldviews. However, they eventually come to identify more closely with one parent, usually the same-sex parent. According to Barbara Newman and Philip Newman (1995) there are four theories that try to explain why this process evolves.

The fear of loss of love In this case the child feels dependant on a parent and copies the behaviour and attitudes of that parent, incorporating aspects of the loved one's personality into his or her own self-concept. Then, even if the parent is not physically

present, the child feels close to the parent (Jacobson 1964, cited by Newman and Newman 1995).

Identification with the aggressor The child fears a parent and in order to protect herself/himself from harm, adapts the mannerisms of the parent. Parents who see a great deal of similarity between themselves and their children may be less likely to harm them (Freud 1936, cited by Newman and Newman 1995).

The need for status and power Children are more likely to model the parent who controls the most resources and exercises the most power. If they copy a powerful model then they appear to feel that they have some of that power as well (Bandura 1986, cited by Newman and Newman 1995). For this reason children within a family have been found to display personality characteristics similar to those of the more dominant parent (Hetherington 1967, cited by Newman and Newman 1995).

Perceived similarity Children can perceive similarities between themselves and a parent. This may be physically or psychologically obvious or it may result from situations where the child accidentally or intentionally copies particular parental behaviours. When children perceive a similarity between themselves and a parent, they are more likely to identify closely with that parent (Heilbrun 1974, cited by Newman and Newman 1995).

3.2.1.4 Establishing a gender-role preference

Barbara Newman and Philip Newman (1995) suggest that there are three factors which contribute to the establishment of a gender-role preference.

- The child's own capabilities and abilities must be compatible with the particular gender-role standards.

- The child must have close bonds with its same-sex parent.

- The child must also receive cues from its home environment, school environment, other social institutions and media that the gender-role in question is valued. Otherwise, ambivalence or rejection of the gender role may result. A problem could also arise if for example, the sex of the child was not the preferred prenatal choice of the parents, since this could affect the child's relationship with its parents and the parents may present obstacles to the development of a gender-role preference (Stattin and Klackenberg-Larsson 1991, cited by Newman and Newman 1995).

3.2.2 The adoption of 'sex-typed' behaviours

Sandra Bem describes 'sex typing' as: "The acquisition of sex-appropriate preferences, skills, personality attributes, behaviors, and self-concepts" (Bem 1992, p. 598). These attitudes, skills and preferences vary across time and within cultures and societies. The extent of sex-typing in a society is reflected in the degree of gender stereotyping prevalent. Through the combined actions of sex-typing and gender stereotyping, activities within societies become specialized and access to a varying range of behaviours, tasks and characteristics is limited to members of one sex or the other. Judy Morelock found that in a group discussion, women tended to conform to opinions expressed in areas in which they felt they had little expertise or interest such as football and the military, while men similarly conformed in areas where they had less expertise and interest such as day care centers and social work. She concluded that: "as long as social issues are perceived as sex-types [ ] each sex will continue to have its limited domain of expertise" (Morelock 1980, quoted by Lott 1987, p. 246).

Many theories have been proposed to explain exactly how gender role identity is established and why sex-typing occurs in activities and roles. The approaches adopted by theorists within these fields vary greatly from field studies of animals and human societies, to laboratory experiments, tests, and interviews. They also differ in the emphasis that they place on nature or nurture. This is a highly debatable and

contentious area of research and each of these theories contributes to a greater or lesser degree to our overall understanding of sex and gender.

There are four main categories of theories that attempt to explain gender role identity: (See Schematic Diagram 3.1)

- Sociobiological theories. These theories emphasis the innate basis of differences in behaviour between females and males. They examine the biological origins of gender role identity and the role which genetic inheritance plays in determining gender differences.

- Psychoanalytic theories. These theories recognise the role played by biological sex in gender role identity. They also recognise the importance of emotional factors such as jealousy, feelings of inferiority and inadequacy which, it is believed, fuel the process of gender role identity. Sex imbalances in power and status structures within society are seen to arise logically either from a recognition of the superiority of masculinity and the consequent inferiority of femininity, or from male efforts to compensate for an inability to give birth.

- Cognitive developmental theories recognise the initial role of biological reflexes and impulses in the development of cognitive processes and the role of intellectual maturation and categorisation processes in gender role identity. Children sort incoming information into categories and one of these categories is 'femininity' and 'masculinity'. They then classify information, behaviours and activities to conform with the child's gender self-classification. In this way children, and later adults, become sex-typed. The degree to which they become sex-typed varies, depending on the maturational stage of development of the individual, and the level and importance of genderisation within that particular society.

- Social Learning theories emphasise the role of 'nurture' in socialising gender differentiated patterns in society. These theories hold that society in general,

including adults, parents, school systems and teachers, peers and the media, model and label sex appropriate behaviours and encourage their adoption in infants and young children. Over time, these sex-appropriate behaviours become established and the young child, and later adult, exerts influence on others to conform similarly according to the norms of that society.

3.3 SOCIOBIOLOGICAL THEORIES

3.3.1 Origins of Sociobiology

As Arlen Carey (1995) has pointed out, modern sociobiology has been adopted by scholars from many different disciplines such as sociology, anthropology, psychology, neurobiology, ethology, zoology and primatology. This broad base of interest stems from the diverse origins of contributing ideas in the overall development of sociobiological theories and these origins will be described briefly:

- In 1859 Charles Darwin published his book, 'On the Origin of Species by Means of Natural Selection', which proposed that evolution occurred through a process of natural selection, a theory which he and another scientist, Alfred Russel Wallace both independently formulated. Theological thinking of the time proposed that the adaptation of all animals and plants to their particular environments was evidence of the wisdom of their Creator (Plomin *et al.* 1997). Literal biblical interpretations of the seven day creation of the world and beliefs about the superior position of humans over the animal kingdom were prevailing ideas of the time in Christian based societies. Charles Darwin's writings therefore provoked many heated debates within the scientific community and had many religious opponents. Despite the current accumulation of a large body of data that supports the theory of evolution, Roger Lewin (1995) and Gary Stix (1997) report that nearly 50% of the American population still do not accept the theory of evolution.

- Eight years before Charles Darwin's 'Origin of Species' book was published, Herbert Spencer, a social theorist, coined the phrase 'survival of the fittest'. He believed that traits which benefit an organism are inherited. Those who inherit the 'best' traits will therefore continue to be successful while those with 'inferior' traits will continue to fail, with the situation eventually arising where the 'fittest' individuals dominate within a species. His determinist views led him to make some very 'politically incorrect' statements such as those reported by Allen *et al.* of the Sociobiology Study Group:

> *"the poverty of the incapable, the distresses that come upon the imprudent, the starvations of the idle [ ] are the decrees of a large, far-seeing benevolence [ ] under the natural order of things society is constantly excreting its unhealthy, imbecile, slow, vacillating, faithless members..." (Allen et al. 1977, p. 134)*

- Konrad Lorenz's work in ethology led to his proposal that 'fixed-action patterns' in animals help them to find food, reproduce and avoid predators. He believed that these actions were genetically determined and were released at critical times by stimuli from the environment. He further suggested that these patterns had evolutionary benefits for animals by leading them through a series of behavioural steps without requiring previous experience. (See Section 3.5.1.1.2)

- In 1964 William Hamilton developed his theory of 'kin selection'. According to this theory, individuals within a species experience an evolutionary advantage if they help their relatives, because it ensures that their closely related genes will survive and be passed on to another generation. This theory helped to explain self-sacrifice which had puzzled scientists and theorists working within a Darwinian selfish, 'survival of the fittest' paradigm.

- During the early 1970's Robert Trivers proposed that 'reciprocal altruism' occurs within a species between individuals who are not related. This altruism requires each of the involved individuals to 'keep tabs' on the helpful behaviour and be

prepared to 'return the favour' at a later stage when it is required. Examples of reciprocal aid include activities such as grooming, feeding, and joint hunting.

Edmund Wilson brought these ideas together in 1975 when he published his book, *Sociobiology: The New Synthesis.* While many critics emphasise biological determinist aspects of sociobiology, this approach does not reflect the current thinking of many sociobiologists who: "see biological process rather as a substratum of a more complex whole – the skeleton of the body social, if you like" (Stevens 1990, p. 160). In addition, many modern sociobiologists now call themselves evolutionary psychologists in order to draw attention to the: "mind's role in mediating the links between genes and human behavior" (Horgan 1995, p. 152).

3.3.2 What is the theory of sociobiology?

Sociobiology is based on the theory of evolution: it focuses on the study of the effects of genetic transmission, diversity, and natural selection over many generations of animal and human social development and it assumes that the basic motivation of individuals is to pass on one's own genetic heritage to as many descendants as possible. In this context, humans are viewed as members of the animal world and so they are subject to the same type of influences that directed evolution. Since we are all descendants of successful survivors, sociobiologists believe that we can learn about who we are and why we behave the way we do by studying the origins of social behaviour.

According to Arlen Carey (1995) one of the cornerstones of sociobiology is the 'maximization principle' by which organisms behave in ways that help to ensure that their genes are passed on to future generations. While the maximization principle may lead to 'selfish' behaviours ensuring the 'survival of the fittest', it may also lead to co-operative behaviours such as kin selection and reciprocal altruism.

There are two ways in which animals can evolve. First of all, animals can evolve over time to suit a particular environment physically. However, if changes occur in that

environment, individual animals may have little or no adaptive abilities to exploit other food sources or sources of protection in the environment and so they may die out. Dinosaurs are an obvious example of this type of animal. In the second case, animals evolve over time to suit an environment physically, but they also develop intelligence. If an environment changes, they can adapt and exploit niches within the environment, finding new sources of food, and thereby increasing their chances of survival. Mammals are an example of these intelligent animals.

Intelligence assists in the 'survival of the fittest' by allowing animals to pass on learning to their offspring. Through the evolution of 'privilege', i.e. non-genetic ways in which parents smooth the way for their offspring in the world (Stewart and Cohen 1997, cited by Mitchell 1997) parents help to ensure the survival of their genes. This privilege can be very basic, by for example providing a nutritious egg yolk for a developing embryo, or a safe burrow or nest for the young to return to in times of danger.

At a higher level of intelligence, privilege can be demonstrated by parents, or others who pass on cultural practices and new skills to the young. One example of privilege can be seen in the case of black rats living in Israel. Over the last few years, plantations of Jerusalem pines have been planted in the natural habitat of these rats. Joseph Terkel (1997, cited by Spinney 1997) has been carrying out research on these rats for over ten years. He has discovered that some innovative mother rats learn to strip the pine cones and use the seeds as a food source. In order to strip the cones they have to carry out a complex series of manipulations. These mothers then pass their skills on to their young pups, thereby giving their pups a survival advantage over pups of less innovative mothers.

In a similar way red colobus monkeys in one part of the east African island of Zanzibar have learned to eat charcoal, which neutralises toxins in some local plants and enables them to extend their evolutionary niche (Spinney 1997). Chimpanzees have also been observed to pass on skills concerning how to fish for ants with a twig, hammer nuts, and dig for termites. Among humans, as Stewart and Cohen point out,

privilege may extend to: "lessons in piano, table manners, driving and ultimately (for the very privileged) tuition at Harvard and the establishment of trust funds" (1997, cited by Mitchell 1997, p. 52).

Edmund Wilson (1975), David Barash (1979) and other sociobiological writers have identified certain universal characteristics and traits within the animal world such as parental and mating behaviours, aggression, co-operation and competition, etc., examples of which may also be found among humans. In fact, the original New York Times advertisement for Edmund Wilson's book 'Sociobiology: The New Synthesis' emphasised this point:

> *"Now There's One Science for All Social Creatures." His "new synthesis" for the first time covers the "whole range of social creatures – from bacteria to termites, from monkeys to mankind," (quoted by Reed 1978, p. 42).*

This 'universality' of behaviours between certain members of the animal world and humans is used by sociobiologists to demonstrate the evolutionary basis of many human behaviours.

Research into the universality of behaviours among humans offers further proof of the 'innate' basis of human nature.

> *"Sociobiologists contend that these common cultural traits reflect deep-seated, biologically based behavior predispositions that have evolved within human neuroanatomy to reflect some of the basic directives of the maximization principle." (Carey 1995, p. 1316).*

Arlen Carey (1995) provides examples of this proof from the work of anthropologist George Murdock who has identified dozens of cultural universals, including an incest taboo, kin groups, kinship nomenclature, status differentiation and courtship rituals, from his examination of a vast collection of historical and ethnographic data. David Buss has found universal strategies in human mating patterns (Buss 1994), while Marks and Nesse (1994, cited by Plomin *et al.* 1997) have found a universal fear of snakes and spiders that they believe was an adaptive fear in our evolutionary past.

3.3.3 Sociobiological approaches to gender

From a sociobiological point of view, differences in gender role identity are inherently biological and have evolved over time because they are valuable for human survival and reproduction. These differences provide a mechanism that allows for specialisation and the division of labour within the family or society. This process of gender differentiation helps to smooth over the possibility of disagreements between individuals by providing a blueprint that establishes the way in which work tasks will be carried out within a social grouping. It also reflects the differences in parental input which males and females invest in offspring and which, in the case of most mammals, involves greater maternal commitment (Wilson 1978; Dawkins 1978; Stevens 1990).

Females are limited in the number of children that they can have, while a man can have as many offspring as he can find fertile partners to inseminate. Therefore, this theory suggests that the optimal reproductive strategies required by a male and a female differ.

Arising from the 'parental investment model' which was originally proposed by Robert L. Trivers, sociobiology theories would predict that a female would be very choosy in picking a mate (since she has a limited supply of eggs and must invest a great deal of time and effort in each offspring). She would look for males who have (relatively) high status within the social context, are ambitious enough to maintain this position, and are able to provide emotional and financial support for themselves and any future children. 'High status' would not have to involve males who are very rich. It could for example be applied to the most powerful member of a gang, a farmer with many cows, an office supervisor or manager, the owner of the best hut or house in a village. A male on the other hand would be likely to be less choosy in picking a mate since he could more easily be promiscuous (due to his lesser commitment to offspring and the fact that he can produce millions of sperm in a lifetime). He would also be predicted to look for (a) beauty and sexual attractiveness which would (supposedly) enhance his prestige, (b) youth and good health so that the female could

successfully 'produce' offspring thereby protecting the male's genes, and (c) female fidelity to ensure that the male in question is only taking care of his own progeny.

> *"It pays males to be aggressive, hasty, fickle, and undiscriminating. In theory it is more profitable for females to be coy, to hold back until they can identify males with the best genes [ ] Human beings obey this biological principle faithfully." (Wilson 1978 p. 125)*

Research by David M. Buss into mating strategies and preferences, reported by John Horgan (1995) appears to support these general theories.

Among many (but not all) animal species, a direct relationship has been found between position in the dominance hierarchy and male reproductive success (Rollins 1996). An example of this relationship among humans is provided by David Barash (1979) who writes about Ismail, a 17th century king of Morocco who is reported to have fathered 1,056 children. However, over the years, with the advent of contraception and feminist movements which have led to greater active participation by females in all aspects of life, this relationship has changed. Females are taking more control of their fertility and choosing when and if, they wish to become pregnant. 'High status' among males is now no longer related to reproductive success but it is related to mating success. From his study of French-Canadian males, Perusse, concludes, "Unmarried high-status French-Canadian males copulate more often with more females than unmarried low-status French Canadian males" (Perusse 1993, quoted by Rollins 1996, p. 293).

It is further proposed that apart form mate choice, strategies which are more likely to ensure survival of offspring lead females and males to differ in their social skills and characteristics. A female therefore will develop skills of co-operation in order to provide a safe environment for her offspring. If females engaged in behaviour that increased the probability of their death, this would place the survival of her family and the group in general in jeopardy. Therefore, the theory postulates, females have evolved greater communicative and social skills than males, which increases their

chances of optimising environmental resources to the benefit of their offspring and families.

The theory further suggests that for many animals and humans the biggest, strongest and most dominant males are more likely to succeed in the competition for mates. This has therefore resulted in the sexual dimorphism of the two sexes. Men are generally taller and are on average 20 to 30 per cent heavier than females. The aggressiveness that is required to win a mate may also spill over into other aspects of life. This explains why from a sociobiological point of view, the play of boys is more aggressive than that of girls (Maccoby and Jacklin 1980), more men are convicted of criminal offences than women and men are also more likely to become involved in war and all types of physical fights than women.

Aggression and competition involve risk taking. Men are more 'dispensable' than women and so it does not affect the group too much if some males die as a result of their risk taking activities. Other males can take their place and continue reproducing, even into old age. These theories therefore suggest that males have developed out-going, aggressive, risk taking skills that prepare them for risky, unpredictable undertakings that may result in improved circumstances for the group as a whole, but which will not adversely affect the group if they fail.

The type of deterministic approach adopted by many sociobiologists to life, love and sexual double standards angers many feminist writers, for example, Ruth Bleier (Bleier 1984). However, there does seem to be some research data to support these theories. Alan Feingold (1992, cited by Rollins 1996) in his meta-analysis of research into mate selection, found that females were more concerned with socio-economic status, ambitiousness, status, character and intelligence than males, while males rated good looks more highly than females.

3.3.4 Criticisms of sociobiology

There are many attractive aspects to sociobiological theories that have a ring of truth about them. While modern sociobiologists have adopted a more flexible approach to the role of 'nurture' and acknowledge the role played by environmental factors in shaping behaviour, rigid interpretations or misinterpretations of the early writings by Edmund Wilson (1975; 1978) and David Barash (1979) have led to many criticisms of these theories. Criticisms tend to fall into five main categories:

1. Criticisms which accuse sociobiologists of using poorly defined terms that are open to wide interpretations. Ruth Bleier for example point out that:

> *"Sociobiologists do not describe or define what they mean, for example, by entrepreneurship or aggressivity. Is aggressivity fighting in bars, getting ahead in business, being creative, being a football star, a Don Juan, a war hero, a professor? Or is it being a mother who pursues City Hall and all of its politicians until a stoplight is installed where her children have to cross the street on their way to school?" (Bleier 1984, p 26).*

2. Criticisms by, for example, the Sociobiology Study Group (Allen *et al.* 1977) who accuse sociobiologists of encouraging the *status quo* and of providing a justification for a wide range of questionable behaviours and situations involving past and present social institutions. Some of the undesirable practices which sociobiologists have been accused of condoning as 'manifestations of 'human nature' includes: racism, class struggle, war, slavery, restrictive immigration laws, eugenics policies such as the Nazi gas chambers, discrimination against women in the workplace, female relegation to child care, male adultery, polygyny, and rape, to name but a few (Allen *et al.* 1977; Bleier 1984).

3. Criticisms that accuse sociobiologists of being selective when choosing examples from history or nature (Allen *et al.* 1977). Elizabeth Allen, for

example, criticises Edmund Wilson's: "speculative reconstruction of human prehistory" (Allen 1978, p. 263).

4. Criticisms from, for example, the Sociobiology Study Group who disapprove of the sociobiologists' approach in which: "There exists no imaginable situation that cannot be explained" (Allen *et al.* 1977, p. 145). In effect, all types of behaviour can be explained by sociobiologists since they are likely to fall within one of three categories: They must be either: (1) behaviours which provide an example of classical 'individual selection' in the case of self-serving behaviours (2) behaviours which provide an example of 'kin selection' thereby accounting for altruistic or submissive behaviour towards relatives, or (3) behaviours which demonstrate 'reciprocal altruism' in which altruistic behaviours are directed towards non-relatives (Allen *et al.* 1977).

   In a similar way the presence of cultural differences that might be expected to evolve over many generations can be explained by resorting to the theory of the 'multiplier effect' which suggests that very small effects can be replicated very quickly within a society. If societies do not develop these effects it can also be explained by the 'threshold effect' which suggests that a certain level of social complexity must be reached by a society before the multiplier effect is activated (Allen *et al.* 1977).

1. Criticisms of the supposed genetic basis for human social behaviour that is assumed but not proven. For example, the Sociobiology Study Group (Allen *et al.* 1977) criticises the way in which sociobiologists:

> *" Start by saying 'if there were a gene for spite' and then go on with a long discussion of the consequences, dropping the 'if' along the way. There are hypothetical altruist genes, conformer genes, spite genes, learning genes, homosexuality genes, and so on." (Allen et al. 1977, p. 143)*

Elizabeth Allen *et al.* is equally critical of Edmund Wilson's: "leap of faith from what might be to "what is" (Allen 1978, p. 262).

3.3.5 Support for the theory of sociobiology

One of the most controversial areas of sociobiology concerns the theory that social behaviour is genetically programmed. This has led to theories that 'genes' must exist which promotes characteristics and behaviours such as entrepreneurship, xenophobia, territoriality, spite, conformity, religion, etc. For many sociobiologists, however, the 'genetic' basis for cultural transmission is dependent on environmental influences. For example, Edmund Wilson and Charles Lumsden proposed a theory of the 'gene-culture coevolution' in which heredity and culture form an 'eternal circle of change'. In this theory heredity influences the brain so that it is biased to receive stimuli from, and learn about, certain areas within the environment. These biases affect and guide the development of a culture, which in turn affects the "distinctive properties of the brain" occurring "in an environment dominated by culture" (Wilson 1995, p. 351). They suggest that over time an individual 'picks up' various customs, myths, attitudes, and modes of analysis that they called 'culturgenes' and which are similar to Richard Dawkin's sociocultural genes which he called 'memes' (Wilson 1995).

Interestingly enough, in spite of bitter criticisms of the genetic basis of culture and behaviour, there has been some evidence that offers support for these ideas although most of these findings are very hotly debated. They include some of the following research areas:

3.3.5.1 The 'schizophrenia' gene

Schizophrenia, a psychiatric behavioural and personality disorder, occur in approximately 1% of the population and many studies have found a genetic basis for the condition (Day 1996; Eastwood 1996). Originally, schizophrenia was believed to be environmental in origin and to be caused by early family experiences. Twin and adoptive studies have shown that schizophrenia has a genetic basis and tends to 'run in families' (Heston 1966, cited by Atkinson *et al.* 1993). (See Sections 3.3.5.2–3.3.5.2.3) Leonard Heston (1966, cited by Plomin *et al.* 1997) found that adopted-away offspring of schizophrenic mothers had a 10% risk of developing schizophrenia, which was similar to the risk for off-spring reared by schizophrenic parents. Adopted twins who had a parent with schizophrenia have also been found to be more likely to develop schizophrenia and to have siblings with the condition. An identical twin who has a schizophrenic twin has a 48% risk of developing schizophrenia while a fraternal twin has a 17% risk (Plomin *et al.* 1997).

Abi Berger (1995) reports on the work of Scott Diehl who suggests that chromosome 6 is the likely location of a gene that makes people susceptible to schizophrenia. In another study (Bassett 1988, cited by Atkinson *et al.* 1993) involving the analysis of DNA samples from families with high incidence rates of schizophrenia, the findings showed evidence of a faulty gene or cluster of genes in chromosome 5.

3.3.5.2 Twin and adoption studies

Twins and adoption represent two 'experiments of nature' (Plomin *et al.* 1997) which have been used to try to settle the 'nature/nurture' debate and establish the relative effects of genetic and environmental influences on development. Since twin and adoption studies therefore have experimental advantages, they have been widely used and they are in effect the 'workhorses of behavioral genetics' (Plomin *et al.* 1997).

3.3.5.2.1 Twin studies

These studies compare pairs of:

(a) identical twins, who develop from a single fertilised eggs which splits, producing two genetically identical individuals.

(b) fraternal twins, who develop from two separately fertilised eggs, and, like other siblings, are 50% genetically related.

Bob Holmes (1997) reports on an experiment carried out by Robert Plomin involving 110 sets of identical and 130 sets of fraternal twins, all of whom were at least 80 years of age and who were given verbal, spatial ability, memory and general cognitive ability tests. It was found that genetic differences accounted for 62% of the variation in general cognitive ability among the 480 subjects. According to Robert Plomin, other studies have shown that the genetic input to mental ability appears to increase with age from about 20% during infancy to 50% in adolescence and 60% in adulthood. It is suggested that as we get older we rely more and more on the skills for which we have a genetic propensity. A major study of 800 pairs of adolescent twins examining dozens of personality traits also found that nearly all personality traits show moderate heritability (Loehlin and Nichols 1976, cited by Plomin *et al.* 1997). Genetic influence has also been reported in twin studies investigating parent-offspring relationships (Rowe 1981; 1983b, cited by Plomin *et al.* 1997), sexual orientation (Kallmann 1952, cited by Plomin *et al.* 1997), self-esteem (Neiderhiser and McGuire *et al.* 1994, cited by Plomin *et al.* 1997) and attitudes and interests (Eaves *et al.* 1989, cited by Plomin *et al.* 1997; Roberts and Johansson 1974, cited by Plomin *et al.* 1997).

3.3.5.2.2 Adoption studies

In adoption studies, birth parents are in effect 'genetic parents', while adoptive parents represent 'environmental parents'. Parents who rear their own children are 'genetic-plus-environmental' parents. 'Genetic siblings' are full siblings who are separated through adoption and reared in different homes while 'environmental' siblings are pairs of genetically unrelated children who are reared in the same home. Adoption therefore produces pairs of genetically related individuals who do not share a common family environment and family members who share the same environment but are not genetically related. Researchers use these variables to analyse genetic and environmental factors (Plomin *et al.* 1997).

Results from adoption studies in general demonstrate that about half of the total variance of measures of general cognitive ability can be accounted for by genetic factors (Plomin *et al.* 1997). Verbal ability, spatial ability, speed and memory tests of adult reared apart twins (McGue and Bouchard 1989, cited by Plomin *et al.* 1997); Pedersen *et al.* 1992, cited by Plomin *et al.* 1997) have also showed significant heritability estimates.

3.3.5.2.3 Adoption-twin combination studies

Two main types of combination studies have been carried out. The first type combines twin and adoption research along with research into other family members. In this way researchers can investigate genetic, environmental and genetic-plus environmental factors. The Colorado Adoption Project is the largest such study and it is currently on-going (DeFries *et al.* 1994, cited by Plomin *et al.* 1997). The results of this project have shown that genetic influence on general cognitive ability increases during infancy and childhood (Plomin *et al.* 1997).

The second type of combination study investigates adopted apart twins and compares this with twins reared together. Two major studies have been carried out, one in

Minnesota, the Minnesota Study of Twins Reared Apart (Bouchard *et al.* 1990a, cited by Plomin *et al.* 1997) and one in Sweden (Pederson *et al.* 1992, cited by Plomin *et al.* 1997). These studies have found that identical twins reared apart in early life are almost as similar in terms of general cognitive ability as identical twins who were reared together.

3.3.5.3 The 'language' gene

In the 1960's Noam Chomsky proposed that all infants are born with an innate sensitivity to universal features of the grammars of all human languages. He called this instinct the 'language acquisition device' or LAD, and he believed that it is this LAD rather than training or 'nurture' *per se*, which enables children to acquire their native language easily.

Noam Chomsky's work and other research that has found a genetic link to linguistic skills, have led to the conclusion that there may be a gene or genes for language. Evidence to support this conclusion comes from research which shows that identical twins tend to share linguistic ability or disability (Cohen 1998). Steven Pinker (1994) reports on research by Myrna Gopnik on an inherited language impairment in one family which indicates that the impairment is caused by a trait controlled by a single dominant gene. He also reports on research into people who suffer from Williams, or 'Chatterbox' Syndrome. These people have a defective gene on chromosome 11, have low IQ's of about 50 and are unable to carry out simple daily tasks. However, they are able to talk in a fluent and grammatically correct manner. Faraneh Vargha-Khadem of the Institute of Child Health in London has also been studying individuals with a disorder known as KE. This condition results in deficits in all aspects of speech that results in the production of unintelligible speech, problems in mastering reading and writing and difficulty in co-ordinating some facial muscles required for speech. Genetic analysis has shown that KE appears to be caused by a single dominant defective gene that is believed to be located on a small segment of chromosome 7. Anthony Monaco and his colleagues at the University of Oxford have been

collaborating with Faraneh Vargha-Khadem and they report that they are close to identifying this gene that they call SPCH1 and which it is believed may "shape [ ] the development of human language" (Cohen 1998, p. 7).

From an evolutionary point of view, the acquisition of language benefited human beings and so many researchers such as Steven Pinker (1994) hold that language is an adaptive product of natural selection. However, he recognises the complementary role of 'nurture', since language is a shared code that requires a learning period which: "synchronises the language ability of each child to that of everyone else around them" (Pinker 1994, p. 30).

3.3.5.4 Study of emotions and emotional expressions

Gail Vines (1997) has described research into imprinted genes and their effects. These imprinted genes are genes which 'silence' the corresponding gene contributed by the other parent. Only one copy of each imprinted gene is active in each offspring and whether the 'silenced' gene comes from the mother or father depends on the particular genetic input. There may also be a 'critical period' when an imprinted gene is 'silenced' or the silencing may only affect particular tissues. So far, about fifteen imprinted genes have been found, but it is suspected that there may be hundreds.

One preliminary research study of mice which Gail Vines reports (1997) indicates that parental genes may influence emotional development. In this research, cells from paternal imprinted genes were found to be clustered in the hypothalamus, the amygdala, the preoptic area and the septum, areas which make up part of the limbic brain system, and which are important for emotional and instinctive behaviours connected with sex, eating and aggression.

The universality of emotions and their expression has been documented by many researchers and was even the subject of a book published by Charles Darwin in 1872, called 'The Expression of Emotion in Man and Animals'. It was suggested by Darwin

that this universality of expression arises from innate responses that have arisen through natural selection and that they have evolutionary benefits. Emotional expression for example warns others if an individual is angry or upset, and our apparently universal ability to interpret emotional expression facilitates social bonding.

In one experiment, subjects from the United States, Brazil, Argentina, Japan and Chile were shown photographs of people who were experiencing happiness, anger, sadness, disgust, fear and surprise (Ekman 1982, cited by Atkinson *et al.* 1993). All of the subjects were able to identify these facial expressions correctly. When this experiment was carried out with members of the Fore and Dan tribes of New Guinea who are preliterate, similar results were achieved. American college students who viewed videotapes of emotions expressed by the Fore tribe were able to identify them correctly, although there was some confusion with the emotions of fear and surprise.

Linda Brannon (1996) has reviewed cross-cultural studies of emotion. She reports on research undertaken by Klaus Scherer and his colleagues (Scherer *et al.* 1986, cited by (Brannon 1996) who surveyed students in Belgium, France, Great Britain, Israel, Italy, Spain, Switzerland and West Germany. They found more similarities than differences in emotions especially for anger and joy. Similar results were reported by James Russell (1991, cited by Brannon 1996) and by Batja Mesquita and Nico Frijda (1992, cited by Brannon 1996) who found more similarities than differences in the expression of anger, disgust, joy, fear, sadness and surprise. They concluded that:

"there exists some evidence that, by and large, certain kinds of events elicit emotions in widely different cultures and that they tend to elicit the same emotions in these different cultures."(quoted by Brannon 1996, p. 198)

3.3.5.5 The study of behaviour

Evidence which supports the influence of genetics on behaviour can be found in research on dog breeding and the selection of mice and rats. Robert Plomin *et al.* (1997) have carried out a review of both of these areas of research.

3.3.5.5.1 Behavioural studies of dog breeds

As Robert Plomin *et al.* (1997) point out, dogs have been bred for centuries both for their behaviour and appearance. Terriers for example were bred to creep into burrows and drive small animals out, while spaniels were initially bred to creep up on birds and then spring, consequently frightening birds into the hunter's net. When the shotgun was invented, different spaniels were bred specifically to point, rather than to spring. The selection process can be very finely tuned as Robert Plomin *et al.* (1997) illustrates. For example, in France, where dogs were used in farm work, 17 different breeds of shepherd and stock dogs have been bred to carry out specialized aspects of farm work. Similarly, in England, where hunting was popular, 26 recognized breeds of hunting dogs were bred. Research carried out over two decades by Paul Scott and John Fuller (1965, cited by Plomin *et al.* 1997) into the development of pure breeds and hybrids found that it is possible to breed selectively for behavioural differences in "social relationships, emotionality, and trainability, as well as many other behaviours" (Plomin *et al.* 1997, p. 60).

3.3.5.5.2 Behavioural studies of mice and rats

3.3.5.5.2.1 Selection studies

Robert Plomin *et al.* (1997) have described the type of behavioural research carried out on mice and rats. In these studies, mice and rats are bred selectively for particular

behavioural traits. One of the most extensive ranges of research has investigated degrees of 'fearfulness' and exploration activity levels. In this case animals, usually mice, are placed in a brightly lit box, which is called an 'open field'. Some animals respond to this situation by freezing, defecating and urinating, while other actively explore it. The most active mice are selected and mated with other high activity-level mice and the least active, or 'fearful' mice are mated with similarly defined fearful mice. This selection process is repeated over thirty generations, and results show a thirtyfold average difference in activity, with no overlaps between the activity levels of the two selective breeding strains. These differences between the two strains also increase in every generation, indicating that many genes are involved in the variation in behaviour, since, if just one or two genes were involved they would separate after a few generations and would not diverge further in later generations (Plomin *et al.* 1997).

3.3.5.5.2.2 Inbred Strain Studies

In inbred strain studies, as Robert Plomin *et al.* (1997) point out, brothers and sisters are mated with each other for at least 20 generations. As a result of this intensive inbreeding, the animals are virtually genetic clones of each other. Any differences in behaviours are assumed to arise due to environmental influences. Large differences between inbred animals have been found, in open-field activity studies and in the case of most behaviours studied, confirming the influence of nurture on behaviour. On the other hand, many hundreds of studies carried out since 1922 on inbred animals have demonstrated that "genetics contributes to most behaviors" (Plomin *et al.* 1997, p.66).

3.3.5.6 The 'intelligence' gene

The research on mice reported by Gail Vines (1997) (See Section 3.3.5.4) which indicates that imprinted genes from fathers influence emotional development, has also found that maternal imprinted genes appear to play a dominant role in the development of intelligence. Researchers have developed androgenetic embryos that

have only parental genes, and gynogenetic embryos with only maternal genes and they have placed these embryos in surrogate mouse mothers. In a series of experiments it was found that gynogenetic embryos developed big heads and brains with small bodies, while androgenetic embryos had large bodies with small head and brains. Later experiments examined the number of cells containing only maternal genes or paternal genes in six different areas of the brain. They found that parental genes were found in the limbic system, while maternal genes were found in the 'executive' brain. This area includes the cortex of the brain which is the site of advanced brain functions such as conscious thought, language and memory, and the striatum which initiates and controls fine movement.

This research involved mice and so it is not clear how much relevance this research has for human development. However, Gail Vines (1997) has pointed out one indication that human brain development may be similarly affected by imprinting genes. This evidence comes from the study of Angelman Syndrome, which occurs when an individual is born without the function of an imprinted gene or genes on chromosome 15. Normally the particular region is silenced in the father and as a result it must be inherited from the mother. However, if the maternal imprinted genes are missing or defective the genes will be inherited from the father. This abnormal development results in learning difficulties, jerky movements and speech difficulties in the offspring. These defects therefore occur within activities that are known to be controlled by the cortex and striatum.

Robert Plomin (In Brief 1998) believes that he may have isolated a specific gene for high intelligence. He took blood samples from gifted children who were attending a special summer school at Iowa State University and also from a control group of students who were identified as having average intelligence. His results show that all the children with high intelligence showed a high occurrence of the IGF2R gene that is located on chromosome 6, thereby indicating a possible location of a 'smart gene'.

3.3.5.7 The 'aggression' gene and criminality

In 1978 a Dutch family was identified in which a high proportion of the males had mild learning difficulties and were prone to aggressive, impulsive behaviours. Rosie Mestel has reported on the results of recent genetic analysis that was carried out on the members of the family (Mestel 1993). The analysis found that there was a faulty gene on the X chromosome that codes for an enzyme called monoamine oxidase A or MAOA. This enzyme plays an important part in brain chemistry, breaking down brain chemicals such as serotonin, noradrenaline and dopamine which pass messages from one nerve cell to the next. The faulty gene appears to be passed on by the mother only to male offspring and provides some limited evidence for an 'aggressive gene' affecting this family.

Further evidence for genetic influences has also been found in research into antisocial personality (ASP) symptoms, where genetic influences have been found to increase from adolescence to adulthood, while shared environmental influences decrease (DiLalla and Gottesman 1989, cited by Plomin *et al.* 1997). Research on over 1,000 twin pairs found genetic influence for criminal convictions (Christiansen 1977, cited by Plomin *et al.* 1997), while a further 13 twin studies of adult criminality found that identical twins are consistently more similar than fraternal twins. A study of 14,000 adoptions in Denmark between 1924 and 1947 (Mednick *et al.* 1984, cited by Plomin *et al.* 1997) found that adoptees were more likely to become involved in criminal behaviour when their biological parents had criminal convictions.

3.3.5.8 The 'homosexual' gene

Simon LeVay and Dean Hamer (1994) have analysed research into possible biological influences in male homosexuality in particular. They report that five modern studies of patterns of homosexuality within families have been published since 1985. Pooling the data from these studies it has been found that in the case of males, about 57% of identical twins, 24% of fraternal twins and 13% of brothers of homosexual men were

also homosexual. In the case of females, approximately 50% of identical twins, 16% of fraternal twins and 13% of sisters of homosexual women were also homosexual. They cite the work of Michael Baily of Northwestern University who has found the overall heritability of sexual orientation to be about 53% for men and 52% for women.

Dean Hamer (LeVay and Hamer 1994) carried out an initial survey of homosexual males and found that a brother of a homosexual man had a 14% likelihood of being homosexual as compared to a 2% likelihood for a man without a homosexual brother. In addition, maternal uncles had a 7% chance of being homosexual and sons of maternal aunts had an 8% likelihood of being homosexual. No correlations were found among fathers, paternal uncles and three other types of cousins.

In order to investigate possible maternal genetic links with male homosexuality, Dean Hamer and his co-workers carried out genetic sample analysis on forty families who had two declared homosexual sons. The samples were typed for 22 markers on the X chromosome. They found that in the region known as Xq28, thirty-three pairs of homosexual brothers, shared the same marker. In a control group of 314 randomly selected pairs of brothers, Xq28 markers were found to be randomly distributed. From these results Dean Hamer concludes that the chromosomal region Xq28 contains a gene that influences male sexual orientation.

3.3.5.9 The 'anxiety' gene

David Concar (1996) reports on research by geneticists in Washington and Würzburg in Germany who claim that a gene on chromosome 17 appears to be associated with anxiety. Research teams analysed DNA samples from hundreds of volunteers The gene in question appears to influence the production of a protein known as a serotonin transporter that is involved in the control of moods. They have identified two types of promoters – a 'sluggish' type and an 'active' type, which form part of a stretch of adjacent DNA, and which spur the gene into action. Subjects with the sluggish

version of this promoter, scored higher in personality tests for neurotic behaviours such as worrying fear and pessimism, than people who had the active promoter.

According to Dennis Murphy of the National Institutes of Health, Washington DC, research also indicates that there are another fifteen genes that seem to be "likely to influence people's tendency to worry" (Concar 1996, p. 22).

3.3.6 The significance of sociobiological theories in explaining gender role identity

Around the world people demonstrate similar trends in a wide range of attitudes, behaviours and approaches. A growing body of research has found a genetic basis for many behaviours and characteristics that had previously been assumed to be of mainly environmental origin.

Current sociobiological theories recognise a broad base of genetic, psychological and environmental factors which influence behaviours. Basic needs such as: the need to survive, to pass on your genes to the next generation, to protect and secure the survival of your own offspring, and to structure social life to assist in the achievement of these aims, remain dominant themes within sociobiology. In this context, gender role identity development can be seen as a means to simplify and organise activities and behaviours within a society by encouraging specialisation into female and male activities. Although within our modern society this type of specialisation may be redundant, genderisation processes still play a significant role in all cultures. These theories therefore help to explain why genderisation occurs within societies, and what importance these processes have for human beings.

3.4 PSYCHOANALYTIC THEORIES

3.4.1 Introduction

Psychoanalytic theories emphasise the significance of early childhood experiences in psychological development, the relationship between anatomical differences and psychological functioning and the effects of inner psychic forces on gender role identity development.

Sigmund Freud was the founder of psychoanalytic theory. Within this overall theory, his psychosexual theories play a pivotal role. When his theories of psychosexual development were first published, they were not favourably received within Victorian society. This disapproval arose primarily because the theories suggested that people were not as rational as previously supposed but were driven by unconscious forces, and because it was suggested that infants and children could have strong sexual and aggressive feelings. These controversial ideas will now be discussed since they moulded and influenced psychoanalytical approaches to gender identity.

3.4.1.1 Sigmund Freud's theory of psychosexual development.

3.4.1.1.1 The conscious, preconscious and unconscious mind

Sigmund Freud believed that we have a conscious, a preconscious and an unconscious mind. The conscious mind is concerned with all of the sensations, memories, thoughts and perceptions that an individual is aware of, the preconscious mind is the stored information and memories which await retrieval into the conscious mind, and the unconscious mind houses the instincts, drives and urges that we are unaware of, but which influence our behaviours and actions. Sigmund Freud used 'free association' whereby patients talked about anything that came to mind without censoring anything, dream analysis and 'slips of tongue' experiences, in order to explore 'unconscious' feelings or experiences that may have been repressed or resisted. Nowadays play therapy is also used to access 'unconscious' feeling in children.

3.4.1.1.2 The id, ego and superego

The 'id' represents the instinctive primitive aspects of a person's personality that function entirely at the unconscious level, and which provides all the psychic energy needed to 'drive' the personality. The id works on the pleasure principle, which means that urges and needs create psychological 'tensions', and these tensions must be relieved and the needs gratified immediately. Reflex actions such as sucking, for example, can help to relieve these tensions. The 'primary process' also enables the id to release tension through wish fulfilment, which can temporarily substitute for the 'real thing'.

According to Sigmund Freud, the 'ego' evolves from the id and attempts to control its psychic energy, so that it conforms to the norms of society. The ego functions on the basis of the reality principle which takes account of the consequences of actions, while balancing the id's needs and desires. The process whereby the ego tries to balance the sometimes conflicting needs of the id and reality, is known as the 'secondary process' and may involve strategies such as 'reality testing' and 'delays in gratification'. Neurotic anxieties can occur if the ego cannot successfully satisfy the needs of the id.

The 'superego' is derived from the ego and "the relics of the shattered Oedipus complex" (Feist 1994, p. 57). (See Section 3.4.1.1.3.3) The 'superego' is guided by the 'idealistic principle' and strives for perfection. It is derived through a process called 'introjection', whereby the standards and values, i.e. the superego, of parents and of society at large are absorbed by the individual. It was Sigmund Freud's understanding that the superego was in effect,

> *"the vehicle of tradition and of all the time-resisting judgements of value which have propagated themselves in this manner from generation to generation." (Freud 1933, cited by Barnes 1985, p. 10)*

The superego has two subsystems: (a) the ego–ideal that develops through reward for good behaviour and correct standards, and (b) the conscience, which arises from punishments for bad behaviour. When people behave in ways that accord with their ego-ideal they feel proud, and when they behave in ways that contradict their conscience they feel guilty.

If individuals are to have happy and contented lives, they must strive to balance the needs of the id, ego and superego. The ego's ability to function effectively, despite the conflicting demands of the superego and id, depends on the level of 'ego strength'. If the person has low levels of ego-strength, she/he will become very confused and suffer great emotional pressures, while a very strong level of ego-strength will result in an individual who functions at a rational and intellectual level that is excessively rigid and socially inappropriate. The well-adjusted person is controlled by his or her ego, while domination of the id leads to psychopathic behaviour and domination of the superego leads to guilt ridden neurotic anxiety.

3.4.1.1.3 A developmental approach to personality

According to Sigmund Freud, an individual's personality development passes through five developmental stages that are not sharply defined but overlap with one another gradually. The adult personality develops from characteristics contributed from each of these stages. Each developmental stage involves a central conflict that must be satisfactorily dealt with or else the individual will become 'fixated' at that level of development, or may 'regress' to that stage at a later stage of development. An inadequate resolution may arise from either overindulgence or insufficient experience of pleasurable sensations arising from the erogenous zones of the mouth, anus, and genitals and which are identified with particular developmental stages. A high level of

libido is required to deal with a fixated developmental stage, and this inhibits the person's ability to cope adequately with subsequent developmental stages.

3.4.1.1.3.1 The Oral Stage

The oral stage lasts from birth to approximately 18 months, and during this time the child's interests center on its mouth and the pleasant sensations associated with eating, licking, tasting, sucking and swallowing. This stage of development coincides with the child's total dependence on others for care. During the oral stage the child begins to teethe, has to learn how to chew food and may be weaned from the breast or bottle. These events normally bring the child for the first time into contact with limitations which 'society' imposes on the child's desires, and so conflicts may arise between the child and its carers. When this stage of development is successfully resolved, the individual develops trust and optimism. Inadequate resolution of any of these crises points may determine the development of various personality characteristics such as dependency on others, sarcasm, distrust, preoccupation with food or drink, smoking, chewing gum or nail biting.

3.4.1.1.3.2 The Anal stage

From approximately 18 months to three years of age, the child experiences the anal stage of development. At this time, the anus and the pleasure associated with the elimination of waste products become the focus of 'sexual pleasure' for the child. This period coincides with 'toilet training' and the imposition of 'society's' standards on the child's natural desire to defecate and urinate. As in the case of the oral stage, if these crises are not adequately resolved, the child may become 'fixated' at this stage of development with resultant personality characteristics such as messiness, destructiveness, meanness, interest in bathroom humour, extreme cleanliness or orderliness. An adequate resolution of the anal stage leads to the development of an adult who is creative and industrious.

3.4.1.1.3.3 The Phallic stage

Between the third and sixth years, children's interest begins to revolve around their genitals, self-stimulation of the genitals and curiosity about the genitals of other family members and peers. Sigmund Freud also controversially believed that the child becomes sexually interested in the parent of the opposite sex and feels hostile towards its same sex parent. This emotional conflict is known as the Oedipus complex and it varies in structure and complexity for the male and female. He proposed in his 1913 book, 'Totem and Taboo' (cited by Allen *et al.* 1977) that the Oedipal complex arises from 'acquired characteristics', dating from pre-historic times which are passed on in the unconscious mind of individuals. (These ideas are related to sociobiological theories. See Section 3.3) He believed that the original human group was ruled by a dominant father, who had exclusive sexual rights to all the females. The sons ganged together and killed their 'primal father' and ate him. Following this event, they were overcome with guilt which led to prohibitions against killing your father and having sexual relations with family members, including your mother. These prohibitions, along with an unconscious wish to break the prohibitions, form the psychological basis of the Oedipal Complex.

For a boy, his sexual rivalry with his father produces feelings of guilt, and later fear, that the father will retaliate and castrate him, which is called 'castration anxiety'. The boy eventually comes to identify with his father (a process that is called 'identification with the aggressor') he introjects his father's values and so, by association, achieves a vicarious relationship with his mother.

According to Sigmund Freud, the resolution of the girl's Oedipus complex is less satisfactory. Although she is first closely attached to her mother, she becomes sexually interested in her father, and comes to blame her mother for the fact that she (i.e. the young girl) does not have a penis. This is called 'penis envy'. Eventually she comes to identify with her mother, partially introjects her mother's values, and again, as in the case of the boy, by association with the mother, enjoys a vicarious relationship with the father. (See Sections 4.7.1.1; 4.7.1.2)

Inadequate resolution of the crisis of the phallic stage can result in individuals who fail in their sexual experiences or jobs, who are promiscuous, or who have very puritanical attitudes towards sex.

3.4.1.1.3.4 The Latency Period

From six years to the beginning of puberty, the child passes through the latency period when she or he experiences new intellectual and social pursuits, freed from conflicting aggressive or sexual drives. When the child reaches puberty, unresolved conflicts from the oral, anal and phallic stages of development may be experienced. The adolescent in addition must resolve the conflict between adult sexual desires and societal prohibitions on pre-marital or underage sex.

3.4.1.1.3.5 The Genital Stage

The genital stage begins at puberty and lasts throughout adulthood. While each of the earlier stages of psychosexual development involved self-centred desires and needs, the aim of the genital stage is the development of mature heterosexual functioning in which the individual enjoys sharing sexual gratification with another. Unresolved early stages of development can interfere with an individual's ability to reach this ideal stage and may also lead to the unconscious choice of non-compatible partners. Therefore, according to Sigmund Freud, individuals do not automatically reach the genital stage of development and having entered it, many do not experience the genital stage completely.

3.4.1.1.4 The Freudian approach to gender role identity

Sigmund Freud proposed that two factors mould and influence the male and female gender role identity. (See Sections 4.7.1.1; 4.7.1.2)

(1) The first factor concerns the role of the external genitalia in shaping attitudes and characteristic ways of behaving. Sigmund Freud believed that 'anatomy is destiny'

and so the child's sexual organs dictate the sexual developmental paths that a female or a male pass through. Culture and the environment could have no real effects on this process. He proposed that the dramatic and sexually intrusive nature of the male's sex organ leads to the development of aggressive, outward looking, dogmatic attitudes among males, while the nature of the female's hidden, sexually enveloping sex organs, lead to more inward looking, submissive attitudes among females.

(2) The second factor concerns the resolution of the male and female Oedipus complexes, the subsequent development of the superego and their effects on gender identity and the male and female mindset. Although Sigmund Freud had many female patients he never felt confident that he understood the psychosexual development of females and he felt more confident in his analysis of the male Oedipus complex.

According to Sigmund Freud both girls and boys: "start off from the premise of the universal presence of the penis" (Freud 1940, cited by Barnes 1985, p. 11). During the Phallic stage of psychosexual development the male child develops sexual desires for his mother and hostility towards his father who is seen as a rival for the mother's affections. When he notices that girls and women do not have a penis, he comes to the conclusion that their (supposed) penises have been cut off as some sort of punishment. The child's subsequent identification with masculinity and his father, following his dangerous (and presumably punishable) sexual desires for his mother, successfully resolves the Oedipus complex and relegates these feelings to the unconscious mind. If the boy however does not successfully move though these developmental stages of severe anxiety, hatred of father, separation from the mother and identification with the father, he will not become 'fully' masculine.

Having successfully navigated a course through the Oedipus complex, the boy introjects his father's authority and values into his own ego, thus developing his own superego. Since girls do not have a penis, Sigmund Freud believed that the boy comes to view all girls as inferior and he assumes that females must feel jealous of males.

These feelings lead him to develop subsequently feelings of dominance and superiority, which reflect the male dominance of most societies and cultures.

While the boy 'discovers' his penis during the Phallic stage, the girl 'discovers' her clitoris. At this stage she sexually desires her mother. Her realisation of genital inadequacy when she sees that boys have penises, leads initially to a futile hope that she will eventually grow a penis, later to 'penis envy' and jealousy of boys, and leading ultimately to feelings of inferiority and inadequacy in relation to males. She comes to associate power and strength with a penis mainly because her father has one. She develops sexual desires for her father and becomes annoyed with her mother who is somehow 'responsible' for the child's lack of a penis.

The female Oedipus complex is (partially but never fully) resolved when the girl accepts that her clitoris can never substitute for a penis, replaces her wish for a penis with a wish for a baby, and identifies once again with her mother. Since the mother is however an 'inferior' role model, the girl does not fully introject the mother's values, thereby resulting in a poorly developed sense of values and morality. At this stage she accepts a vicarious sexual relationship with her father through her mother, but due to the 'inadequate' resolution of her Oedipus complex, she still retains a close 'Oedipal' relationship with her father. As an adult she transfers her sexual desire for her father to other males who can symbolically supply her with a 'penis' during labour when she can produce a baby. This is called the 'penis-baby equation paradigm'. The ultimate aim of a female is however to give birth to a male who would enable her to 'produce' a penis herself. The girl's concept of femininity depends on her acceptance of her inferior status and life style, or otherwise she may develop neurotic tendencies.

Sigmund Freud believed that the resolution of the female Oedipus complex was less complete than that of the male Oedipus complex. He reasoned that a great deal of libido has to be utilised to deal with the Oedipus complex. In the case of the male, castration anxiety follows the onset of the Oedipus complex and leads to its

resolution. The male therefore can devote his libidinal psychic energy to forming a superego.

While castration anxiety fully resolves the male Oedipus, 'castration' produces the female Oedipus complex rather than resolves it. The intense nature of the boy's castration anxiety motivates him to struggle very hard to resolve his Oedipus complex, while the girl lacks this motivational trigger. Without the 'strong' castration anxiety to 'break up' the Oedipus complex, the female has to rely on her 'weaker' fear of losing her parent's love. This means that the resolution of her Oedipus complex is less complete than the boy's resolution. She 'patches' together her superego using past experiences and her fear of losing love and so her superego has less 'strength' and independence. As Peter Gay points out, Sigmund Freud believed that the 'thinness' of her superego means that "[s]he shows less sense of justice than man, less inclination to submission to the great exigencies of life, is more often led in her decisions by tender or hostile feelings" (Gay 1988, p. 516).

For the rest of her life the female feels anger and disappointment arising from her Oedipus complex crisis and genital inadequacy, causing feelings of inferiority and jealousy of males which leads to "a lifetime of self-hatred for being feminine" (Beal 1994, p. 57).

3.4.1.1.4.1 Criticisms of Sigmund Freud's theories of gender role identity

Sigmund Freud's theories on gender role identity have been widely criticised for the following main reasons:

- Theories such as the Oedipus complex, penis envy, and castration anxiety are untestable since they are applied after the fact and any confirmation or disclaimers (which may indicate defence mechanisms) can be taken as further evidence that the hypothesis is correct. Sigmund Freud himself accused his critics of 'unconscious resistance' to his ideas and implied that those outside the 'system' could not fully understand his arguments (Jacobs 1993).

Sigmund Freud was very reluctant to encourage any scientific evaluation of his theories because he believed that the extent of his own and other psychoanalysists' observations "makes them independent of experimental verification" (Gay 1988, p. 523).

So far, research into the psychosexual aspects of Freud's theories has been limited, inconclusive and frequently flawed (Horgan 1996) and the theories themselves have been found to be 'unresponsive to research' (Feshbach *et al.* 1996). Seymour Fisher's examination of all research up to 1994 into Sigmund Freud's psychosexual theories related to the Oedipal complex, concludes that his: "grand theory [ ] does not hold up well to empirical inspection" (Fisher and Greenberg 1996, p. 169).

In addition, the almost 'religious-like' acceptance of Freudian ideas means that psychoanalysts "typically do not drop or significantly change a theoretical conjecture simply because of lack of empirical support" (Feshbach *et al.* 1996, p. 124).

- Sigmund Freud's theories were formulated from data collected on patients suffering from various psychotic illnesses, whose psychological functioning was seriously impaired. They were also not representative of people at that time or today in the 1990's, since they came mostly from middle and upper classes in Victorian Vienna. His data base was very small, with, for example, his theories on feminine development arising from information gleaned from a "mere handful of cases" (Gay 1988, p. 516).

- His theories on early childhood development were derived from his own self-analysis, and from second-hand interpretations of adult dreams and memories of childhood, which can suffer from bias, distortion and inaccuracy. He worked from notes that he made several hours after treatments, and which were not taken down verbatim.

> *"For the most part what we find in Freud's writings is the end result of his thinking – the conclusions without the original data upon which they were based, without an account of his methods of analysis, and without any systematic presentation, either qualitative or quantitative, of his empirical findings." (Williams 1987, p. 67)*

- The theories demonstrate a bias against females, as well as assumptions of male superiority and chauvinistic attitudes. According to Michael Jacobs, "It is difficult to avoid the impression that Freud saw women as less developed than men, genitally, emotionally and in their moral thinking" (Jacobs 1993, p. 107). He himself confessed that he did not understand females in spite of 'thirty years of study' (Gay 1988) and he accepted in his final statements on femininity, that what he had to say was: "certainly incomplete and fragmentary and does not always sound friendly" (Freud 1933, quoted by Brannon 1996, p. 119).

  In addition he made many incorrect statements about feminine sexuality concerning for example, the non-importance of the clitoris, and the widespread frigidity of females which have since been scientifically disproved (Masters and Johnson 1966), while many non-testable aspects of his psychosexual theory such as penis envy, castration anxiety and the Oedipus complex "have fallen out of favor even among psychoanalysts" (Horgan 1996, p. 74).

3.4.1.1.5 Development of Sigmund Freud's psychoanalytic theories after his death

While Sigmund Freud was still alive, a number of colleagues had disagreements with him over aspects of his theories, principally his theory of libido motivation. They severed relationships with him and worked on developing their own theories. Notable among these dissenters were: (a) Alfred Adler who founded his own psychoanalytic group, the Society for Individual Psychology, and (b) Carl Jung who developed his own school of thought called 'Analytical Psychology'.

After Sigmund Freud's death in 1939, his views on femininity and gender development were established as more or less canonical for his profession' (Gay 1988). While periodic disagreements arose, most psychoanalysts tended to accept the basic tenets of his psychosexual theories while quibbling with individual aspects of the theories. One of the most important of these psychoanalysts was Erik Erikson.

3.4.1.1.5.1 Erik Erikson

Erik Erikson extended the Freudian theory of psychosexual development to include what he referred to as 'psychosocial' development. He recognised that there is a series of biological, psychological, social and cultural factors that together affect the development of an individual. This developmental process lasts a whole lifetime and occurs through social conflict resolved during key interaction points in development. He identified eight stages of development (Erikson 1950, cited by Craig 1996, p. 59):

1. Oral-sensory (lasting from birth to 1 year)
2. Muscular-anal (2-3 years)
3. Locomotor-genital (4-5 years)
4. Latency (6-11 years)
5. Puberty and adolescence (12-18 years)
6. Young adulthood
7. Adulthood
8. Maturity.

Successful transitions through the infancy, childhood and adolescence stages of development lead the individual to acquire a sense of basic trust, autonomy, initiative, industry and identity. During adulthood and maturity, successful completion of all of the developmental stages encountered leads to the acquisition of a sense of intimacy, generativity and integrity.

Erik Erikson adapted the Freudian phallocentric approach to psychosexual development, although he differed from Sigmund Freud in emphasising positive aspects of female development and femininity. In one of his most famous play therapy investigations of psychosexual development, he asked 236 boys and 232 girls to construct scenes for an imaginary film using small toys and figurines (Erikson 1955). He found that the girls devised quiet, simple, static interior scenes of everyday life within homes or school, which had low walls, gates, furniture and 'family dolls'. Sometimes the scene was disturbed by intruders, usually 'cute puppies' or 'mischievous' boys. The boys devised exterior scenes that involved large buildings or towers which sometimes fell down, and outdoor scenes with lots of activity involving wild animals, Indians and traffic accidents. They frequently used a policeman (sic) who tried to control the chaotic, action-filled scenes (Erikson 1955).

From this type of work Erik Erikson deduced that the boys were representing the external, outward orientation of males with variables such as "height and downfall and motion and its channelization or arrest (policeman)" (sic) (Erikson 1955, p. 295) The girls meanwhile were representing the more peaceful 'inner' orientation of females through "static interiors , which are open, simply enclosed, or blocked and intruded upon" (Erikson 1955, p. 295).

> *"It is clear that the spatial tendencies governing these constructions closely parallel the morphology of the sex organs: in the male,* external *organs,* erectible *and* intrusive *in character, serving highly* mobile *sperm cells;* internal *organs in the female, with vestibular* access, *leading to* statically expectant *ova." (Erikson 1955, p. 295) (the author's own italics)*

Erik Erikson suggests that these constructed scenes reflect the female's acceptance or anticipation that her future life would revolve around the home and child care while the male anticipates a future in while he can be "strong and aggressive, mobile and independent in the world [and able to achieve] high standing" (Erikson 1955, p. 296).

While many of these conclusions could have been written by Sigmund Freud himself, Erik Erikson goes forward to modify Sigmund Freud's negative view of females. Rather than seeing the girl from a Freudian point of view as a "failed boy" and the "grown woman" as "a kind of castrated man" (Gay 1988, p. 515). Erik Erikson sees positive value in femininity itself since the female "is the womb of the species and the nurturer of its helpless infancy" (Williams 1987, p. 63) and she brings unique contributions to society with qualities of caring, compassion, nurturing and acceptance. She still however 'needs a man' to fulfil her life completely and as Carol Gilligan points out, Erik Erikson suggests that the female:

> *"holds her identity in abeyance as she prepares to attract the man by whose name she will be known, by whose status she will be defined, the man who will rescue her from emptiness and loneliness by filling 'the inner space.' " (Gilligan 1982, p. 12)*

3.4.1.1.5.2 Feminist psychoanalytic theories

A number of psychoanalysists, such as Karen Horney, Melanie Klein, and Nancy Chodorow, took issue with Sigmund Freud over his attitudes towards females. In general, they upheld many of the basic tenets of Sigmund Freud's general theories of psychoanalysis, but adopted a gynecentric view of psychosexual development. These theories reversed the Freudian phallocentric approach that saw the male sex as more important, admirable and psychologically balanced than the female sex, and they

replaced it with theories that see the female sex as preferable to the male. However, many of their modifications represent a case of 'tweedle dum and tweedle dee'. While females feel alienated by phallocentric theories, as Linda Brannon (1996) points out, males can find it hard to relate to feminist theories.

3.4.1.1.5.2.1 Karen Horney

Karen Horney disagreed with a number of areas of Freudian psychosexual theories. She criticised the male bias of Freudian theory, its emphasis on male psychology and its interpretation of female psychology based on masculine norms. She argued that penis envy was not a longing for a physical penis, but rather a symbolic longing for the social prestige and position which males have in our society. She further suggested that the female ability to give birth, gives females an 'indisputable superiority' which leads to male jealousy, and 'womb envy'. In an attempt to cope with these feelings of jealousy, males strive to 'produce' various prizes, achievements and material goods that duplicate the production of a baby at birth.

She suggested that both females and males, rather than just females, have feelings of inferiority. Like Sigmund Freud, she saw that penis envy (which is relegated to the unconscious mind due to its threatening feelings) leads to inferiority feelings in females. However, she also believed that the male's envy of the female's breasts and reproductive ability leads to male feelings of inferiority, which are also repressed into the unconscious mind. In order to cope with these feelings both females and males overcome their feelings of inadequacy by regarding the opposite sex as inferior (Brannon 1996).

Finally, she differed from Sigmund Freud in emphasising social and cultural influences, rather than biological factors, in shaping and developing aspects of psychosexual development and personality.

3.4.1.1.5.2.2 Melanie Klein

Melanie Klein agreed with Sigmund Freud on the importance of early childhood, the unconscious mind and libidinal impulses. However, unlike him, she placed a special emphasis on the role of mothering and the early feminine orientation of girls and boys. She believed that the infant's mind has the same basic elements that the adult has, and so the infant can experience strong feelings of love, and 'oneness' with the mother, along with feelings of envy and hatred. Kleinian theories go further than Freudian theories in their analysis of aggressive behaviour. According to Melanie Klein, in her 'object-relations' theory, the young infant does not have a concept of whole objects and so builds up a model of 'part-objects' such as 'the nipple-giving-milk' or 'the nipple-not-giving-milk'. The infant can love the 'good breast' or build up anger at the 'bad breast' that can be manifested through biting, crying and temper tantrums, digging its fingers and nails into the mother or using its excreta to 'punish' the mother. In a similar way to Karen Horney, Melanie Klein differed from Sigmund Freud in recognising an important role of the social context in psychological development (Klein 1984).

3.4.1.1.5.2.3 Nancy Chodorow

Nancy Chodorow suggests that all infants initially form a close relationship with their mother or mother substitute. Since the young girl is female like the mother, it is easy for her to develop a 'sense of self'. However, her sense of self is a sense that merges with others and shows empathy and sensitivity, and so, "in any given society, feminine personality comes to define itself in relation and connection to other people more than masculine personality does" (Chodorow 1974, quoted by Gilligan 1982, p. 7). The mother is able to provide a clear role model for her developing femininity. However, because the girl never really separates emotionally from her mother, she comes to resent this dependency as she grows older, and alternates between feelings of love and hostility for her mother.

The young boy on the other hand must reject femininity if he is to develop a male 'sense of self', and this is a more difficult process to undertake than that undertaken by the girl. In order to cope with this necessary emotional separation, the boy comes to fear, mistrust and denigrate all things feminine (Brannon 1996). The boy develops into adulthood, more independent and less emotionally tied to his mother. Considering the type of experiences which females and males undergo, Nancy Chodorow proposes that as girls grow older they may have problems with individuation and separation, while boys may feel threatened by intimacy and closeness. Nancy Chodorow also accepts the Freudian theory of penis envy, but she sees that the female envies not the male penis itself, but the ability of males to separate themselves more completely from the mother.

3.4.1.1.5.3 The significance of psychoanalytical theories in explaining gender role identity

Overall, the two abiding aspects of Sigmund Freud's psychoanalytic theory have been his 'discovery' of the unconscious mind, and his recognition of the importance of childhood experiences. The hypothesis that "the human psyche [is] shaped by childhood and can be reshaped through psychotherapy" has not been proved yet in spite of many years of worldwide therapeutic practice (Horgan 1996, p. 77).

His controversial ideas on psychosexual development and gender role identity have been very widely criticised, particularly for his analysis of feminine development. Among feminist writers, his theories in this area are generally seen as androcentristic, and are seen as reflecting the writings of someone who did not really understand females. As Peter Gay (1988) points out, Freud himself admitted his ignorance of women when he told Marie Bonaparte that he had been doing research into the feminine 'soul' for thirty years and still did not know what women really want. To him the sexual life of the adult woman was a 'dark continent'. The alternative views of psychosexual development offered by feminist psychoanalytic theories highlight the debatable nature of Sigmund Freud's conclusions. Therefore, while aspects of his

overall psychoanalytic theory may be supportable, his psychosexual theories and theories of gender role identity are unreliable.

The theories of Karen Horney, Melanie Klein and Nancy Chodorow primarily reverse the phallocentric nature of Sigmund Freud's psychosexual theories and replace them with gynecentric theories. The inherent biases of both approaches therefore cannot provide a comprehensive framework to describe the development of both sexes. Erik Erikson's psychosocial theories, by emphasising the combined role of biological, social and psychological events in shaping development, extend the more limited theories of Sigmund Freud, and provide a fairly comprehensive explanation for overall development. However, because he retains a phallocentric, *post hoc* rationalisation, his theories fail to provide a complete explanation for gender role identity development.

3.5 COGNITIVE DEVELOPMENTAL THEORIES

3.5.1 Piaget's theory of cognitive development

Jean Piaget's theories of cognitive development (1926; Piaget and Inhelder 1966) have provided the main influence for cognitive developmental theories of gender role identity. Following observations and interviews with his own and other children, he developed his theory of cognitive development. His theory deals with the intellectual growth of concepts within areas such as number, space, time, causality and morality. According to Jean Piaget, the child is a 'scientist' and 'constructivist' who actively explores the environment gaining an understanding of its essential features.

As Dennis Child (1981) has pointed out, Jean Piaget's theory is a genetic, maturational and hierarchical one. It is genetic in that it recognises the triggering biological mechanisms, "rooted in the development of an individual's nervous system" that lead to intellectual functioning (Child 1981, p. 140). It is maturational because Jean Piaget proposed that concept formation passes through "clearly definable stages [across] specific age ranges" (Child 1981, p. 140). It is a hierarchical

theory because it recognises that successive levels of achievement in concept development must be reached and "passed through in a given order" before proceeding to the next level (Child 1981, p. 140). Individuals move along a developmental 'path' for each concept at different speeds and may reach different levels of proficiency within a range of concept areas at the same time.

3.5.1.1.1 Schemata

Jean Piaget saw intelligence developing through interaction with the environment. Initially the young infant, motivated by reflex actions, 'operates' on the environment by carrying out various actions such as sucking, looking, touching, etc. The organised action patterns that the infant carries out, become internalized and are represented as thought processes, which are known as 'schemata'. At a later stage of development when the actions are replaced by symbols such as numbers and words, they are known as 'representational schemata'.

From a Piagetian point of view, schemata are the internal conceptual frameworks which individuals form as a result of past experiences, and which develop further as new information is absorbed into these frameworks. Individuals build up schemata to cope with all actions and behaviours, developing schemata for example, for walking up stairs, writing, and skipping. When we encounter a new experience, we try to utilise our existing schemata. If our existing schemata cannot be applied to the new situation, we experience a state of 'disequilibrium'. We try to reach a state of 'equilibrium' by either a process of 'assimilation' in which the new information is incorporated into an existing schema, or 'accommodation' in which an existing schema changes to fit the new information or skills. At first, schemata are simple and pragmatic, while later on, they become more complex and symbolic.

3.5.1.1.2 Stages of cognitive growth

Jean Piaget proposed that there were four main stages of cognitive growth (1926; Piaget and Inhelder 1966; Piaget 1984).

(1) The sensorimotor stage

This stage lasts from birth to approximately 2 years. At the beginning of this stage he proposed that young children do not have a concept of themselves as individuals separate from the world, and they do not have a concept of object permanence. During this stage the infant slowly learns to utilise a range of reflexes and action patterns in order to (a) explore the environment (b) interpret the information that it receives through its sensory organs and (c) build up a picture of its environment. The child also uses these reflexes and action patterns to gain motor control and to develop language skills. (This theory relates to Konrad Lorenz's research. See Section 3.3.1) As the sensorimotor stage progresses, the infant builds up increasingly complex schemata that enable it to gain more control of the environment and to increase its knowledge base.

(2) The pre-operational stage

This stage lasts from approximately 2 years to 7 years of age. In this stage the child's previous total reliance on sensory input in order to explore the world is augmented and gradually surpassed by the child's increasing abilities in "internalizing imitations and actions" (Child 1981, p. 143). The child uses 'symbols' or 'signifiers' in order to 'internalise' these actions and represent objects that are not there, through the use of deferred imitation, symbolic play, drawing and language (Lloyd and Swann 1985). This 'symbolic function' enables the child to 'think'. "A frequent analogy is that the pre-operational child thinks like a cine film in contrast with the slide projector of the sensorimotor child" (Lloyd and Swann 1985, p. 55).

One major difficulty which Jean Piaget proposed affects the pre-operational child, is the child's inability to 'decentre' her or his thinking. According to Jean Piaget, this means that the child does not look at things from the speaker's point of view, resulting in the production of 'egocentric' speech. He discovered in his experiments, that young children were unable to solve deductive reasoning problems. He believed that this was because they were unable to decentre and adopt flexible modes of thinking. Jean Piaget's conclusions in this area however, have been criticised, notably by Margaret Donaldson (1983), James McGarrigle (McGarrigle and Donaldson 1974) and Peter Bryant (1974). Jean Piaget himself has been accused of being unable to decentre and of being unable to see his own experimental problems from the child's point of view. According to his critics, this has led him to underestimate the capabilities of the pre-operational child.

As children progress through the pre-operative stage of development, they experience fundamental changes in their understanding of concepts such as reversibility, class inclusion, and conservation.

(3) The concrete operational stage

This stage lasts from approximately 7-11 years. When a child can solve problems in areas such as conservation, class inclusion, reversibility and decentering, she or he is understood to be functioning at a concrete operational level. During this period the child develops further skills in mathematics and in understanding relationships, and begins to handle abstract logic and concepts, and test out hypotheses.

(4) The formal operational stage

At this stage the child has attained adult abilities in thinking logically and abstractly and can solve problems 'mentally' without the need of concrete materials.

Jean Piaget's ideas have been very influential within educational psychology in particular, where his highlighting of the active role of the child in intellectual development has influenced child-centered classroom practices. His mark can also be seen in school books and school curricula where the introduction of logical, mathematical and abstract problems is usually guided by Piagetian principles.

However, as already discussed, aspects of his theories concerned with underestimation of the young child's abilities and decentering have been criticised (Donaldson 1983; Bryant 1974; McGarrigle and Donaldson 1974). His clinical interview method has also been criticised by Kathy Sylva and Ingrid Lunt (1986) while problems have been encountered with his stage theory (Lloyd and Swann 1985) and the vagueness of concepts such as 'assimilation', 'accommodation' and 'equilibration' (Boden 1983, cited by Lloyd and Swann 1985). He also can be criticised for placing too much emphasis on the: "knowing child but very little on the other half of the equation, the environment" (Lloyd and Swann 1985, p. 64) or on the child's emotional development.

Within the area of gender role development, Jean Piaget's model of development has provided inspiration for two theories of development (a) Cognitive developmental theories of gender identity, with Lawrence Kohlberg (1966) representing the main exponent of this approach and (b) The Gender Schemata Theory of gender role identity which Sandra Bem (1981) developed from basic Piagetian ideas.

3.5.1.2 Cognitive developmental theory of gender role identity

From a cognitive developmental point of view, the child's 'gender identity', which is the categorisation of oneself as a 'boy' or a 'girl', is established through normal cognitive processes by 18-24 months of age (Lewis 1975 cited by Bem 1992) and finally stabilised by 5 or 6 years of age. The child attempts to understand its surroundings and 'discovers' that:

> *"there are alphas and betas in the environment [ ] the child moves toward other alphas and away from betas. That is, it is the child who realizes what gender he or she is, and in what behaviors he or she should engage." (Bem 1992, p.383)*

Early cognitive developmental accounts of the development of gender understanding stressed a stage model of development. According to Lawrence Kohlberg (1966) there are four stages involved in the development of gender understanding that emerge in a developmental sequence from toddlerhood through to early school age.

1. Using the correct gender label

This refers to the categorization of self and others by sex (Eaton and Enns 1986, cited by Vasta *et al.* 1992). By 2 ½ years children can accurately label other children as boys or girls, and by the age of 3 years, they can sort photographs of boys and girls, and apply the labels correctly (Thompson 1975, cited by Unger1979; Leinbach and Fagot 1986).

Children of 18 – 23 months can identify words such as man, lady, daddy, mummy, boy and girl, and match these with corresponding photographs (Lloyd and Duveen 1989). Barbara Lloyd's and Gerard Duveen's experiments using 3 and 4 year old children, found that identification of gender pronouns and matching photographs was almost 100% successful. Gender confusion accounted for only 2.4 % of errors (Lloyd and Duveen 1989).

2. Understanding that gender is stable over time

3. Understanding gender constancy

These two stages involve an understanding that gender does not change over time and it cannot change, even if one wants it to (Eaton and Von Bargen 1981).

4. Understanding the 'genital basis of gender'

This refers to the understanding that one's gender is invariant, despite changes in activity, dress, or appearance (Eaton and Von Bargen 1981).

Cognitive developmental theories suggest that while children are in the pre-operational stage of cognitive development (2-7 years) they are 'perception bound' and so their definitions of sex are based on observable features such as clothes, hairstyle, occupations or behaviours (Kohlberg 1966). It is also proposed that young children find it difficult to 'reverse' procedures and so have not reached an understanding of 'gender constancy', which relates to the problems posed by conservation. As a result, they cannot understand that if a person's outward appearance changes, they still maintain their biological sex. They also may not understand 'gender' stability and the inevitable procession from young girl to adult women, or young boy to adult man.

As the child moves towards the concrete operational stage of cognitive development, they reach an understanding of the permanence of sex. Gender stability and constancy appear to emerge between 4 and 7 years of age (Thompson and Bentler 1971; Levin *et al.* 1972, cited by Thompson 1975; Serbin *et al.* 1993) and seem to be related to the child's understanding of the genital basis of gender. When the child understands the genital basis for gender, it can then appreciate that a child's biological sex does not change simply because the child is dressed to look like a member of the opposite sex (Bem 1989).

Gender identity becomes internalised through a process of 'self-socialization' (Kohlberg 1966) and this process guides the child's sex-role development and behaviour. The child, who is an active agent in constructing her or his range of gender-appropriate behaviour, gradually progresses through various intellectual stages of development, which result in qualitatively different organisations of the world, and further development of concepts of gender role identity.

Lawrence Kohlberg (Kohlberg and Zigler 1967) found that as children mature cognitively, their sex-role knowledge also matures, and so children who were advanced in other areas of cognitive functioning showed earlier and higher levels of sex role knowledge than peers of the same age, who were less cognitively advanced. According to Lawrence Kohlberg the development of a gender identity is basically a cognitive reality judgement rather than a product of "social rewards, parental identification or sexual fantasies" (Kohlberg and Zigler 1967, p. 103). Once the child's gender identity is established, it is irreversible.

Lawrence Kohlberg's original experiments on gender constancy, in which he asked children if a doll's sex could be changed if they wanted it to, have, just like Jean Piaget's experiments been criticised for underestimating the capabilities of the young child and failing to look at the problems set from the child's point of view. Sandra Bem suggests that difficulties which children have demonstrated in gender constancy: "may be more an artifact of faulty assessment procedures than a fact of early childhood" (1989, p. 650).

Carol Lynn Martin, and Charles Halverson, Jr. (1983, cited by Atkinson *et al.* 1993) and Miller (1984, cited by Atkinson *et al.* 1993) found that when the problem was translated into a medium which the children related to more fully, they showed earlier understanding of gender constancy than Lawrence Kohlberg found. In Miller's experiment children were shown photographs of some of their school friends who were dressed up in clothes, stereotypically assigned to the opposite sex. They were then asked if the child in the picture was a boy or a girl. Almost all of the 3, 4 and 5 year olds responded correctly (Miller 1984, cited by Atkinson *et al.* 1993). In the experiment carried out by Carol Lynn Martin and Charles Halverson, Jr. (1983, cited by Atkinson *et al.* 1993) children were asked "If you wore [opposite-sex] clothes, what would you *really* be, a boy or a girl?" This time over 90% of the 4, 5 and 6 year olds answered correctly. Sandra Bem carried out experiments in which she presented subjects with pictures of nude toddlers and pictures of these toddlers dressed in masculine and feminine stereotyped clothes. Her results indicated that Lawrence

Kohlberg had underestimated the capabilities of young children to cope with gender constancy (Bem 1989). In her experiments, 40% of 3, 4, and 5 year old children showed an understanding of gender constancy.

The order in which gender constancy is achieved has also been questioned by researchers who suggest a different sequence. Two separate sets of studies (DeVries 1969, cited by McConaghy 1979; Thompson and Bentler 1973, cited by McConaghy 1979) found that an understanding that gender is permanent, develops between 3 and 7 years, while an understanding that genitals, instead of behaviours (such as clothes, hair styles, or toys played with) determine gender, does not develop until 7-9 years of age or later. Further research by Maureen Mc Conaghy provides further evidence that unlike Lawrence Kohlberg's proposal, for most children in her experiment: "gender permanence precedes understanding of the genital basis of gender" (McConaghy 1979, p. 1225). Similarly, research by Martin and Little (1990, cited by Brannon 1996) concluded that gender constancy was not a critical component in the development of gender knowledge.

Conflicting research has also cast doubt on Lawrence Kohlberg's hypothesis that gender development, along with other cognitive development, is completed by late childhood or preadolescence. Researchers have found that there are continuing changes in gender role identity attitudes during adolescence and adulthood. Katheryn Urberg (1979, cited by Brannon 1996) found in her study of US 7th graders, 12th graders and adults, that adults showed less gender stereotyped attitudes than 12th graders, who demonstrated the highest levels. These findings suggest that there is a relationship between age and gender stereotyped attitudes. Similarly, Phyllis Katz and Keith Ksansnak (1994, cited by Brannon 1996) found evidence for increasing flexibility in gender attitudes and tolerance for gender atypical behaviours with increasing age from elementary to high school level.

3.5.1.2.1 The role of modelling

When children have established a gender label for themselves, they begin to 'organise' their world on the basis of sex and they begin to identify with the characteristics, behaviours and attitudes which society has assigned to that label. However, according to Lawrence Kohlberg, the child will model herself or himself on those who are "high in prestige and competence" (Unger 1979, p. 159). Since the male in many societies has a 'relatively' high status, it is easy for the boy to model his father, and to develop "competence, strength, power, and instrumental achievement" (Unger 1979, p. 159) which are the qualities that society ascribes to males. The girl on the other hand, has to model herself on her mother, and adopt values of "attractiveness, goodness, and social approval" (Unger1979, p. 159) in a society where females have a 'relatively' low status. The conflict that this poses for many girls, explains for Lawrence Kohlberg, the (debatable) prevalence of 'tomboyishness' in young girls.

3.5.1.2.2 The role of labelling

Young children prefer to carry out activities that are labelled as appropriate to their sex (Masters *et al.* 1979; Stein, A., *et al.* 1971, cited by Montemayor, 1974). Carol Lynn Martin and Charles Halverson, Jr. (1983, cited by (Atkinson *et al.* 1993) found that achievement behaviour in children was related to the sex-typed labelling of the task, and that boys more than girls, were likely to spend a longer time working on a task if it was labelled as sex appropriate. David Hargreaves has shown that children are able to carry out 'opposite-sex' behaviours when the task is given a neutral label (Hargreaves 1976 1977; 1979). However, children appear to learn very early to avoid behaviours that have been stereotypically assigned to members of the opposite sex (White 1978, cited by Martin and Halverson 1981; Hartup *et al.* 1963, cited by Bradbard *et al.* 1986). Jane Connor and Lisa Serbin (1977) found that for many children this tendency is established by the time they reach nursery school.

The limiting effects of labelling were investigated by Marilyn Bradbard *et al.* who examined the effects of sex-typed labelling of novel objects. They found that stereotyped labels had dramatic effects on the amount of exploration which the children undertook by influencing: "their memory by directing their curiosity to sex-appropriate rather than sex-inappropriate objects" (Bradbard *et al.* 1986, p. 485).

Children appear to understand that an individual's ability to carry out an activity depends on the sex role assignation. If an activity is labelled as masculine, then it is assumed that females will not be very good at it and visa versa. While Janet Shibley Hyde's work was primarily concerned with the effects of sexist language and the use of the generic 'he', her work also highlights the effects of labelling in the area of sex-role stereotyping. In her experiment 132 boys and girls aged between 8-12 years of age were asked to rate the performance of females in a fictitious job called 'wudgemaking'. Some of the children were given a description of the wudgemakers' job in which wudgemakers were described as being (a) a 'he' (b) a 'she' or (c) 'they' or a 'he or she'.

> *"Few people have heard of a job in factories, being a wudgemaker. Wudges are made of oddly shaped plastic and are an important part of video games. The wudgemaker works from a plan or pattern posted at eye level as* he or she *puts together the pieces at a table while* he or she *is sitting down. Eleven plastic pieces must be snapped together. Some of the pieces are tiny, so that* he or she *must have good coodination in* his or her *fingers. Once all eleven pieces are put together,* he or she *must test out the wudge to make sure that all of the moving pieces move properly. The wudgemaker is well paid, and must be a high school graduate, but* he or she *does not have to have gone to college to get the job." (Shibley Hyde, 1984, cited in (Santrock 1996, p. 383)*

When the wudgemaker was described as being a 'she', female competence was rated very highly, when they were described as 'they' or as 'he or she' female competence was intermediate and it was lowest when the wudgemaker was described as being a 'he'.

Raymond Montemayor (1974) carried out an experiment in which he used either sex-appropriate, sex-neutral or sex-inappropriate labels on a game played by 6-8 year old girls and boys. He found that the children performed best when the game was labelled sex-appropriate (for them), intermediate when a sex-neutral label was supplied and poorest when it was labelled sex-inappropriate (for them).

Stein *et al.* (1971, cited by Martin and Halverson 1981) also found similar results in a paper-and-pencil task that was given either a masculine, feminine or neutral label.

3.5.1.2.3 Stereotyping

The process of stereotyping is an important aspect of cognitive developmental theories, since young children initially 'group' things together in order to simplify and understand the environment.

> *"people use categories, schemas, or stereotypes in everyday interactions with others in order to guide their interactions, to make swift judgments and inferences about others, and to facilitate their memory for these social interactions." (Taylor 1981, p. 57)*

From this point of view, stereotyping is seen in a positive light, as a normal cognitive process (Martin and Halverson 1981). One of the important 'groupings' which the child carries out and one which Jerome Bruner (1957) called a 'primitive categorization' involves the grouping of people according to sex.

Many studies have shown that children as young as two years have already successfully categorised people into male and female divisions (Thompson 1975, cited by Unger 1979). Susan Sterkel Haugh *et al.* (1980) carried out an experiment in which 3 and 5 year old children watched a 5 minute videotape of two infants, a boy and a girl, who were matched for size, looks, age, etc. They were dressed in the same way and played with the same toys. For various control groups each of the infants was named either as 'Bobby' or as 'Lisa'. The results showed that the children responded

in a significantly stereotypic way based on gender labels provided for the infants, regardless of the infant's actual sex. They also found that there were no developmental differences between the 3 and 5 five year old children. "[T]hese stereotypes are as well learned and elicited at age 3 as at 5" (Sterkel Haugh *et al.* 1980, p. 599).

Because they have more limited experiences than adults, young children tend to rely more than adults on 'pre-packaged' gender stereotypes and as Eleanor Maccoby (Maccoby 1980) has pointed out they may even exaggerate or oversimplify characteristics to help them sort incoming data. Carol Lynn Martin and Charles Halverson, Jr. describe the over enthusiastic application of sex-typing schemas with 'illusory data bases' by young children.

> *"Most children will say that "fathers drive," even though they often see both their mothers and fathers driving. Despite information to the contrary, children will maintain that driving is a masculine activity." (Martin and Halverson 1981, p. 1125)*

Children younger than 4 years rely primarily on hair and clothes cues in discriminating between the sexes. Young children for example have been found to classify girls as 'people with long hair' while boys may be classified as 'people who do not wear skirts or dresses'(Levin *et al.* 1972, cited by Thompson 1975; Thompson and Bentler 1971). By around seven years of age (and the start of the concrete operational stage of cognitive development) the child's understanding of sex and sex-roles has matured. At this stage children understand, for example, that the sex of a boy will not change if he wears a skirt.

3.5.1.2.4 Early childhood sex typing

Cognitive developmental theory suggests that once the child has developed a gender identity she or he will sift through the available options in its environment and focus on those which are associated with her or his label "because of the child's need for

cognitive consistency, self-categorization as female or male motivates her or him to value that which is seen as similar to the self in terms of gender" (Bem 1992, p. 598). In this way the child becomes sex typed. Sex typing of the child into femininity or masculinity (or androgyny as Sandra Bem suggests) (See Section 4.4.2.3) varies according to the particular societal and cultural influences experienced by the child. It also depends on maturation, since for example, children up to three years of age are "unlikely to show a preference for sex-related toys or activities" (Williams 1987, p. 161).

A wide range of experiments have been carried out which show that by the time children reach pre-school-level, they are sex typed and adopt sex differentiated practices in their play and toy choices. (See 4.5.2) Some examples of these findings include:

- Evidence that boys and girls are better at recalling information that is relevant to their own 'gender stereotype' than information that is more relevant to the stereotype of the opposite sex (Liben and Signorella 1993, cited by Newman and Newman 1995). In an experiment using a memory test (Nadelman 1974, cited by Martin and Halverson 1981) boys for example, recalled more masculine items than feminine items, while the situation was reversed in the case of girls. Children have also shown selective memory for sex-consistent rather than sex-inconsistent information (Koblinsky *et al.* 1978, cited by Martin and Halverson 1981).

- Evidence for sex differentiated toy preferences (Eisenberg *et al.* 1982), play interests (Fling and Manosevitz 1972), activity preferences (Thompson 1975, cited by Unger 1979; Connor and Serbin 1977; Montemayor 1974) and avoidance of toys labelled as appropriate for the opposite sex (Hartup *et al.* 1963, cited by Bradbard *et al.* 1986). Children have been found to be less likely to explore or ask questions about objects that are labelled as appropriate for the opposite sex, than for those labelled sex appropriate (Bradbard and Endsley 1983; Bradbard *et al.* 1986).

- Evidence that from 2 years of age children prefer to play with same sex peers (Jacklin and Maccoby 1978). This preference for same-sex peers is a: "widespread phenomenon. It is found in all cultural settings in which children are in social groups large enough to permit choice" (Maccoby 1990, p. 514). It is particularly pronounced between 6 and 11 years of age. In their experiments with young children (mean age 33 months), Carol Jacklin and Eleanor Maccoby found that girls and boys demonstrated higher levels of social behaviour with same-sex partners than with opposite sex partners (Jacklin and Maccoby 1978). In another experiment (Maccoby and Jacklin 1987) children of approximately 4½ years spent nearly 3 times as much time with same-sex partners than with children of the other sex. By 6½ years this preference had grown stronger with children spending 11 times more time with same-sex than with opposite sex partners. When children as young as three were asked to approach another child, they stopped further back from children of the opposite sex than same-sex children (Wasserman and Stern 1978, cited by Maccoby 1990). In one experiment, when special efforts were made to change same-sex play to opposite-sex play through positive 'shaping' of behaviours, the children returned to segregated play when the experiment stopped (Serbin *et al.* 1977, cited by Maccoby 1990).

As Deanna Kuhn and her colleagues point out (Kuhn *et al.* 1978) these differences in choice of toys, play activities, etc. are seen to develop from a basic cognitive process of valuing one's own sex and devaluing the opposite sex. This leads to a situation where children learn to associate with, and value same sex behaviour and attitudes from an early age. They learn "what is for me" and "what is not for me" and this selective process places "restrictions on learning" (Bradbard *et al.* 1986, p. 486). As a result, the child 'loses out' on opportunities to experience 'opposite-sex roles' and behaviours, which limits the kinds of activities children can carry out competently and can "lead to selective behavioral performance" (Bradbard *et al.* 1986, p. 486).

3.5.1.3 Gender Schema Theory

Sandra Bem has been instrumental in formulating newer cognitive-development accounts of gender role development. Her information-processing theory is called the 'gender schema theory'.

Cognitive developmental theory of gender role identity suggests that concepts and attitudes towards gender develop as part of an overall scheme of cognitive development, along with mathematical, logical, scientific and other conceptual skills. Sandra Bem however, proposes that gender plays a more significant and central role in processing information. She suggests (Bem 1981) that sex-differentiation plays such a major role within most societies that children acquire a 'schema' of gender that affects both how they view themselves and others and how they view behavioural alternatives within the society. She proposes that a 'gender schema' is an 'anticipatory' network of associations that becomes a basic part of the individual's conceptual framework, and directs the sorting and categorisation of incoming information.

> *"Gender-schematic processing in particular thus involves spontaneously sorting attributes and behaviors into masculine and feminine categories or "equivalence classes," regardless of their differences on a variety of dimensions unrelated to gender, for example, spontaneously placing items like "tender" and "nightingale" into a feminine category and items like "assertive" and "eagle" into a masculine category." (Bem 1992, p. 386)*

The readiness of an individual to categorise information from the environment in this way derives, according to Sandra Bem, from "the assimilation of the self-concept itself to the gender schema" (Bem 1992, p. 386).

The everyday experiences of the individual child confirm the assimilated self-concept,

> *"Adults in the child's world rarely notice or remark upon how strong a little girl is becoming or how nurturant a little boy is becoming, despite their readiness to note precisely these attributes in the "appropriate" sex." (Bem 1992, p. 386)*

In this way the child becomes sex typed and "cultural myths become self-fulfilling prophecies" (Bem 1992, p. 387).

Like cognitive-developmental theories, gender schema theory sees the developing child as an active agent in her or his own socialisation. The process of forming gender schemata is viewed as more important than the actual content of the schema. This is because individuals grow up in societies that vary in their levels of prevailing sex differentiation. An individual's level of sex-typing can also vary according to the strength of assimilation to the gender schema by that individual and on how closely the person identifies with that gender schema.

This theory therefore combines aspects of both cognitive developmental theory and social learning theories which will be discussed later (See Section 3.6) by recognising both the role of the 'active child' and the influence of the sociocultural environment.

Variations among individuals in the display of 'masculine' and 'feminine' behaviours and attitudes have led Bem to investigate psychological androgyny (Bem 1974; Bem, 1985). The word 'androgyny' comes from the Greek word *andro* which means 'male' and *gyne* which means 'female', and refers to the extent that an individual displays both feminine and masculine characteristics (Hargreaves and Colley 1987, p. 35).

3.5.1.3.1 Psychological androgyny

While it may be convenient to describe certain behaviours as being predominantly 'masculine' or 'feminine', both women and men are capable of being aggressive, gentle, ambitious, caring, supportive, domineering, etc., depending on the circumstances. Indeed, many tests that emphasise differences between females and

males find, but do not emphasise, the degree of overlap between female and male scores (Czerniewska 1985).

Sandra Bem (1975) has looked specifically at psychological androgyny and the capacity of women and men to be both feminine and masculine in their attitudes and behaviour. She devised, and later modified, the Bem Sex Role Inventory Test (BSRI) which measures sex-role stereotyping in adults. Subjects are divided into four categories:

- Androgynous, i.e. subjects who score high in masculinity and in femininity attributes.
- Feminine, i.e. high on feminine but low on masculine attributes.
- Masculine, i.e. high on masculine but low on feminine attributes.
- Undifferentiated, i.e. low scores on both masculine and feminine attributes.

Some researchers have criticised the BSRI as a tool, and criticised its circular nature whereby initial self ratings of the subjects based on culturally defined behaviours, are tested using these same culturally defined behaviours (Spence and Helmreich 1981, cited by Hargreaves and Colley 1987; Hargreaves and Colley 1987).

It is suggested that psychological androgyny may be formed by specific child-rearing practices and parental attitudes that encourage cross-sex behaviour. It has been found for example, that children whose mothers do non-traditional tasks developed more flexible sex-role attitudes, seeing more activities and occupations as appropriate for both females and males, and they themselves were more flexible in their preferences for activities, occupations and friends (Bem 1992; Craig 1983; Serbin *et al.* 1993).

In general, girls are allowed greater flexibility in adapting cross-sex behaviours than boys. Girl peers do not object or appear to be concerned if other girls play with 'boys' toys or engage in 'masculine' activities. In contrast boys criticise other boys, calling them 'sissies' if they engage in 'girls' activities, such as playing with dolls, crying if they are hurt, or showing concern towards another child in distress. Any lapses into 'feminine behaviour' by boys must be covered up or hidden to avoid ridicule. Katherine Clarricoates reports on one such incident, taken from her 18 month study of four primary schools:

> *"Two boys are happily playing in the Wendy House: Edward is setting the table whilst Tom is ironing. The teacher comes forward: 'Aren't you busy? What are you playing?' Edward looks at Tom, both look sheepish. 'Batman and Robin', states Edward vehemently. The teacher smiles and moves away." (Clarricoates 1980, p. 35)*

As already discussed (Section 3.5.1.2.2) the 'perceived' gender differentiation of an activity seems to be important. David Hargreaves and his colleagues (Hargreaves *et al.* 1985; Hargreaves 1976; 1977; 1979, cited by Hargreaves and Colley 1987) carried out some interesting experiments in which children were provided with tasks which were labelled sex-inappropriately, and it was found that consistent sex differences in performance could be reversed according to the labelling provided.

In experiments using the Bem Sex Role Inventory Test (BSRI), for example, (Deaux and Major 1977; Kail and Levine 1976, cited by Bem 1992) subjects who were defined as being 'sex typed' were found to process information such as random lists of words or information about themselves according to gender and sex categorisations, while those defined as 'non sex typed' were less likely to do so. They also carried out this process of classification much faster than 'non sex typed' subjects, suggesting that,

> *"sex-typed individuals do not bother to go through a time-consuming process of recruiting behavioral evidence from memory and judging whether the evidence warrants an affirmative answer – which is presumably what non-sex-typed individuals do." (Bem 1992, p. 398)*

Other studies have shown that individuals sort and recall information along gender classification lines (Taylor *et al.* 1978, cited by Beall and Sternberg 1993; Fiske *et al.* 1991, cited by Beall and Sternberg 1993). As a result, as Anne Beall and Robert Sternberg point out: "if we misremember, we are more likely to make a within-sex mistake than a between-sex mistake" (Beall and Sternberg 1993, p. 61).

People tend to 'tag' information so that

> *"An observer may organize seemingly diverse behaviors such as baking cookies, petting a cat, taking long naps, and being very talkative with a convenient or stereotyped label, such as 'grandmotherly type.' " (Beall and Sternberg 1993, p. 67)*

Therefore, according to gender schema theory, a schema becomes a 'lens' or a 'mental filter' through which we view the world and interpret information. Here are two typical experiments that have demonstrated the modifying effects of 'gender' assumptions and classifications. In one experiment, subjects were found to interpret the 'state' of the baby differently depending on the presumed sex of the baby. When a baby was believed to be a girl, subjects in the experiment reported that 'she' smiled a lot and was a satisfied baby, but if they believed it was a boy, they said that the baby did not like strangers (Sidorowicz and Lunney 1980, cited by Beal 1994). In another experiment, college students were shown a video of a 9 month old baby who was reacting very strongly to a Jack-in-the box. When the students were led to believe that the infant was a boy, they described the emotional reaction as 'anger', while this reaction was described as being 'fear' when the infant was thought to be female (Condry and Condry 1976).

Sandra Bem (1975) has suggested that it is psychologically 'healthy' to be 'psychologically androgynous'. She believes that females unconsciously inhibit characteristics that are culturally assigned to males, and vice versa. According to Sandra Bem, contrary to typical stereotypes, females have the potential to be aggressive, competitive, and independent, while males have the potential to demonstrate empathy and emotionality.

She also proposes that rigid sex-role stereotypes may restrict emotional and intellectual growth. She found that women who scored high on feminine characteristics were less creative, more anxious and insecure, and scored lower on tests of intelligence and spatial perception than women who scored low on feminine traits. Men who scored high on masculine characteristics, were found to score lower on tests for intelligence and creativity, and were less playful and spontaneous than those with androgynous personalities (Craig 1983; Bem 1975). However, it is not clear from a wide range of research on for example, performance on ability tests (Antill and Cunningham 1982), emotional well-being (Lubinski *et al.* 1981), levels of self-esteem (Spence *et al.* 1974, cited by Hargreaves and Colley1987), and parental effectiveness (Baumrind 1982), that psychological androgyny is a good predictor of psychological well-being. One review of the literature found that score levels of masculinity in both males and females may be a better predictor of well-being than measures of androgyny (Taylor and Hall 1982). Further confirmation of these findings comes from a long-term study of individuals with androgynous personalities who were studied at 12 years of age and later at 31 and 41 years of age. In this study Jennifer Aube and Richard Koestner (1992, cited by Brannon 1996) found that masculine instrumental traits were positively related to adjustment during adulthood for both females and males.

Gender schema theory acknowledges the active role of the child in his or her own socialisation. It also recognises the importance of society and culture on an individual's development, and attempts to explain variations in sex-role behaviours and attitudes in terms of changing cultural influences. Sandra Bem (1975; 1981;

1985; 1993, cited by Atkinson *et al.* 1993) suggests that society should avoid emphasising the functional importance of the gender dichotomy (Bem 1981) and instead encourage the development of androgynous personalities. However, it seems that this approach does not give sufficient consideration to the physiological and emotional aspects of male and female development that may affect psychological well-being.

3.5.1.4 The significance of cognitive developmental theories in explaining gender role identity

Cognitive developmental theories recognise the role of the thinking child in gender role identity and the 'inevitable' developmental movement of the child towards a recognition of her or his own gender identity and its constancy and permanence. The staged learning approach of Lawrence Kohlberg to gender identity, which was influenced by Piagetian theories, has been criticised for underestimating the capabilities of young children and not recognising the continuing development of gender role identity into adolescence and adulthood. In addition, the order and importance of developmental stages identified by Lawrence Kohlberg and other cognitive developmental theorists have been questioned.

The later development of gender schema theory by Sandra Bem provides a more comprehensive theory of gender role identity. Her theory takes account of the cognitive action of the child on its world. It also acknowledges variations in gender identity between and within societies, and recognises the role of society and socialization practices in gender identity formation. However, in an attempt to address the social and interactive nature of development, many theorists currently adopt a social constructivist approach to development. (See Section 3.6.3) This approach combines cognitive developmental and social learning theories, and provides a more comprehensive explanation for development than cognitive developmental theories can provide by themselves.

3.6 SOCIAL LEARNING THEORIES

3.6.1 The development of social learning theories

3.6.1.1 Social learning theory

Traces of early social learning ideas have been identified in the environmental determinism of John Watson (1928, cited by Shaffer 1988) who believed that the young child was a 'tabula rasa', whose development depended on environmental experiences and influences. Another foundation of the social learning approach was laid by Neal Miller and John Dollard (1941, cited by Deaux *et al.* 1993) who suggested that imitation could be explained by basic principles of stimulus, reward, and reinforcement.

Albert Bandura with his research student Richard Walters and other colleagues, developed these ideas into a social learning theory (Bandura and Walters 1959; 1963, cited by Green 1989; Bandura 1969, cited by Slavin 1997). This theory proposed that new behaviours could be acquired through observation of a model, without the need for reinforcement. This is referred to as 'vicarious reinforcement' or 'no trial learning'. The actions of the model allow the observer to find out the pros and cons of a particular line of behaviour, and the likely consequences that would befall those imitating that behaviour.

The observer is selective in the particular model that she or he attends to and which behaviours are imitated. For example, Albert Bandura found that children were more likely to imitate same sex models, and models with high levels of attractiveness, status and power. They are also more likely to model those behaviours which are rewarded, rather than punished, and behaviours that are highly valued by that society, Previous levels of experience and training, as well as variations in the personal skills and characteristics of the observer, could also affect the level of knowledge that can be gained from a particular experience.

3.6.1.2 Social cognitive theory

Albert Bandura expanded and updated his social learning theory in 1986 (cited by Craig 1996) to take greater account of the role of cognition in development and learning. This newer theory is called 'social cognitive theory', and it proposes that cognition plays an important part in determining which events and models will be observed, what meaning to place on these observations, how much attention to pay to aspects of these events, and what will be retained for future retrieval (Green 1989). Individuals, through experience and observation, learn about society's norms and the behaviours that conform to those norms. They will tend to imitate those behaviours that are rewarded, and so in this way, children who are exposed to models of both sexes, learn to attend to and imitate same sex behaviours, and avoid cross sex behaviours.

Social cognitive theory has been criticised because: (1) it assumes that development moves towards conformity (b) it appears to adopt a 'copy' theory of knowledge (Green 1989) which does not fully explain how observational learning leads to the production of novel behaviours (c) it fails to address the question of the obvious developmental differences between infants and adults.

3.6.2 The social learning approach to gender role identity development

According to social learning theories, gender role identity develops from selective reinforcement of particular behaviours, specific learning experiences, and the imitation of models within the child's environment. Social learning theories point to observable, antecedent events such as parental reactions to actions, choice of toys, clothes and activities for children (Fagot 1978). Apart from child-rearing practices, the child's wider experiences of society, and in particular school experience and peers' interactions, are seen to affect the child's gender identity development, through reward and punishment of appropriate and inappropriate gender behaviours.

Children acquire 'sex-typed' behaviours through observation and modelling of significant same-sex adults, siblings, and later peers, whom they admire. Children initially are exposed to modelling of behaviours associated with both sexes. However they gradually learn that girls are 'rewarded' for playing with dolls while boys are 'rewarded' for playing with toy cars. While they may experiment by playing with cross-sex toys, they gradually conform to the behavioural standards operating in their environment. Therefore, the degree to which children become sex-typed in their behaviours depends on the extent of sex-role differentiation operating within their culture.

3.6.2.1 Parental influence on sex-typing

3.6.2.1.1 Gender differentiation before birth

The process of gender differentiation hinges on an acceptance of gender stereotypes. In our society, we not only accept and expect females and males to have different characteristics, interests and abilities, we even expect to find evidence for these differences from the moment of birth. This acceptance of gender stereotypical differences appears to result in patterns of differentiated behaviours among adults, and even children, when confronted with babies and infants. These differentiated behaviours are triggered when the gender of a baby or infant is confirmed. Before this confirmation of gender, people are uncomfortable and feel it is rude to talk about the infant as an 'it'. Expectant parents frequently overcome this awkward 'it' stage, by assigning a gender to their unborn baby on the basis of prenatal behavioural activities. For example, an active, kicking foetus is often presumed to be a male, while a quiet, passive one is presumed to be female (Unger 1979).

Nowadays, parents can find out the sex of their unborn child through an ultrasound scan. Expectant mothers who have learnt the sex of their child this way have been found to report different levels of prenatal activity depending on the gender of the baby. Carole Beal reports that the movements of a male foetus were described as being "vigorous" and "a saga of earthquakes", while mothers of a female foetus

described the movements as being, "very gentle", and "lively but not excessively energetic" (Beal 1994, p. 44). Parents who learn the sex of their unborn child frequently start purchasing toys and clothes for the baby, and in this way, even before birth the unborn baby can become genderised.

3.6.2.1.2 Gender differentiation in early infancy

Parents either consciously or unconsciously define the gender-role standards for their baby or young child. The toys which parents give to their children, the experiences that they expose their children to and the activities that they encourage their children to participate in, all reflect the parents' gender-role standards. Their sex-role standards may or may not correspond closely to that of their particular culture or society.

When a baby is born, one of the first questions usually asked is, 'Is it a boy or a girl?' There is evidence to show that the sex assignment of the baby, brings with it generally accepted beliefs of society about the nature, behaviour and status of females and males and influences how people interact with that baby. The biological sex of the new-born therefore becomes "a sign" that assigns and predicts the type of characteristics expected from the baby throughout its life into adulthood (Lloyd and Duveen 1989, p. 283).

Parents have been found to adjust their behaviour according to the sex of their children. Jeffrey Rubin *et al.* (1974) found that parents react differently to new born sons or daughters. They carried out a study of female and male infants who were of similar birth weight and length and achieved similar Apgar scores.[4] Within a few

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[4] The Apgar test is used to estimate the degree of asphyxia, or oxygen shortage in a new-born baby. A score of 2, 1 or 0 is given to each of the following conditions: the baby's colour (2 if the baby is pink all over, 0 if the baby is completely blue), type of breathing, heart rate, muscle activity and response to a

hours of birth, parents of girls used descriptions such as 'beautiful', 'small' and 'cute' when talking about their daughters, while fathers describe their sons as being 'firm', 'large featured', 'alert', 'strong' and 'well co-ordinated'.

The comments made by fathers concerning the 'state' of new-borns, that is whether they were quiet, or crying, etc. also varied according to their sex (White and Woolett 1981, cited by Woolett *et al.* 1982). When a baby boy cried, fathers made comments such as "Your lungs are good, aren't they?" while a crying girl received comments such as "She's noisy, like her mum" (White and Woolett 1981, cited by Woolett *et al.* 1982, p. 82).

The great majority of given names are specific to males or females and the clothes chosen for children are often sex specific. In a series of experiments two 6 month old boys and two girls were dressed, either in a ruffled dress and socks, or a 'babygro' (Smith and Lloyd 1978). Mothers were observed playing with one of the children and were told that the child was called either, 'John' or 'Jane'. They found that if the infant was presented as a boy, the women were likely to offer the hammer or rattle to the infant, and gave it a lot of verbal encouragement and stimulation in gross motor activity. However, if the same infant was presented as a girl they offered it a doll first and carried out actions that were designed to soothe and calm the infant.

There is evidence to show that it is the father who plays the critical role in reinforcing femininity in daughters and masculinity in sons (Johnson 1975). Highly 'masculine' boys tend to have fathers who are decisive and dominant in setting limits and dispensing both rewards and punishments. 'Femininity' in daughters is related to the father's masculinity, his approval of the mother as a model, and his encouragement of participation in feminine activities (Hetherington 1967).

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stimulus in the nose. A score of 4 or less out of the maximum possible of 10 is a sign of severe asphyxia. Source: The Reader's Digest Association Limited, (1983) *Family Medical Adviser*, London.

Fathers treat their sons differently from their daughters. For example, at twelve months of age, boys are punished more by their fathers than girls are. Compared to mothers, fathers are more likely to react to their children differentially according to sex and to demand sex-appropriate behaviour from them (Fagot 1974). This is demonstrated by the finding that while fathers will allow their daughters to play with trucks and dolls, they will not allow their sons to play with 'feminine' toys such as dolls. In one experiment (Langlois and Downs 1980), parents were interviewed while their child was placed in a playroom that had stereotypical girls' toys such as a toy stove with pots and pans, and stereotypical boys' toys such as a garage with cars and lorries. The experimenters asked the child to play with the toys. For example, a boy would be asked to play with a kitchen set 'the way that girls do for a little while'. While mothers were generally positive to both feminine and masculine play, fathers reacted positively to boys' play with masculine toys but very negatively to play with feminine toys. Their reactions included frowns, sarcastic comments and, in one case even involved picking the boy up and physically moving him away from the kitchen set.

Mothers stress competent task performance for both sexes, but fathers of girls are less concerned with performance and are more concerned with interpersonal interactions with their daughters (Block *et al.* 1974). The importance of achievement, career, and occupational success is stressed more for boys than for girls, particularly by fathers (Block 1978). Fathers were more likely than mothers to show both more intense positive and more intense negative reactions concerning their sons' choices of activities than their daughters' choices (Lansky 1967).

3.6.2.2 Sex differentiated play patterns

When children are very young, adults buy sex differentiated toys for them. For new-born babies these toys are often colour coded so that for example a soft toy rabbit given to a boy will be blue, but one bought for a girl will be pink. As the children

grow older and pass through various 'present giving' occasions such as birthdays, Christmas, Easter, holidays, etc., they accumulate a range of 'gender' approved toys.

Harriet Rheingold and Kaye Cook (1975) found that even at three years of age, boys' bedrooms contained more vehicles, toy animals, military toys, educational-art materials, sports equipment and spatial-temporal objects than girls' bedrooms. Girls meanwhile had more dolls, doll houses, and domestic objects than boys.

This differentiation in patterns of play activities approved for females and males seems to result in play patterns, even at 2-4 years of age, which are more restricted for boys than for girls (Duveen and Lloyd 1988; Lloyd 1987; Lloyd and Smith 1985). In a series of studies (Lloyd *et al.* 1988) 60 children were observed while using gender-marked toys. The female-marked toys included irons, ironing boards, comb, brush, and mirror sets, large white hats, shopping bags, baby dolls, a cradle, etc. Male-marked toys included fire engines, construction trucks, pegbenches with hammers and guns. It was found that while girls did not differentiate in their play with toys according to gender markings, boys showed a strong tendency to play with male-marked toys and they avoided female-marked toys.

The type of play activities chosen seems to be differentiated from early pre-school years onwards. Boys tend to prefer physical and athletic activities, involving body contact and competition (Hutt 1978). Girls, on the other hand tend to prefer verbalisation, playing co-operatively, taking turns, and singing (Sutton-Smith and Sovasta 1972).

Parents differentiate in the type of household tasks that they ask girls and boys to undertake (Lytton and Romney 1992). Susan McHale *et al.* concluded that "sex-typing in children's household labor remains evident, especially for girls" (McHale *et al.* 1990, p. 1423). When children are old enough to be given household jobs, girls are usually assigned jobs such as caring for younger children and helping with cleaning and food preparation. Girls are usually chaperoned more than boys and lead a more protected and sheltered life.

> *"by the age of seven, [ ] the daily experience of little boys in terms of where they are allowed to go, how they spend their time and to what extent they are kept under adult surveillance is already markedly different from that of little girls!" (Newson and Newson 1986, cited by Hargreaves and Colley 1987, p. 146)*

Boys are usually asked to carry out outdoor tasks such as mowing the grass, raking leaves, shovelling snow, or taking out rubbish bins (Medrich *et al.* 1982, cited by McHale *et al.* 1990). An extensive study of worldwide cultures found that boys were often given jobs that took them outside the home feeding and herding animals for example, while the girls' tasks were house-bound (Whiting and Whiting 1975).

The influence of feminist movements, changing patterns of employment and unemployment, along with increases in single-parent families and nuclear families has led to reassessments of gender-roles in society, which inevitably affect child-rearing practices. For example, mothers who work outside the home appear to have children who are more likely to have gender-neutral ideas about appropriate behaviour. Meanwhile, mothers who work in the home and practise more traditional patterns of gender differentiated work roles, are more likely to have children who see stereotyped gender roles as appropriate (Jones and Mc Bride 1980).

3.6.2.3 The influence of peers on genderisation

When children move to school, they are influenced in their gender-role development by their school peers. A considerable degree of genderised socialisation takes place during playtime when children learn how society 'outside the home' expects them to behave and play. When researchers carried out an extensive study of elementary playgrounds (Luria and Horzog 1985, cited by Santrock 1996) they concluded that playgrounds should more appropriately be called 'gender schools'. Children influence each other by acting as models, reinforcing or punishing behaviour and interpreting behaviour (Mussen *et al.* 1990). In general, children who play cross-sex activities are criticised or left to play by themselves. However, girls are allowed more leeway in

this area and can play in a 'tomboy' fashion: "without losing their status in the girls' groups, but the reverse is not true for boys" (Santrock 1996, p. 408).

Boys tend to play in large groups or on their own rather than in pairs, and their play tends to be rougher (Humphreys and Smith 1987), and take up more space. A boys' group will typically consist of a leader, several of his close friends and peripheral members who are friendly with some of the central group members (Beal 1994). This type of organisation is called a 'dominance hierarchy' and dominance is established through threats, challenges, and sometimes physical aggression (Pettit *et al.* 1990). Boys are also likely to play in public places and on the streets, and friendships tend to be based on shared interests in various activities. Beverly Fagot (1985) found that boys modified their behaviour according to the reactions of male peers. For example, they were much more likely to continue with activities if they had received positive reactions from other boys then when they received negative reactions. They were unaffected however by the reactions of female peers.

Girls tend to play in small groups of one or two, and their friendships are based on the sharing of confidences (Kraft and Vraa 1975, cited by Maccoby 1990). They tend to avoid conflict that will establish a clear winner or looser. Carole Beal (1994) reports on a study of interactions between same sex pre-school children (DiPietro 1981). When groups of three boys or three girls were observed playing on a small trampoline, boys were found to argue and challenge each other for turns on the trampoline, while the girls set up a turn-taking system that avoided arguments. This difference in approach can also be seen in the type of games girls and boys play. One study found that boys tend to play games with variable or debatable rules which means that they are more likely to come into conflict with others. Girls meanwhile tend to play turn-taking games where conflict is less likely to occur (Lever 1976, cited by Miller *et al.* 1986).

Eleanor Maccoby found evidence that children prefer, and like to be with, same-sex peers (Maccoby 1990) while Corinne Hutt (1972, cited by Sylva and Lunt 1986)

found a particularly strong tendency in children to imitate the behaviour of same -sex peers. Research has also shown (Serbin *et al.* 1993) that children who have the greatest knowledge of gender role standards prefer to play with same-sex peers and relate better to sex-typed adult activities and occupations.

3.6.2.4 Gender differentiation in schools

Gender differentiation tends to be a feature of schools. Once children are old enough to travel to school by themselves, girls make their way to school in separate groups from their brothers (Clarricoates 1980). Separation between the sexes often begins in early infancy where there may be separate playgrounds and toilets for girls and boys, and they may be required to 'line up' in sex differentiated rows (Clarricoates 1980). One researcher (King 1978, cited by Croll and Moses 1991) found that sex was often used as an organisational feature of the classroom, with boys' and girls' names listed separately on the register, coats hung up separately and record cards in different colours for boys and for girls. Sometimes a competitive element was introduced to see whether the boys or the girls would be more successful at a task.

According to one researcher (Delamont 1980; 1983, cited by Croll and Moses 1991), schools do not simply reflect the type of genderisation found in the society at large, but instead they actually exaggerate and amplify these 'gender' distinctions. Overall research in this area tends to show that:

> *"Primary classes are made up of little boys and little girls rather than little children and reference to this and the use of it for organization, control and class management is a routine feature of teaching in primary school." (Croll and Moses 1991, p. 274)*

3.6.2.5 Sex differences in teacher-pupil interactions

Katherine Clarricoates (1980) found that teachers classified children according to their sex. Girls were seen to be obedient, tidy, neat, conscientious, orderly, fussy, and gossipy. Boys were judged to be livelier than girls, adventurous, aggressive,

boisterous, self-confident, independent, energetic, had a 'couldn't-care-less' attitude and were loyal.

Teachers also tolerated different standards of behaviour between the sexes. In one example, a teacher allowed two boys who were playing a game and were 'seized with a fit of laughter' to continue, but two girls behaving in a similar way were told to 'calm down' and stop 'giggling hysterically' (Clarricoates 1980, p. 31). Girls were punished more harshly for using improper language, and in addition, higher standards of dress and hygiene were expected from girls. Aggressive behaviours were especially discouraged among the girls.

In mixed sex classes, girls do not receive as much attention from teachers as boys. The results of one study found that there were many lessons in which female pupils took no part at all, and that there were: "many more classes [in which] girls received only minimal attention compared with boys" (Buswell 1981, cited by Croll and Moses 1991, p. 274). Myra Sadker, David Sadker and colleagues (1985; 1986; 1989, cited by Brannon 1996) report similar findings and conclude that:

> *"Teachers from grade school to graduate school ask males more questions, give them more precise feedback, criticize them more, and give them more time to respond. Whether the attention is positive, negative, or neutral, the golden rule [ ] is that boys get more." (Sadker et al. 1989, cited by Brannon 1996, p. 308)*

Another study (Stanworth 1981, cited by Croll and Moses 1991) found that boys were twice as likely to look for the teacher's attention and four times as likely to make contributions to classroom discussions. A meta-analysis of a wide range of studies (Kelly 1988, cited by Croll and Moses 1991) found that there was no study in which girls received more individual teacher attention than boys. Over a school career, this would obviously affect overall levels of direct contact which individual girls may have with their teachers.

However, while girls receive less attention than boys, we must look at the type of attention that boys receive. Boys receive a higher level of criticism from teachers than girls. Paul Croll and Diana Moses (1991) found a much higher proportion of boys than girls having special educational needs that required extra teacher attention. Indeed, over a wide range of special needs, boys outnumber girls by approximately two to one. Boys are also more likely to be regarded as discipline problems by their teachers (Croll and Moses 1991). It has also been shown that the higher level of teacher-criticism tends to be directed at a small proportion of boys, rather than at all the boys in a class (Croll and Moses 1991).

There is a difference however between the type of criticism which boys and girls receive. When praise and criticism patterns were analysed (Dweck *et al.* 1978, cited by Hargreaves and Colley 1987) it was found that one-third of the total criticism that was directed at boys, was concerned with academic performance, while the majority of the criticism was for conduct or non-intellectual aspects of work. In contrast, more than two-thirds of the total criticism directed at girls was aimed at the quality or correctness of their work. Meanwhile, when the researchers examined praise patterns, they found that the results were reversed. Boys received higher total levels of praise for the quality of their work, than girls did. The teachers were also more likely to attribute failure to a lack of effort by boys than by girls. It has been postulated (Dweck *et al.* 1978, cited by Golombok and Fivush 1995) that these differences in levels of criticism and praise for academic work, as opposed to general class behaviour, contribute to lower academic expectations by girls.

While it is true to say that girls receive less attention from teachers in class, this does not seem to have any significant adverse consequences on girls' actual academic achievements. At primary level, girls' overall performances are as high as those of boys, and in most studies are rather higher (Croll and Moses 1991). Recent research indicates that at secondary school level girls are more successful than boys in almost all major subjects (Gold 1995; Woodhead 1996). Indeed Christina Hoff Sommers, in

her analysis of data on sex differences in classroom teacher-pupil interactions concludes:

> *"Girls are getting the better grades, they like school better, they drop out less, and more of them go to college. If teacher attention were crudely to be correlated with student achievement, we would be led to the perverse conclusion that more attention causes poorer performance." (Hoff Sommers 1995, p. 166)*

3.6.2.6 The significance of social learning theories in explaining gender role identity

From the wide range of social learning research findings available, it is obvious that socialising factors play an important role in passing on information concerning the standards of genderised behaviours expected within a society. These theories also play a very important role in explaining how it is that children who are exposed to sex typed behaviour patterns and sex roles performed by members of both sexes still, to a large extent, restrict their behaviours to those displayed by same sex models. Observational learning as a mechanism also provides an important insight into 'no trial' learning and the way in which children, for example, can learn sex typed behaviours which they have seen on television. Overall, therefore, social learning and social cognitive theories provide quite extensive explanations for the development of gender role identity.

3.6.3 Social constructivist theory

Because there are limitations to social learning theories (See Section 3.6.1.2), some theorists have adopted a social constructivist approach to development which it is believed offers a more comprehensive theory of development. This theory has evolved from cognitive developmental and social learning approaches. Social constructivist theorists adopt a transactional approach to development, and recognise the important effects of socialisation on the child's development, as well as the importance of the child's own interactions on the environment, and the child's

cognitive role-construction activities. "[T]he child is an agent in its own *and* the world's construction" (Wartofsky 1984, cited by Rogoff 1991, p. 72). This theory does not see nature and nurture as separable, since they both: "build integrally on each other" (Rogoff 1991, p. 72).

From this point of view, all learning is closely connected to the social environment and so: "all our major perceptions and actions involve *shared* association, *shared* constructs, *shared* schemata, *shared* concepts" (Richardson 1985, p. 48). These shared 'meanings' and 'constructs' are, in effect, our culture, and the skills and information connected with our culture are passed down from generation to generation.

From a Piagetian point of view, individuals must construct knowledge by transforming information, and revising rules and concepts in the light of new information, thus making the information their own. However, while Jean Piaget's theories play an important part in the development of social constructivism ideas, they do not provide a complete answer, because essentially the Piagetian child works 'alone'. The 'constructivist' work of Lev Vygotsky, with its greater emphasis on the social nature of learning, and the transfer of culture, plays a more central role in social constructivism.

Lev Vygotsky proposed that for every skill that an individual wishes to learn, there is a current performance level, and a potential developmental level. Between the actual and potential levels lies the 'zone of proximal development' which is really the level of performance that an individual can achieve with the help of a more experienced people. In each generation, people who are able to carry out particular skills guide those who are less experienced in these skills and in this way pass on: "sociocultural technologies and skills [which] include inventions such as literacy, mathematics, mnemonic skills, and approaches to problem-solving and reasoning" (Rogoff 1991, p. 68). To facilitate the learner, more experienced individuals tend to provide some level of 'scaffolding' which provides assistance in solving tasks, especially at critical stages

of learning. Through a process of 'cognitive apprenticeship', a learner's participation level and responsibilities are gradually increased until she or he acquires expertise, while working under the tutelage of a more expert adult or peer.

Children are active participants in their own socialization. "They do not simply receive the guidance of adults, they seek, structure, and even demand the assistance of those around them in learning how to solve problems of all kinds" (Rogoff 1991, p. 68). Children use strategies that help them to be in a position where they will learn. For example, where possible, they tend to stay near to adults and other peers who are involved in activities, they try to become involved in many of these activities, and attempt to follow any instructions provided.

Between different societies and cultures there are variations in the types of skills and values that are promoted. "Relevant skills (e.g. reading, weaving, sorcery, healing, eating with the right hand) vary from culture to culture as do the objects and situations available for the practice of skills and the transmission of values" (Rogoff 1991, p. 87). In some societies, 'cultural amplifiers' (Cole and Griffin 1980, cited by Rogoff 1991, p. 87) such as television and computers form part of the range of skills which that society promotes.

This approach recognises the effects of both nature and nurture, the active, and interactive role which the individual and society have in developmental change, it provides a more complete explanation of innovation than cognitive developmental or social cognitive theories, and it takes account of variations in gender role identity development within families and societies in general.

3.7 CONCLUSIONS

- Each of these theories emphasise different aspects of gender identity development that offer valuable insights into the process of gender role identification.

- While there are physical, biological and functional differences between the two sexes, gender differences in gender identity, sex typing and sex roles are largely culturally defined and can vary over time, and within and between societies.

- The persistence of some degree of gender differentiation between the sexes throughout history, and across societies, indicates that this differentiational process has some benefits for human society.

- Development is an interactive process. At its basic level, the genome represents the potential for development of an individual. The particular genetic makeup of this individual affects how she or he behaves and reacts within an environment. The nature of these interactions in turn determines whether the individual's potential will ever be realised. As Daniel Freedman has pointed out it is impossible to separate the factors that contribute to the development of an individual since we are all "100 percent innate, 100 percent acquired [ ] 100 percent biological, 100 percent cultural" (Freedman 1980, p. 26).

4. GENDER DIFFERENCES

4.1 INTRODUCTION

Although female and male human beings are genetically almost identical, the media and society in general assume that there are large differences between the sexes in a wide range of abilities, characteristics and skills. These 'gender' differences have been used to explain and condone prevailing sex differences in gender roles and in expectations for future activities and capabilities. This chapter looks at the limitations and reliability of data on 'gender' differences. It also looks at divergent perspectives on 'gender' difference research and it focuses on a range of skills, characteristics and behaviours in which some researchers have identified sex differences.

4.2 WHAT DOES 'GENDER DIFFERENCE' MEAN?

When statisticians say that there is a gender difference in a variable such as aggression, reading ability or height, they are really talking about differences in mean or average values between samples of a female population and a male population. When the scores of a population are calculated, they tend to fall into what is termed a 'normal distribution' pattern. This means that the scores of most people cluster around the middle average or 'mean' values, while the remaining scores decline gradually at both ends of the scale to represent the highest and the lowest scores for that variable.

If, for example, weight is being measured, it will usually be found that the majority of people in a sample will weigh around the average weight, some will be overweight and some underweight, while a few will be obese and a few will be very underweight. If we look at the normal distribution pattern of two sample populations and we find that the mean values of the two populations are very different, then we can conclude that there are significant statistical differences between the two samples. Two populations may have the same mean values but the spread or variance of these average values may be very different for each population. It is necessary therefore, when assessing statistical data in sex differences, to note the degree of variance, along with the mean values.

4.2.1 How reliable are the data?

In order to analyse data and assess their reliability, it is necessary to take into account a number of aspects.

4.2.1.1 Sample size and its representational value

When experimenters carry out an experiment using subjects, they hope that the sample that they have chosen is representative of the population at large. In general, the larger the sample size chosen, the more reliable the data base. While reliable data may be obtained from a suitably chosen sample of between 100-500 subjects, some researchers report sex difference findings using a data base of, for example, ten subjects. The error inherent in any counting measurement is proportional to the square root of the sample size. A sample size of 1,000 gives a 3.2% error, while a sample of 100 gives a 10% error, and a sample of 10 gives a 32% error. Reducing the sample size from, for example, 100 to 10 will therefore increase the error by a factor of about 3.

It is also important to choose subjects who will not, by their very nature, bias the data. For example, an examination of reading abilities in a class of ten male and ten female 'dyslexic' children may find 'gender differences' which are peculiar to that particular classroom setting and are not representative of the school population as a whole.

4.2.1.2 Biased reporting

Undue emphasis placed on sex differences can obscure areas of similarity. This can arise because research journals and the media in general tend to be more interested in data that support sex differences than in data that show no sex differences. It can therefore appear that there are more 'gender' differences than 'gender' similarities.

Research by, for example, Janet Hyde and Marcia Linn (1986) and Alice Eagly (1987) shows that gender generally accounts "for less than 10% of variability in social behaviour and more typically accounts for less than 5%" (Aries 1997, p. 92). As a result, research that reports gender differences may in actual fact be referring to a gender difference which has been found between a minority of females and a minority of males.

Data on sex differences can be termed 'significant' even if there is only a very small difference between females and males. As Elizabeth Aries points out: "A 5 percent difference between men and women can be distorted to suggest that all men are alike and all women are alike, and that men differ from women" (Aries 1997, p. 91).

4.2.1.3 'Between sex' versus 'within sex' differences

The media tend to highlight 'between sex' differences rather than 'within sex' differences. For example, many research findings have highlighted gender differences in spatial abilities. However the degree of overlap between the two populations may not be mentioned. While the 'average' girl may score lower in spatial ability tests than the 'average' boy, the scores of many girls may be greater than those of a large number of boys.

4.2.1.4 Variability of terms and tools used

Researchers often define a particular variable in different ways and use varying tools to measure it. Aggression is a case in point. Experiments that have found gender differences in aggression have varied from pencil and paper tests, tests in which subjects administer real or simulated electric shocks to participants, to word association tests, etc. In some cases, researchers have reported gender differences in aggression without testing females on the basis that it would be too upsetting for them to participate in these experiments.

4.3 DIFFERENT PERSPECTIVES ON GENDER DIFFERENCES. ARE FEMALES AND MALES DIFFERENT, OR THE SAME, OR SHOULD WE BE ASKING THAT QUESTION AT ALL?

Before examining data on gender differences, it is necessary to look briefly at the six main perspectives on sex and gender differences that have influenced research in this area.

4.3.1 The 'man is superior-woman is deficient' perspective

This perspective is one that has been very frequently adopted over the period since analysis in this area first began. According to this view, males are superior to females physically, emotionally and intellectually, and so women are 'deficient'. Plato for example, defined women as "lesser men" (quoted by Mulvany 1994, p. 2). Aristotle believed that "[t]he female is a female by virtue of a certain lack of qualities; we should regard the female as afflicted with a certain natural defectiveness" (quoted by Kane 1993, p. 1).

Another example of what would nowadays be termed 'male chauvinism', but which at the time reflected accepted thinking, comes from St. Thomas Aquinas who said that: "Woman is subject to the man on account of the weakness of her nature, both mind and body" (quoted by Kane 1993, p. 1). Jean-Jacques Rousseau believed that: "Woman is made to please and to be in subjection to man" (quoted by Spender 1983, p. 20). Manisha Desai reports that Francis Galton, the famous geneticist, concluded that women were "inferior to men in all their capacities" while James Cattell and Edward Thorndike, professors at Columbia University early in the 20th century, believed that women should be confined to occupations such as nursing, social work or teaching that require "average intelligence" (Desai 1995, p. 1182).

The writings of Sigmund Freud also demonstrate this perspective. Central to Freudian thinking is the belief that females feel inferior to males because they (i.e. the females) lack a penis.

> *"As we learn from our psycho-analytic work all women feel that they have been injured in their infancy, and that through no fault of their own they have been slighted and robbed of a part of their body; and the bitterness of many a daughter towards her mother has as its ultimate cause the reproach that the mother has brought her into the world as a woman instead of a man."* (Freud, S. *Some Character-Types met with in Psycho-Analysis, Collected Papers*, quoted by Klein 1989, p. 73)

In more modern times, the debatable findings of Camilla Benbow and Julian Stanley provide an example of this perspective (1983, cited by Brannon 1996; Benbow and Stanley 1992). (See Section 4.5.1) In this case, the researchers attribute the presence of more males than females in the high scoring regions of the (US) College Board's Scholastic Aptitude Test in Mathematics (SAT-M), to innate biological abilities favouring males.

4.3.2 The 'women and men are the same' perspective

The next perspective, typified by the early work of Eleanor Maccoby and Carol Jacklin (1974) focuses on the basic similarity between the sexes. (See Section 4.5) Eleanor Maccoby describes how the publication of this book fitted in with the 'feminist zeitgeist' of the time:

> *"when most feminists were taking a minimalist position, urging that the two sexes were basically alike and that any differences were either illusions in the eye of the beholder or reversible outcomes of social shaping."* (Maccoby 1990, p. 513)

In more recent writings, Eleanor Maccoby accepts that many of the current null findings on personality measures between the sexes "are partly illusory" (1990, p.

513) because they are based on individual differences and do not take sufficiently into account the effects of social interaction between the sexes.

> *"behavioural differentiation of the sexes is minimal when children are observed or tested individually. Sex differences emerge primarily in social situations, and their nature varies with the gender composition of dyads and groups." (Maccoby, 1990, p. 513)*

Eleanor Maccoby and Carol Jacklin's 1974 analysis of sex differences has been used as a source of reference in equal rights litigation (Roth Walsh 1997). Up to the time of their study, women's subordinate position in society had been maintained on the basis of female physical, intellectual and emotional inferiority to males. Subsequent re-analysis of data on sex differences since the 1970's has highlighted the fact that in many areas under investigation there are more 'within sex' differences than 'between sex' differences (Czerniewska 1985; Aries, 1997).

Mary Brabeck and Ann Lerned emphasise the danger involved in highlighting sex differences that are largely unsupported. They point out that this can lead to the reinforcement of gender stereotypes which

> *"erroneously emphasize gender over ethnicity, race, socioeconomic state, educational experience, or other equally compelling explanations for the sources of diversity in the ways people think and make meaning."* (Brabeck and Lerned 1997, p. 261)

Research into sex difference that highlights the 'women are the same' perspective has helped to increase women's status and opportunities in many occupations, previously restricted to males, such as medicine, engineering, dentistry, the police force, and the army, etc.

4.3.3 The 'women and men are different' perspective

Another approach is adopted by those who see that both sexes are different but do not attach blame or superiority to either sex. While working solely within the area of sociolinguistics, Deborah Tannen typifies this perspective (1990; 1997). She does not agree with minimising 'gender' differences because: "Pretending that women and men are the same hurts women, because how they are treated is based on norms for men" (Tannen 1997, p. 84).

She proposes that many misunderstandings and frustrations experienced by cross-sex interactions arise from a non-recognition of the differences between females and males. Facing the reality of the situation enables individuals to shift 'blame' from a personal inadequacy, to the more neutral 'failure to understand a person from a different culture'. "Recognizing gender differences frees individuals from the burden of individual pathology." (Tannen 1997, p. 84). It also enables us to take these differences into account, adjust to them and learn from them.

In a similar vein, Judy Rosener (1997) has examined the business leadership styles of females and males. She found that both sexes tend to lead in different ways, with females using an 'interactive style' (which tends to be collaborative and flexible) while males used a 'command-and-control style' (which is a type of leadership modelled on a military style of operation). She hastens to point out however that her findings do not indicate that one style is better than the other. The command-and-control approach appears to be better in traditional organizations while the interactive style, "is particularly effective in flexible, nonhierarchical organizations of the kind that perform best in a climate of rapid change" (Rosener 1997, p. 296).

Sherry Turkle also adopts this perspective in her analysis of computing styles (Turkle 1984; 1984). Males are seen as 'hard masters' of computer programming, while females are 'soft masters'. (See Section 5.3.5.1.1) Both styles are seen as valid styles

and one style not superior to the other. She suggests that the diversity and 'epistemological pluralism' that these two styles represent should be welcomed.

4.3.4 The 'women and men are the same – sometimes' perspective

Proponents of this approach take the view that gender characteristics and behaviours are not sex-specific, but can be displayed by members of both sexes. The polarities of behaviours that our society designates to females and males represent "different moments of the self" (Dimen 1991, quoted by Aries 1997, p. 97) which can be activated depending on the context (Aries 1997). As Elizabeth Aries points out, 'gender' should be seen less "as an attribute or style of behavior [and more] as something people do in social interaction" (Aries 1997, p. 97). "None of us is feminine or is masculine or fails to be either of those. In particular contexts people do feminine, in others, they do masculine" (Bohan 1993, cited by Aries, 1997, p. 97).

Elizabeth Aries identifies three elements that are of relevance to the present discussion and which must be considered when looking at data on behavioural gender differences (Aries 1997). These dimensions are:

4.3.4.1 The effects of status

In general, people who hold positions of power and status behave differently from those who are their subordinates. While a lot of research has highlighted the more dominant behaviours displayed by males over females, it is suggested that this arises from status-related discrepancies rather than from 'gender' differences *per se*. When females hold positions of high status they also adopt dominant behaviour strategies with subordinates.

In one experiment (Eakins and Eakins 1983, cited by Aries 1997), mixed-sex university faculty meetings were observed. Turn-taking was observed to be related to a hierarchy of status, with those who held the highest rank and longest tenure in the

department 'holding the floor' most frequently. Those who held lower qualifications and rank were interrupted most. Cathryn Johnson (1994, cited by Aries 1997) also found that when women and men were given a managerial role and give the same type of authority they adopted similar styles of conversations with subordinates.

4.3.4.2 The effects of social roles

Women and men appear to adopt similar behaviours when they take on similar social roles. Barbara Risman (1987, cited by Aries 1997) found that men who took over all the child-caring responsibilities were behaviourally more similar to mothers, whether they were single or married mothers, than to married fathers.

4.3.4.3 Situational context

Although research has frequently shown females in submissive interactional roles, they have been found to adopt both autocratic and democratic styles of interacting depending on the context (Stitt *et al.* 1983). Elizabeth Aries reports on the research findings of Christopher Stitt and his colleagues who found that "when autocratic behavior was legitimized, women made decisions without considering opinions of other group members, were aggressive, and gave orders" (Aries 1997, p. 94).

Depending on the context therefore, females and males can display behaviours stereotypically associated with the opposite sex. Females do not hold a monopoly on facilitative communication for example and as Elizabeth Aries points out, people who are teachers, group facilitators, clinicians, and hosts use facilitating strategies in their dealings with others. "When the norms, roles, and expectations change, so do men's and women's behavior" (Aries 1997, p. 99).

4.3.5 The 'woman is superior-man is deficient' perspective

Women are better than men is the claim of the fourth school of thought that is typified by the 'different voice theorists' who focus on positive values of femininity and their superiority over males in certain areas of behaviour such as empathy, caring, and consensus building (Goldberger 1997). They criticise efforts to minimize differences between the sexes and focus on sameness, which forces women to be judged as part of a masculinist culture and undervalues their unique characteristics. Nancy Chodorow (1978), Carol Gilligan (1982) and the 'Women's Ways of Knowing' group, Mary Belenky *et al.* (1986) typify this 'women-are-better' approach.

It is argued by proponents of this approach that the world would be better if more emphasis was placed on 'feminine' values and points of view. Judy Rosener (1997), for example, believes that women's interactive leadership style in business is more suited to today's "fast-changing, service-oriented world of business" (Roth Walsh 1997, p. 292) than men's command-and-control style. This she believes would give American businesses a competitive edge. It is also suggested that in this 'better world' women would have a greater chance of achieving equality than they would ever have in the present social system (Kimball 1995, cited by Roth Walsh 1997).

Critics of the 'different voice' approach include Mary Brabeck and Ann Lerned (1997) who, for example, believe that there is insufficient evidence to support the view that females and males differ fundamentally in their 'ways of knowing'. They question the vagueness of terms used by 'different voice' theorists and their biased approach in using female-only subjects when investigating gender differences. They highlight empirical studies that either refute or fail to support Carol Gilligan's theory of gender difference in moral reasoning and Mary Belenky *et al.*'s 'Women's Ways of Knowing' research. (See Section 4.7.4) Their conclusion is that:

> *"The evidence from the theories of intellectual development under investigation for more than two and a half decades does not support the hypothesis that women engage in a different way of knowing than do men"* (Brabeck and Lerned 1997 p. 267)

4.3.6 The 'we shouldn't be asking this question at all' perspective

Finally there are a group of theorists who disagree with the whole question of looking at gender differences. By attempting to isolate differences between the sexes we indirectly establish a 'norm' and since the male is usually taken as the norm, the female is viewed as the deviant. Frequently what research in this area is really asking is, "Are women as good as men?" (Unger 1992, p. 106). According to Rhoda Unger this is not really a "relevant feminist concern" (Unger 1992, p. 231).

As Mary Roth Walsh points out, writers such as Rachel Hare-Mustin and Jeanne Marecek have drawn attention to the possibility that the 'special qualities' which the 'different voice' theorists suggest females possess, may arise from women's subordinate position in society rather than from some innate qualities (Roth Walsh 1997). In similar vein Crawford and Marecek (1989, cited by Roth Walsh 1997), suggest that women's 'special' aptitude for care and relationships may be used to limit women's activities.

Sandra Bem (1996, cited by Roth Walsh 1997) believes that it would be more useful to examine how society converts gender differences into female disadvantage. Similarly, Bernice Lott believes that:

> *"If we focus our attention on observing and cataloging gender differences, we shall certainly find them, although not under all circumstances and in all situations; and we will tend to forget how these differences have been created by social learning and how they continue to be maintained throughout the life span."* (Lott 1987, p. 49)

Other theorists (Kahn and Yoder 1989, cited by Roth Walsh 1997), query standard definitions of gender, believing that gender is constantly being 'reconstructed' thereby invalidating the structure on which 'gender difference' research is built.

It is also problematic to emphasise 'women's different ways of knowing' since this implies that females cannot think like males. As Deborah Tannen points out "it is only a short step – maybe an inevitable one – from "different" to "worse" (1997, p. 83). This would logically lead to additional exclusion of females from a further range of activities and jobs (Crawford and Marecek 1989).

4.4 PHYSICAL DIFFERENCES BETWEEN MALES AND FEMALES

4.4.1 Part 1: Brain function theories

4.4.1.1 Introduction

Neuroscience researchers have examined brain functioning in order to establish whether males and females differ because their brains are different. Since the brain is centrally involved with the nervous system in controlling the operation of our bodies and is the seat of our intelligence, thinking, memory, consciousness and emotions, evidence which would prove that females and males are 'wired' differently, would help to explain the gender discrepancies occurring within our educational, business and social institutions. The origins of our sense of identity as male or female would therefore stem from the fact that we have either a 'male brain' or a 'female brain'. While, theoretically at least, this line of research could find different patterns of strengths and weaknesses in functioning within either sex, in practice this type of

research has tended to emphasis ways in which females have deficient skills or abilities compared to males.

Within this controversial field there are some researchers, such as Doreen Kimura (1992) who conclude that there are substantial differences between male and female brains resulting in females and males having 'different occupational interests and capabilities, independent of societal influences.' Others such as Ruth Bleier (1984), would argue instead that there are more 'within gender' than 'between gender' differences. (See Section 4.2.1.3)

The following discussion will examine theories that attempt to explain ways in which specialised areas of the brain may be primarily responsible for specific tasks and functions and whether any specialization and lateralization processes are sex specific.

4.4.1.2 Sexual dimorphism in structure and size of brain

Experiments have been carried out on a large number of cadaver female and male brains since the 19th century and it has been established that on average, men's brains are 10% bigger and heavier than women's brains. Initially these findings were used to explain why males were superior to females.

> *"[T]herefore, as higher civilization is heralded, or at least evidenced, by increasing bulk of brain, [ ] so we must naturally expect that man, surpassing women in volume of brain, must surpass her in at least a proportionate degree in intellectual power." (Popular Science Monthly 1878-1979, quoted by Halpern 1992, p. 140)*

When it is taken into account however, that men are on average taller and weigh more than women, these sex differences in brain weights disappear.

During the 19th century, scientists believed that they had located an area of sex difference in the brain. They reported that the female frontal lobes were smaller than

the male's, while their parietal lobes were larger (Wade and Tavris 1993). Since, at that time, it was believed that the size of the frontal lobes determined the level of intelligence, these findings were used to explain why women were intellectually inferior to males. In the early 1900's however, other scientists proposed that the parietal lobes determined intelligence and by coincidence, found that this time the parietal lobes of females were smaller than those of males and their frontal lobes were in fact larger than those of males. As Stephanie Shields (1975, cited by Wade and Tavris 1993) points out, the manner in which these 'findings' oscillate to suit theories is highly suspicious.

There are however, two areas of the brain where sex differences have been found. These areas are: (a) the Hypothalamus and (b) the Corpus Callosum.

4.4.1.2.1 Hypothalamus

When the hypothalamus is examined microscopically, sex differences in the synapse structures, i.e. the communication paths between neurons, can be found, although it is not clear exactly what role these differences play. Sexual dimorphism has also been found in the medial preoptic region of the hypothalamus where a cell group called INAH3 is larger in males, smaller in females, and controversially argued by Simon LeVay and Dean Hamer (1994) to be smaller or sometimes even absent in male homosexuals. (See Sections 2.1.2.1.1; 2.1.2.4.1.1.1.1; 3.3.5.8) Swaab and Fliers (1985, cited by Carlson 1988) and Allen *et al.* (1989, cited by Carlson 1988) also report sexual differences in the medial preoptic area.

The hypothalamus plays an important role for both sexes, in functions such as body temperature control, eating and drinking control, emotions, and cardiovascular function. It also plays an important role in the organization of hormonal production, either in a cyclical fashion in the case of females or in an acyclical fashion in the case of males. There is therefore a functional difference between the male and female hypothalamus. Although both sexes produce the same type of hormones, the exact

proportions of these hormones, whether there are more 'female' sex hormones such as progesterone or oestrogen, or more 'male' androgens such as testosterone, distinguishes males from females. Biological theories that deal with the possible effects of these hormonal influences on sex and sex differences in behaviours have already been discussed in Chapter 2.

4.4.1.2.2 Corpus Callosum

Some researchers have reported sex differences in an area of the brain know as the corpus callosum. For example, Sally Vincent (1996) reports that the females' corpus callosum is bigger than that of a male, and it has thicker and more complicated neural fibres. Doreen Kimura (1987, cited by Halpern 1992) and Witelson (1989, cited by Halpern 1992) also report a larger corpus callosum in the case of females. Looking specifically at a bulb-like area of the corpus callosum called the 'splenium', de Lacoste-Utamsin and Holloway (1982, cited by Rollins 1996) found the female splenium to be larger. However, despite extensive research into this area the majority of researchers have been unable to replicate this finding (Rollins 1996).

Most information on the corpus callosum has been obtained:

(a) from the study of rats (where it is males who have the larger corpus callosum) and

(b) from the study of 'split brain' patients who have had part, or all of the corpus callosum severed in attempts to reduce various symptoms, such as epileptic seizures.

Because it is know that the fibres of the corpus callosum connect the two brain hemispheres, it has been suggested that this 'proves' that females process information bilaterally (Hines 1990, cited by Halpern 1992) and that this also explains their 'supposed' intuition (Vincent 1996). However, very little is known about the actual

role that the corpus callosum and its thicker fibres play in female brain processing or in any real or presumed sex differences.

4.4.1.3 Hemispheric specialization and lateralization

4.4.1.3.1 Specialization

The brain is divided into two mirror halves called cerebral hemispheres. Although it is still a very debatable area, many neuropsychologists claim to have found evidence for the hemispheric specialization of various emotions, actions and thought processes. For example, Kate Douglas (1996) reports on the research of Ruben and Raquel Gur, two psychologists who are researching the area of emotions. They believe that they have evidence for right hemisphere specialization in the area of negative emotions, such as sadness, fear and disgust, and left hemisphere specialization in the area of positive emotions such as happiness and amusement. Another example is provided by the 'New Scientist' (In Brief 1997) which reports on research by Theodor Landis and Marianne Regard. These researchers believe that they have isolated an area in the brain that is responsible for intense interest in 'fine foods'.

There are three main ways in which researchers have attempted to obtain information on hemispheric specialization within the brain:

1. By carrying out research on the dissected brains of cadavers and animals.

2. By using brain imaging using techniques such as:

   - Electroencephalograms (EEG) In this case, electrical activity in the brain is recorded using electrodes. Sometimes these electrodes are placed on the scalp, or on the brain tissue itself. Fine wires that can deliver electric shocks are sometimes inserted in particular areas of the brain or drugs are administered and the resultant electrical activity recorded. This type of

research has been carried out on animals, on volunteers and on patients suffering from mental illnesses, epilepsy, or other brain dysfunctions or while they were undergoing brain surgery.

- Computerised Axial Tomography (CAT) In these scans, a series of X-ray images is built up and analysed by the computer to create a three-dimensional picture of the structure of the brain. These scans however, are unable to highlight the activity occurring within the brain.

- Positron emission tomography (PET) This involves injecting animals, patients or volunteers with radioactive isotopes. The emission of positrons is then recorded and depending on the type of isotope used, blood flow, oxygen and glucose levels can be monitored. The subjects are sometimes required to carry out tasks while a scan identifies regions of the brain that are most active during this activity.

- Functional magnetic resonance imaging (fMRI) This scanning machine can detect changes in oxygen and blood flow levels within the brain using magnetic fields and radio-wave pulses. The machine subsequently transforms the electromagnetic data into colour coded maps that highlight changes in oxygen and blood flow levels in areas of the brain during specific activities.

- Magnetoencephalography (MEG) This is a very sensitive scanning machine that uses liquid-helium cooled superconducting sensors to record magnetic fields activated by nerve networks.

- Transcranial magnetic stimulation (TMS) in conjunction with PET Magnetic impulses are targeted at specific areas of the brain and a PET scan is then used to monitor brain activity.

3. By carrying out studies on individuals who have suffered brain damage as a result of (a) strokes (b) accidents or (c) 'split brain' or lobotomy surgery undertaken in the belief that it may alleviate various symptoms and conditions.

Within the area of brain functioning, there are some findings that are generally accepted and other areas that are hotly debated. The more accepted findings concern motor and sensory functions of the body that are associated with particular areas in the brain. Neuroscientists have gradually built up a 'map' of these associated functions by electrically stimulating localised areas of the brains of humans or animals and observing which muscles react or which sensations are evoked. Recent research using brain-imaging, which investigates areas such as emotions, language, and spatial skills are more debatable, although in general, most researchers find left hemisphere specialization for language, and right hemisphere specialization for nonverbal perception and spatial skills. A word of warning however on the reliability of many brain imaging processes has been voiced by John Mc Crone (See Section 4.4.1.6), who points out the many errors that have already occurred in this field. "There are a hundred ways that error, or even plain wishful thinking, can creep into the process" (Mc Crone 1995, p. 33).

4.4.1.3.2 Hemispheric lateralization

Hemispheric lateralization is a term used to describe the tendency for one side of the brain to process stimuli more effectively than the other side. Information on lateralization, or bilateralization, in which processing takes place effectively in both hemispheres, has been inferred from the study of stroke and other brain injury patients, from scans and from research involving divided visual field and dichotic listening experiments.

4.4.1.3.2.1 Divided visual field and dichotic listening experiments

In divided visual field experiments, a stimulus is presented for a fraction of a second to the left or right side of a person's field of vision. The subject in the experiment stares straight head at a particular point in the center of the field of vision, called the 'fixation point'. Visual information on the left field of vision will be processed by the right hemisphere and visa versa. Various types of information can be presented, such as words, pictures, numbers, shapes, faces. It is assumed that, for example, words will be processed quicker if presented directly to the hemisphere specialised to deal with these data. If presented to the 'wrong' hemisphere, it is assumed that there will be a time delay in processing, while the information is passed through the corpus callosum to the 'correct' hemisphere. In dichotic listening, subjects are presented with various sounds, such as words, letters, animal sounds, or random sound sequences either singly to the right or left ear, or simultaneously to both ears. In general in these experiments, words are assumed to be processed more easily by the right ear (which means that information will be processes in the left hemisphere) and non-linguistic sounds by the left ear (which means that information will be processed by the right hemisphere). Through these various methods, researchers have attempted to identify patterns of lateralization and bilateralization within the brain.

4.4.1.3.2.2 Chirality

One area of lateralization that has been firmly established is 'handedness' or chirality. It is now well known that the right hemisphere controls the movements of the left side of the body and visa versa. As a result of this process of hemispheric lateralization, most right-handed people have dominant motor control in their left hemisphere. Approximately 90% of the human population are predominantly right-handed and for many of these people, the right foot, eye, ear and nostril are likewise preferred for activities. 95% of right-handed and 70% of left-handed people have left hemisphere control of speech and language. Of the remaining left-handed people, 15% are controlled by the right hemisphere and the remaining 15% are controlled bilaterally (Springer and Deutsch 1989, cited by Halpern 1992).

4.4.1.3.2.3 General areas of lateralization

Although it is a field of considerable debate, there is some agreement among researchers on general areas of lateralization within the two hemispheres. The left hemisphere appears to be more specialized in the areas of language, speech, writing, skilled motor acts, logical thinking, detailed analysis, temporal and sequential analysis, serial processing of sensory information, science, and mathematics. Meanwhile, the right hemisphere appears to be more associated with spatial relations, music, artistic ability, imagination and fantasizing, emotional expression, intuition, the recognition of faces and the emotions expressed in faces, simple language comprehension, perceptions of space, body control and awareness, and parallel processing of sensory information (Gleitman 1986; Efron 1990); Lefton and Valvatne 1992; Glassman 1995). Researchers within the general field of lateralization research tend to apply these findings equally to both females and males and concentrate on defining variations in cerebral dominance arising from handedness.

4.4.1.3.2.4 Theories of sex lateralization

When we move into the investigation of sex differences in lateralization, the areas of concern become more focused. Within this field, researchers are concerned with establishing whether males are more lateralized than females and therefore, whether females are more bilateralized than males. In particular, sex lateralization research has focused heavily on the two areas of language and spatial abilities. A wide range of psychological and educational tests have found that, in general, females outperform males in language related tests and males outperform females in spatial ability tests.(See Sections 4.5.2; 4.5.3) This has led to the (debatable) conclusion that males and females therefore have 'different' types of brain. Since the left hemisphere has been identified as being primarily responsible for language processing and the right hemisphere is primarily responsible for spatial abilities, a simplistic explanation for gender differences is often offered whereby males are viewed as being more 'right brained' and females more 'left brained'. These ideas have been widely reported in the popular press where they are often taken as established facts.

Ideological problems arise however, when stereotypical beliefs about the abilities of males and females conflict with these naïve theories. The type of confused thinking which results from these simplistic approaches is pointed out by Ruth Bleier;

> *"girls and women are considered to be more verbal (left hemisphere) but less analytical (left hemisphere) and more "intuitive" (right hemisphere) but less visuospatially skilled (right hemisphere); and men are considered to be "naturally" gifted in visual-spatial (right hemisphere) and analytical (left hemisphere) cognition but not in intuitive, holistic, gestalt thinking (right hemisphere)."* (Bleier 1984, p. 92)

Although linguistic skills are obviously very important for most areas of activity, these skills are generally undervalued within sex lateralization research. On the other hand, spatial abilities which include skills such as mental rotation, perceptual disembedding, and spatial orientation (assumed to be essential for all science and mathematics subjects), are very highly valued. Many brain function findings are often consciously or unconsciously manipulated to show that males always have a 'superior' type of brain functioning because they are more adept (in general) at spatial skills. Ruth Bleier, points out for example that when researchers find that females process verbal and spatial functions bilaterally, they conclude:

> *"that the reason girls and women are inferior in visuospatial tasks is because such tasks require hemispheric specialization, as is presumably the case in males. But they conclude that visuospatial tasks must require hemispheric specialization* because *women are not hemispherically specialized and are inferior. Another group finds that women are* more *lateralized (left hemisphere more specialized for verbal and the right for visuospatial tasks) and concludes that they are, therefore, inferior in visuospatial tasks because such tasks must require equal bilateral representation. They allow, however, that women are superior in verbal skills, since these, unlike visuospatial skills, must require hemispheric specialization."* (Bleier 1984, p. 93)

Some evidence to support the theory that males are more lateralized in language and spatial skill processing comes from studies of patients who have suffered strokes, tumours or brain injury due to accidents. A lesion can occur in an area of the brain that is associated with control of a particular function in the body. These lesions

appear to impair the organization of messages coming from sensory stimuli or travelling to the motor areas and this can result in permanent or temporary loss of particular body functions. Sometimes, however, the brain may recover from this damage through the development of new neural connections or when one part of the brain takes over the functions of the injured area. This 'plasticity' is at its peak in young children but decreases gradually over a life-time.

When female and male stroke patients are compared, it is generally found that males suffer more serious language impairment if their left hemisphere is damaged, while females injured in the same areas regain speech faster and more completely. Similarly, when male patients suffer damage in the right hemisphere, their spatial abilities are more likely to undergo serious impairment than females similarly injured. These findings are often used to support the theory of greater lateralization for males and bilateralization for females, who, it is believed, are able to avail of a wider range of linguistic and spatial processing areas following brain injury. Research by Doreen Kimura and her colleagues (Kimura and Harshman 1984, cited by Wade and Tavris 1993; Kimura 1987, cited by Halpern 1992; Kimura 1992) offer a different explanation for these variations. They propose that language areas in the female brain are more focally organized within the anterior region, while male language areas are more diffusely organized. They suggest that when individuals experience a stroke, they are more likely to suffer damage in the posterior region of the brain. Females therefore experience less language impairment following a stroke, 'not because speech is more bilaterally organized in women but because the critical area is less often affected (Kimura 1992).

Meanwhile the whole issue of whether there are sex differences in degrees of lateralization is still debatable. Healey *et al.* (1985 cited by Halpern 1992) suggest that the degree of lateralization that may be demonstrated by males or females is modified by the type of task examined, for example, whether it is an oral or a manual task. Results from fMRI studies have also been conflicting, with Allen *et al.* (1987,

cited by Wade and Tavris 1993) reporting sex differences, unlike Ruth Bleier *et al.* (1986;1988, cited by Wade and Tavris 1993) who were unable to find differences.

4.4.1.3.2.5 Levy's Cognitive Crowding Hypothesis

Levy's Cognitive Crowding Hypothesis (1976, cited by Halpern 1992) offers an explanation for the 'supposed' tendency of females to process linguistic and spatial data bilaterally. In this case bilateralization in linguistic processing is seen as advantageous because it allows more 'cortical space' for language processing. However when it comes to the processing of spatial abilities, this type of bilateralization 'crowds out' spatial processing which is better handled laterally. Contradictory evidence comes from McKeever and Van Deventer who report that: "the hypothesis of verbal-spatial processing incompatibility within the same hemisphere is not supported" (1977, quoted by Halpern 1992, p. 156).

4.4.1.3.2.6 Waber's Age at Puberty Hypothesis

Some researchers believe that variations in degrees of lateralization occur due to maturational factors, rather than as some suggest, due to hormonal influences prenatally, or varying socialization influences. The underlying assumption here is that lateralization itself is preferable to bilateralization.

Deborah Waber's, Age at Puberty hypothesis (1976; 1977, cited by Beal 1994) suggests that lateralization develops gradually during childhood but stops when the individual reaches puberty. Since girls on average reach puberty two years before boys, boys would therefore have extra time in which to develop lateralized areas of processing. Deborah Waber (1976; 1977, cited by Beal 1994) and Newcombe *et al.* (1983, cited by Lott 1987) found that early maturers of both sexes, i.e. those individuals who develop secondary sexual characteristics early for their age, showed less laterality, greater verbal abilities and poorer spatial reasoning than late maturers. In other words, they displayed the type of 'qualities' and 'problems' associated with

females. They also found an association between late maturing, good spatial reasoning and lateralization in the case of both sexes. Here, late maturers display the types of 'strengths' associated with males. Recent research in this area, however, found only limited support for Waber's hypothesis (Halpern 1992). Two literature reviews by Newcombe and Dubas (1987, cited by Halpern 1992) and Signorella and Jamison (1986, cited by Halpern 1992) concluded that the relationship between spatial ability and age of puberty was small, while Geary (1988, cited by Halpern 1992) could find no relationship between these two factors. Conflicting data is also reported by Susan Curtiss who found that cerebral lateralization developmental data showed: "either no sex difference in lateralization or a tendency for females to show greater laterality at an earlier age" (1985, p. 103).

Meanwhile, Salthouse *et al.* (1990, cited by Beal 1994) found a peak of performance levels in a lateralized area such as spatial reasoning at puberty level, with a steady decline from then on, even if the skills were practised on a daily basis (e.g. by a practising architect). The issue of lateralization and maturation is therefore unresolved, and while it is obvious that maturational factors may play a role in the degree of lateralization found in individual subjects, more work needs to be carried out in this area to clarify these factors and their effects.

4.4.1.3.3 The reliability of hemispheric specialization and lateralization research findings

Great reliance is presently being placed on brain imaging in attempts to establish areas of hemispheric specialization and lateralization. John McCrone (1995) points out a number of problems with this field, including problems of interpretation that can sometimes become confused with 'plain wishful thinking'. He also shows that to a scanner an 'off' signal looks much the same as an 'on' signal. For this reason, an area of activity in the brain involving inhibitory nerve messages could be interpreted as an area of excitation nerve messages. Additionally, when the brain becomes more practised at a particular process, the network of nerve cells needed to perform it can

shrink. John McCrone, therefore makes the very important point that: "An apparently busy area of brain could just be a zone that is struggling with something new or unfamiliar: the real work could be taking place in areas that look silent." (1995, p. 33). Caution must therefore be exercised in interpreting data from brain imaging sources.

The brain is very complex and contains between 10^{10} and 10^{11} neurons interconnected at 10^{14} junctions or synapses (Ward 1997). Efforts to replicate the level of possible connections between synapses using computer models have presented gigantic problems for scientists even when they attempt to consider one small area of brain activity. For example, James Bower's work involves the production of a realistic computer model of the piriform cortex located just above and behind the nose which is involved in recognising odours. He has calculated that to identify, for instance, the smell of a banana involves about 6 million neurons, each one receiving 10,000 inputs from other neurons (Holmes 1994). Our experiences of a 'banana' involve far more processes than merely recognising its smell, such as those involving memory, visual, textural and cognitive processes. Simple models of brain specialization and lateralization therefore are unlikely to hold, because: "in any real-life everyday situation, action involves the continual interplay of the whole constellation of cortical functions acting in an integrated and well-co-ordinated fashion" (Beaumont 1990, p. 88).

Evidence for the plasticity of the brain following injury or strokes would certainly lead to the conclusion that the types of experience which individuals undergo may affect brain organisation and functioning. Additional support for the ability of the brain to undergo development in functioning comes from Alison Motluk (1997) who reports on research that focused on twelve bilingual people. Six of these subjects were labelled 'early' bilinguals since they had learned two languages in infancy. The other six were labelled 'late' bilinguals since they had mastered a second language between 11 and 19 years of age. The Broca's area in the frontal region of the cortex is believed to be involved in the production and understanding of speech and early positron

emission tomography (PET) scans suggested that language ability is always centred in the same part of Broca's area.

Using functional magnetic resonance imaging (fMRI), researchers found that early bilinguals 'lit' up the same part of Broca's area while using both languages. However in the case of late bilinguals, two discrete regions about eight millimetres apart were activated. These findings suggest that it is possible to develop new language areas in the brain, in this case through language training, thereby providing further proof of the brain's flexibility.

An experiment by Donald Wong (1997) has shown that the type of linguistic environment that you experience can affect which side of your brain processes pitch. In this experiment English speakers and Thai speakers listened to 80 pairs of Thai words. [5] The subjects were required to decide whether the two words sounded the same, either by consonant or by tone. Using positron emission tomography (PET), blood flow was tracked in the subjects' brains. It was found that the Thai speakers consistently lit up the left side of the brain, particularly in the Broca's area, while the English speakers lit up the right hemisphere. It is suggested that this occurs because the nuances of the English language are often carried by the rise and fall of the voice, and so pitch is processed in the right 'emotional' side of the brain. In the case of 'tonal' languages such as Thai, pitch carries not only emotional information, but also can alter the meaning of a word. For this reason, in the case of Thai speakers, pitch is processed on the left side of the brain, particularly in Broca's area which is associated with processing the linguistic content of language.

The failure of many theorists therefore to find neat generalities in brain functioning may simply stem from the fact that varying experiences, training and genetic

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[5] These words were not emotionally charged and were sometimes just nonsense words.

backgrounds may result in brain organisations which, as Carole Wade and Carol Tavris point out, varies "considerably from person to person" (1993, p. 107).

Finally, faced with the conflicting interpretations of findings within the area of sex lateralization, it is probably best to conclude with Hines and Gorski (1985) that:

> *"One sex is not simply more lateralized than the other. Rather, males seem to be more lateralized than females in some respects; females seem to be more lateralized than males in other respects; and the sexes seem to be equally lateralized in still other respects. Although this complexity may seem disheartening, it is probably an accurate reflection of neural organization."* (Hines and Gorski 1985, p. 80)

4.4.1.3.4 Conclusions

- Sexual dimorphism in brain size and in areas such as the hypothalamus and corpus callosum has been identified, although it is not clear whether any of the identified differences results in intellectual functional differences between females and males. However, differences in brain organisation can arise from other factors apart from gender. For example, tonal differences between Thai and English speaking people and differences between early and late bilingual speakers indicate that experiences and training can lead to brain differentiation. For this reason, the apparent dimorphism of female and male brains may have cultural development and training origins.

- Various techniques have been used to 'map' the brain and identify hemispheric specialization and lateralization of certain functions and activities. However, the debatable nature of many findings must be stressed given the complexity of brain functioning, its plasticity, limitations on the ability of researchers to monitor brain functioning safely, naturalistically and accurately, and the small data bases that have so far been available.

4.4.2 Part 2: Physical development

When baby boys are born, they are on average slightly heavier and longer than the average baby girl. There is a higher rate of birth defects among males. New born healthy girls and boys receive similar scores for reflexes and neurological responses, and their average development after birth in terms of grasping, smiling, crawling, and walking proceeds at a similar rate (Beal 1994; Maccoby and Jacklin 1974). Height remains equal for both sexes until the age of 7 when girls become taller than boys, and then at age 10 when boys become taller than girls. By adulthood, there is a 6% difference in height and a 20% difference in weight, in favour of males. Females mature between 2 and 2½ years faster than males. At birth their skeletal development is four weeks in advance of boys and at adolescence, three years in advance (Shepherd-Look 1982).

4.4.2.1 Perceptual sensitivity

In general, female and male infants follow a similar developmental path in their perceptual abilities of hearing, taste, smell and sight. Some researchers have found that females appear to be more sensitive and variable in their responses to taste and olfactory cues (Shepherd-Look 1982) although others question the reliability of these findings (Beal 1994). The speed and duration of responses to auditory and visual cues are similar for both sexes (Shepherd-Look 1982). While most studies indicate that there are no sex differences in touch sensitivity and pain thresholds, any studies that record a sex difference show greater female sensitivity in this area (Shepherd-Look 1982).

4.4.2.2 Male vulnerability

Approximately 140 males are conceived for every 100 females. In one study (Bentzen 1963) about 78% of stillborn foetuses delivered before the fourth month were male. When the end of the prenatal period is reached, the birth ratio has fallen to 105 males

to 100 females (Reinisch *et al.* 1979). By the end of childhood, the ratio of surviving males to females has dropped to one.

Males are more vulnerable to many childhood diseases. Boys are over-represented among children with speech, learning and behaviour disorders. Reading problems are 3-5 times more prevalent in boys than in girls (Knopf 1979). During adolescence, males have a higher rate of schizophrenia, delinquency, academic underachievement, and suicide than females. In fact Dee Shepherd-Look concludes: "Until adulthood, it is difficult to find a pathological condition in which the incidence among females is higher than among males" (Shepherd-Look 1982, p. 408).

4.5 INTELLECTUAL DIFFERENCES

Eleanor Maccoby and Carol Jacklin (1974) reviewed and interpreted over 2,000 books and articles on gender differences in intellectual ability, motivation and social behaviour. They concluded that there were very few hypothesised gender differences that could be attributed to sex alone, and their findings were welcomed as a powerful argument for equality between the sexes. Evidence for some differences was indicated in male superiority in mathematical skills and in visual-spatial abilities female superiority in verbal skills and a higher level of aggression in males when compared with females.

Within this highly debatable area, there are researchers who report findings that either confirm or dismiss Eleanor Maccoby and Carol Jacklin's original findings. Jeanne Block (1976) has criticised their conclusions, pointing out methodological and interpretative problems with their data. Researchers such as Alan Feingold (1988), and Janet Hyde and Marcia Linn who have studied data over a twenty-year or more span, report findings that suggest that sex differences in cognitive abilities are disappearing (Hyde and Linn 1988, cited by Brannon 1996; Linn and Hyde 1989, cited by Atkinson *et al.* 1993).

4.5.1 Mathematics.

Attempts to establish conclusively whether there are sex differences in mathematical abilities have failed so far due to confusing research findings. In general, girls begin to count and use numbers before boys, and they are better than boys at arithmetic computation throughout primary school levels (Fennema 1980, cited by Brannon 1996). There is some evidence that at primary school level boys are better than girls in mathematical reasoning problems (Marshall 1984, cited by Vasta *et al.* 1992). Some research has tended to show that from high school level onwards, boys begin to achieve higher scores in mathematical ability tests and their advantage in this area generally holds into adulthood. These data have however been questioned. Janet Cottrell (1992), for example, reports that when much of these data were re-examined and other factors such as course experience were factored out, sex accounted for only 1% of the variance in mathematical ability. Other research (Klein 1992, cited by Cottrell 1992) has found that mathematics grade point averages are virtually identical, while Karen Gold (1995) Chris Woodhead (1996) and David Charter (1996) all report on the fact that since 1993, girls in general have scored higher than boys in GCSE and A-level mathematics.

Two researchers who found evidence that boys were better than girls mathematically are Camilla Benbow and Julian Stanley (1983, cited by Brannon1996; 1992). They examined the scores of approximately 10,000 talented 7^{th} and 8^{th} grade students who scored high marks in the (US) College Board's Scholastic Aptitude Test in mathematics (SAT-M). They found that the boys achieved higher levels of performance than girls, and concluded, controversially, that this male mathematical superiority arose from innate biological abilities. They stated for example, that:

> *"We favor the hypothesis that sex differences in achievement in and attitude toward mathematics result from superior male mathematical ability, which may in turn be related to greater male ability in spatial tasks."* (Benbow and Stanley 1992, p. 200)

Other researchers have highlighted the important role of social and educational factors in mathematics test scores. Doris Entwisle and David Baker (1983) found that the boys in their study held higher expectations for their own performance in mathematics than the girls, who held unnecessarily pessimistic expectations. As Janet Cottrell points out however, "Low self-confidence in females must not be confused with limited abilities" (1992, p. 2). These low expectations appear to be associated with differential expectations held by parents. In one study of parental influences on student achievements, Jacquelynne Eccles Parsons *et al.* concluded that parents have sex-differentiated perceptions of their children's mathematics abilities:

> *"despite the similarity of the actual performance of boys and girls [ ] By attributing their daughters' achievements to hard work and their sons' to high ability, parents may be teaching their sons and daughters to draw different inferences regarding their achievement abilities from equivalent achievement experiences."* (1992, p. 239)

Research by Jacquelynne Eccles and Janis Jacobs (1986) has shown that students are very influenced by their parents' perceptions of the difficulty of mathematics and attitudes towards the importance of mathematics. Although mothers generally help their children with their homework more than fathers, in one study (Sherman 1983, cited by Halpern1992) fathers were found to be seven times more likely to be asked to help with mathematics homework than mothers, thereby perpetuating, or perhaps reflecting, a perception that females are not experts at mathematics.

Elizabeth Fennema (Fennema and Sherman 1977; 1978) carried out a study of twelve hundred US ninth-grade students of comparable mathematics background. They found that sex differences in mathematics achievement scores only occurred in schools where there were also significant sex differences in the students' self-perception of their ability to learn mathematics and the value that they placed on

mathematics learning. They found that parents' and teachers' expectations for students' learning were also a significant factor in achievement and learning.

Gaea Leinhardt *et al.* examined the teaching methods of thirty-three teachers and found that teachers spent relatively more time teaching mathematics to boys than to girls (1979, cited by Eccles and Jacobs 1986). Lee Jussim and Jacquelynne Eccles found that teachers' attitudes acted as self-fulfilling prophecies affecting student mathematical achievement (1992, cited by Brannon1996). Lucy Sells highlighted the role of social support in encouraging girls to enrol in advanced mathematics courses and to achieve high grades (1980, cited by Brannon 1996). Overall, as Diane Halpern states: "In general, females receive less support and encouragement and more discouragement to pursue mathematics coursework and related occupations than their male counterparts" (Halpern 1992, p. 219).

In spite of the aforementioned obstacles to female mathematical development, sex differences in mathematics appear to be decreasing. For example, Alan Feingold (1988) carried out an analysis of Differential Aptitude Tests (DAT) conducted from 1947 to 1980, the Preliminary Scholastic Aptitude Test (PSAT) and Scholastic Aptitude Test (SAT) administered between 1960 and 1983. He found that over the period under study, the gap between the sexes in mathematics had narrowed. For example, girls had closed the gap on three DAT aptitude tests, – Verbal Reasoning, Abstract Reasoning, and Numerical Ability. Sex differences in scores were also cut in half in the DAT Mechanical Reasoning, Space Relations, and PSAT-Math tests. However, among high achieving mathematics students, boys still held an advantage over girls over the period examined.

Marcia Linn and Janet Hyde found in their analysis of studies which reported mathematics sex differences (covering a twenty year period), that female ability in tests of mathematical reasoning has been increasing to match that of males (1989, cited by Atkinson *et al.* 1993). More recent results indicate that efforts aimed specifically at encouraging girls to participate more fully in a range of subjects including mathematics seems to have borne fruit. (Gold 1995) Chris Woodhead

(1996) reports that girls are now more successful than boys in mathematics at GCSE level and at 7, 11 and 14 years of age in National Curriculum assessments in mathematics.

4.5.2 Verbal ability

Female infants produce more sounds at an earlier age than males, they use words sooner, and the size of their early vocabularies is much larger than that of males (Vasta *et al.* 1992; Hyde 1981, cited by Brannon 1996; Harris 1977, cited by Vasta *et al.* 1992). In one experiment for example, girls had acquired fifty words on average by eighteen months of age while boys did not achieve this level of word acquisition until twenty-two months (Nelson 1973, cited by Hargreaves and Colley 1987). As Ross Vasta *et al.* (1992) also point out, girls demonstrate earlier grammatical development, and greater abilities in tests of language complexity that examine aspects such as sentence length, use of pronouns, and use of conjunctions. During early adolescence, female superiority on both receptive and productive language begins to emerge and continues to increase through secondary school level and beyond (Halpern 1992). Diane Halpern, reports on a longitudinal study (Martin and Hoover 1987) which examined the scores of 4,875 girls and 4,497 boys who sat the Iowa Test of Basic Skills. The researchers found that: "girls scored higher on tests of spelling, capitalization, punctuation, language usage, reference materials, and reading comprehension" (Halpern 1992, p. 67). In this study, the 'between sex' differences were also quite large, with females representing two-thirds of the highest scoring students in Grade 8.

The language advantage which researchers claim favours females, is also reflected in the higher numbers of boys experiencing language difficulty such as speech and reading problems. Stuttering is predominantly a male problem (Skinner 1985, cited by Halpern 1992). Dyslexia is also predominantly a male problem with males being five times more likely to have mild dyslexia and ten times more likely to have severe dyslexia than females (Sutaria 1985, cited by Halpern 1992). As already discussed (See Section 4.4.1.5.4) following strokes and brain surgery, males are also more likely

to suffer a greater degree of language impairment and recover more slowly than females.

Explanations that attempt to explain the (debatable) extent of female superiority in verbal ability have focused on two areas:

(1) Theories that associate bilateral cerebral specialisation with superior verbal abilities in females. (See Sections 4.4.1.3-4.4.1.6)

(2) Theories that focus on socialization patterns and their role in developing greater verbal abilities in females. (See Sections 3.6.2.1-3.6.2.5) Research indicates for example, that mothers talk more to their daughters than to their sons from early infancy onwards (Cherry and Deaux 1976, cited by Brannon 1996). In a study investigating the role of parental expectations, middle class parents were found to have higher reading expectations for girls than for boys (Entwisle and Baker 1983).

Some researchers, however, doubt the extent of female verbal ability superiority. They would argue that 'verbal ability' as an entity is tested by a wide variety of tools and covers many different skills, and so the experimental data on which this claim is laid are debatable. Many tests for example, require skills apart from purely 'verbal' skills such as concept formation, reasoning, learning and memory. Linda Brannon has listed the principal tests which give an indication of the variety of tests used:

> *"The tasks that researchers have used to study verbal ability include not only the verbal subtests of the Wechsler tests but also verbal fluency, anagram tests, reading comprehension tests, synonym and antonym tasks, sentence structure assessments, and reading readiness tests as well as the spelling, punctuation, vocabulary, and reading subtests from various achievement tests."* (Brannon 1996, p. 90)

Others point out that any female advantage that has been claimed is either very small or does not hold up across a range of verbal ability tests. Eleanor Maccoby, who with Carol Jacklin concluded in 1974 that females had an advantage (although a small one)

over males in verbal abilities (Maccoby and Jacklin 1974), she was prepared to admit by 1990 that this advantage had 'faded' (Maccoby 1990). Alan Feingold (1988) found that although girls initially in 1947 and 1960, scored higher than boys on three DAT tests, Spelling, Language and Clerical Speed and Accuracy, and the PSAT-Verbal tests, by 1980 boys had completely closed the gap on PSAT-Verbal tests and cut in half the difference in Clerical Speed and Accuracy. Janet Hyde (1981, cited by Brannon 1996) in her meta-analysis of Eleanor Maccoby and Carol Jacklin's report (1974) found that sex differences in verbal ability only accounted for 1% of any differences. In a later meta-analysis of 165 studies reporting sex differences in verbal abilities, Janet Hyde and Marcia Linn (1988, cited by Brannon 1996) found that while females scored higher in some verbal abilities, males scored higher in other tests. They also found that while the earliest of the 165 studies found sex differences, the more recently published studies did not.

4.5.3 Visual spatial ability

Up until 8 years of age, research indicates that there are no sex differences in visual spatial ability. Between the ages of 8 and 11, a few studies indicate that there is male superiority, but most do not. Sex differences in spatial abilities become more pronounced from adolescence onwards (Johnston 1987, cited by Vasta *et al.* 1992).

Some researchers disagree with these male superiority findings, however, because they argue it is not clear what exactly is being tested in many spatial ability tests since the term 'spatial ability' has not been agreed upon. Spatial abilities are believed to be involved in activities as diverse as finding your way around a town or building, recognizing upside-down objects, playing chess, map-reading, solving mazes and doing jigsaw puzzles (Singleton 1986, cited by Hargreaves and Colley 1987). Linda Brannon has described some of the definitions of spatial ability that have been used in tests.

> *"These definitions have included the ability to visualize objects, to mentally manipulate objects, to perceive spatial patterns, to locate objects in space, to recognize shapes, to locate a figure embedded in a larger figure, to succeed at putting together block designs or jigsaw puzzles, and to estimate the time of arrival of a moving object."* (Brannon 1996, p. 98)

This variability in definitions of spatial abilities leads to an obvious problem. Since no one can really agree on a set of definitive tests with which to test spatial abilities, comparative analysis of research findings is difficult. In addition, the arbitrary nature of these definitions means that we cannot be sure that the skills intended to be tested are in actual fact being tested. As Paula Caplan *et al.* conclude:

> *"The fact that the term spatial abilities exists does not prove that humans' brains or cognitive abilities fit whatever arrangement might be assumed to exist by the (often mutually contradictory and highly inconsistent) various researchers."* (1985, p. 797)

Females tend to do better in tests of perceptual speed in which people must rapidly identify matching objects and in tests in which people must remember the placement of a series of objects. When tests involve nonvisual, nonanalytic spatial skills, no gender differences have been found. However, in tests involving analytic processes, male superiority appears in adolescence and increases throughout secondary level schooling (Brannon 1996). As already discussed (Sections 4.4.1.3 - 4.4.1.6), lateralization of cerebral specialisation, and Waber's Age at Puberty Hypothesis has been offered as explanations for findings of male superiority in visual spatial abilities.

Some researchers have highlighted factors that may affect female performance in spatial ability tests. For example, research indicates that our society labels spatial activities primarily as masculine, and females tend to avoid these activities. Nora Newcombe and her colleagues (Newcombe *et al.* 1983, cited by Lott 1987), asked college students to rate 231 activities according to whether or not they required spatial abilities, and to indicate whether they felt these activities were 'feminine' or 'masculine' activities. They found that the activities that were labelled as spatial were those which were rated as 'masculine' activities by both females and males. These

were also the activities that the male subjects participated in more frequently than the female subjects. Research carried out by Matthew Sharps and his colleagues (Sharps *et al.* 1993, cited by Brannon 1996) highlights directly the role of labelling. They found that when a spatial memory and mental rotation task was emphasised as a 'spatial task', female performance decreased.

Early socialization factors are believed to affect female spatial abilities since girls are generally discouraged from playing with blocks and mechanical toys that develop spatial ability skills. In one experiment girls and boys aged between 3-4 years were given special training with toys that are often stereotypically labelled as 'boys' toys', such as blocks, dominoes, toy cars and geometric shapes. When this group and a control group were given a test in spatial ability, the 'trained' group scored higher (Sprafkin *et al.* 1983, cited by Brannon 1996).

In another experiment, children were tested with a version of the Embedded Figures Test (Connor *et al.* 1978, cited by Halpern 1992). Following this initial test, the experimenters presented all the children with an 'overlay training procedure'. In this training programme, five transparent overlays which together formed a complex figure, were sequentially removed to reveal an increasingly simplified diamond shape. The overlays were then repositioned one at a time. After this training, sex differentials disappeared, all the children improved, while the girls showing significantly higher levels of improvement than the boys. Maryann Baenninger and Nora Newcombe also found that experience and training played a part in spatial ability performance (1988, cited by Brannon 1996). A study of Eskimo culture found that both sexes were expected to participate in hunting expeditions, travel great distances and be skilled in spatial visualisation and orientation. When Eskimo women and men were given spatial ability tests, no sex differences were found (McGee 1979, cited by Lott 1987).

4.5.4 Motivation

Sex differences have been found in the expectations for future success or failure in a task and in the explanations offered to explain success or failure in a task. Weiner's

(1974) Attribution theory suggests that there are three dimensions of causes that help to explain success or failure in a task.

4.5.4.1 Locus of causality

This dimension differentiates between causes for success or failure that are internal or external. Internal causes could be considered to be ability, effort, personality, mood or health, while others such as luck, interference by others, home conditions or task difficulty could be considered to be external, since they may be believed to originate outside the person and are therefore outside their control (Bar-Tal 1984).

4.5.4.2 Stability over time

This dimension differentiates between causes for success or failure that vary over time. Some causes such as mood, effort or luck can be considered to be unstable because they can fluctuate over time, while other causes such as ability, task difficulty or home conditions may not change over time and so will be regarded as stable (Bar-Tal 1984).

4.5.4.3 Controllability

The third dimension differentiates between causes for success or failure that are under the control of the person. Causes such as effort, attention, or help from others can be seen to be under the control of the individual, while causes such as mood, luck, health or ability may be viewed as outside their control (Bar-Tal 1984).

Whether a person expects to do well or not in a future task depends on the stability of their perceptions of cause. If past failures are attributed to stable causes, then the person will not expect to succeed in a similar task again. Similarly, past successes attributed to stable causes, will predict future success. If failure is attributed to unstable causes, then future success is possible, while success attributed to unstable

causes will lead to unpredictability of future success. Those who attribute their success to internal causes experience feelings of pride, competence, confidence and satisfaction, while those who attribute failure to internal causes experience feelings of guilt and resignation (Bar-Tal 1984).

Research indicates that females and males differ in their causal attributions for success and failure. When females succeed in a task they are more likely to attribute their success to luck or ease of task, while males are more likely to attribute their success to ability (Dweck *et al.* 1978, cited by Hargreaves and Colley1987; Nichols 1975, cited by Bar-Tal 1984). Teachers react differently to boys and girls in their comments on class work. When boys receive low marks at school it is frequently assumed that have not tried hard enough. Compared with boys, teachers provide girls with more positive comments on non-intellectual aspects of their work, while providing more negative comments on their intellectual work (Dweck *et al.* 1978, cited by Hargreaves and Colley 1987).

Carol Beal (1994) reports on an experiment (Dweck 1981) which investigated the effects of this type of gender differentiated approach. In this experiment, boys were given difficult or 'impossible-to-solve' anagram problems. When a boy did not get a problem right, the adult "reassuringly said that he had clearly done the best he could and that perhaps he should be given easier problems next time" (Beal 1994, p. 148). Subsequently, these boys reported that they felt they had not coped well with the problems because they "just weren't smart enough" (Beal 1994, p. 148). When they were given new problems that were quite easy, they had great difficulty solving them. As part of the experiment, girls who failed to solve these problems were told that they had failed because they had not concentrated hard enough. When questioned later, these girls expected to do well in future problem solving, and they persisted longer when presented with a new set of problems.

Differences in teacher approaches towards the intellectual and non-intellectual aspects of boys' and girls' work are believed to determine causal perceptions of

success and failure (Bar-Tal 1984). Boys frequently get 'into trouble' for being noisy, late, not trying hard enough, not doing homework, being untidy, etc. These negative comments however do not necessarily indicate lack of academic ability. Girls on the other hand, receive more praise for 'being good', the tidiness of their work, helping in class, being on time, etc. The more frequent negative comments that they receive for intellectual work are more likely to be attributed to low academic ability.

The labelling of a task appears to affect attributions for success and failure (Brannon 1996). In one experiment involving girls and boys aged 4-5 years, girls who experienced failure on a task labelled 'masculine', were more likely to attribute this failure to lack of ability (Löchel 1983, cited by Hargreaves and Colley 1987). David Rosenfield and Walter Stephan (1978) varied the labelling on a task. The 'masculine' label was justified when the task was seen as a co-ordination task, involving geometric shapes and mathematical abstraction, while the 'feminine' label was justified when the task was seen as one requiring design co-ordination involving delicate design and sensitivity to subtle cues (Brannon 1996). When men believed that the task was a 'masculine' one, they attributed their success to internal factors such as ability, and their failure to external factors such as bad luck or task difficulty. Following a similar pattern, females took personal credit for success on a 'feminine' task, but blamed failure on external factors. On cross-gender tasks however, both males and females were more likely to attribute their success or failure to external factors (Brannon 1996).

Tied in with attribution theory are Eccles's theories (Eccles 1987, cited by Halpern 1992). These theories propose a model of motivation in which an individual will persist at a task in which they expect to succeed and avoid tasks in which they expect to fail. They also persist at tasks which have a goal that they value, and avoid those whose goals they do not value. Socialisation practices which differentiate between the sexes could lead individuals to approach, value and expect to succeed in areas that are sex-appropriate and similarly avoid, devalue and expect to fail in areas that are sex-

inappropriate. Eccles' theories therefore may be of relevance to research that shows underrepresentation by one sex in particular subject areas, activities or jobs.

4.6 TEMPERAMENT AND SOCIAL BEHAVIOUR

4.6.1 Aggression

Young boys engage in more rough and tumble play and are encouraged to do so, by their fathers, in particular. They are also more likely to imitate aggression when it is modelled, and exhibit more antisocial behaviour than females. One cross-cultural study of verbal and physical aggression in preschool children in Japan, India, Kenya, the Philippines, Mexico and the United States (Whiting 1997, cited by Brannon 1996) found that boys displayed higher levels of both types of aggression. Patrice Miller and her colleagues (Miller *et al.* 1986) found that boys were involved in conflict more often than girls and were more likely to use 'heavy-handed' tactics such as threats and physical force to solve disputes. Girls on the other hand, tended to adopt behaviours that helped to defuse the conflict. Overall, research has tended to confirm sex differences in aggression with the emergence of social play at about two years, and continuing on through to young adulthood (Wolman 1978).

Ann Frodi *et al.* (1977) and Alice Eagly and Valerie Steffen (1986) reviewed aggression in adulthood and found that sex differences remain for physical aggression, but few remain for psychological or social aggression. They also found that when women feel that their aggression is justified, they demonstrate the same levels of aggression as men. Women, however, tend to be reluctant to display aggression, especially physical aggression, either because aggression is socially prohibited for females, or from fear of harming another, or from fear of reprisal. In laboratory experiments where gender related cues are removed and where perhaps social restraints are reduced, women display just as much willingness to behave aggressively as men (Brannon 1996).

Although in general, males demonstrate higher levels of aggression at all ages, Janet Hyde (1984) has shown that both sexes become less aggressive as they grow older. A 22 year longitudinal study of 600 subjects from approximately eight years to thirty years of age, found that males showed more aggressive behaviour than females (Lefkowitz *et al.* 1977, cited by Brannon 1996; Husemann *et al.* 1984, cited by Brannon 1996; Eron 1987, cited by Brannon 1996). They also found that early aggressive behaviours were more predictive of aggressive behaviours in adulthood for males than for females. Linda Brannon (1996) summarises these aggressive behaviours. They included criminal behaviour, traffic violations, convictions for driving while intoxicated, aggressiveness toward spouses, and severity of punishment of children.

A six year longitudinal study of aggressive behaviours in girls and boys from approximately 9 years of age carried out by Robert Cairns *et al.* found that girls and boys were both aggressive but in different ways. Boys were more likely to be physically aggressive with other boys, while girls were more likely to use a more subtle form of aggression that they called 'social aggression'. This type of aggression involved attempts to alienate or ostracise a girl from a social group or defame her character and was rarely demonstrated by boys (Cairns (1989) cited by Brannon 1996, p. 213).

By adulthood, males are more likely to commit violent crimes, such as murder and robbery, and they are more likely to be arrested for crimes and serve time in prison. Kathryn Holmquist reports that: "Between 90 and 95 per cent of crime in the Republic, the UK and elsewhere is committed by males" *(The Irish Times, Thursday, May 9th, 1996).*

As Robert Cairns *et al.* have shown, males are also likely to become embroiled in male-male confrontations involving physical violence (Cairns 1989, cited by Brannon 1996). While overall violence for males and females decreases throughout adolescence, the likelihood that boys will have and use weapons during violent

incidents increases. As a result, males are more likely to become victims of violence. Lorna Siggins reports that:

> *"In a detailed examination of 1995 (Irish) homicide figures, Sgt Keogh has found that 80 per cent of victims and 92 per cent of accused were male, with 84 per cent of victims in the 16-65 age group and 55 per cent between the ages of 16 and 35." (The Irish Times, Wednesday April 2nd 1997)*

4.6.2 Activity level

Infant boys during their first few weeks cry more, spend more time awake and are more active on average than infant girls (Eaton and Enns 1986, cited by Vasta *et al.* 1992). Eleanor Maccoby and Carol Jacklin's (1974) research review found no evidence for sex differences in activity levels during the first year of infancy but found that after that age, results were variable. However, when a sex difference was reported, boys are found to be physically more active than girls (Maccoby and Jacklin 1974). A longitudinal study of children at 13, 25 and 44 months, however, failed to find any sex differences in vigour or activity levels (Feiring and Lewis 1980, cited by Hargreaves and Colley 1987). Donald Routh and his colleagues (Routh *et al.* 1974, cited by Lott 1987) similarly found no evidence for significant sex differences in measures of activity level. One socialising factor that may influence female activity levels was identified by Beverly Fagot (1984) in her study of 24-30 month old children in a playgroup. She found that when girls engaged in high activity-level play they did not receive any encouragement either from their peers or their teachers, while similar male behaviour was encouraged.

Boys have been found to play outdoors more than girls. They have also been found to be more physically active, participate in more rough and tumble games (DiPietro 1981, cited by Lott 1987) and use more physical space in their activities (Harper and Sanders 1975, cited by Hargreaves and Colley 1987). However, practice and increased opportunities to participate in physical activities appear to play a part in decreasing sex differences in this area. Evelyn Hall and Amelia Lee (1984, cited by Lott 1987) studied children over three consecutive years on five standard fitness tests,

and found that both girls and boys improved consistently over the three years. By the final year of the study, the girls were better than the boys on most of the tests.

4.6.3 Exploration

Some research indicates that boys are more likely to explore and manipulate objects than girls (Eaton and Enns 1986, cited by Vasta *et al.* 1992). In one study in which pre-school boys and girls were observed (Adams and Bradford 1985, cited by Halpern 1992) boys were found to touch unfamiliar objects more often than girls, while girls touched familiar objects more frequently than boys.

Corinne Hutt (1970, cited by Hargreaves and Colley 1987) introduced pre-school children to a novel toy that was really a rectangular metal box with lights, levers, counters and buzzers and then she observed their reactions. She found that boys were more likely to approach the toy and explore and play with it than the girls. In a similar way (Rabinowitz *et al.* 1975, cited by Hargreaves and Colley 1987) introduced a novel toy, namely, a board with a picture of a clown driving a train engine that had various buttons, buzzers and levers. This time, no sex differences were found in approaches and exploration of the novel toy, although boys played with the toy for longer. It could, however, be argued that the novel toys previously described may have related more closely to male, rather than female designated toys and so may not have appealed to girls. Taking this point into account, McLoyd and Ratner (1983, cited by Hargreaves and Colley 1987) carried out an experiment in which three different novel toys were introduced, namely: a car panel, a house panel, and a coloured panel. They each fitted on a large rectangular box with levers and various items to manipulate. This time no sex differences were found in approaches or exploration of these objects.

4.6.4 Risk taking

Boys take more risks than girls in their play and are not supervised as much as girls. Extensive research has already established that exploration and independence are encouraged more in boys than in girls. Carole Beal (1994), for example, reports on the 'independence training' which boys receive, their greater likelihood to play with electric wall sockets and other forbidden objects, and their disobedience when requested to 'stop doing something'. Girls are more likely to be collected from school, to be required to play at home rather than in the neighbourhood, to be forbidden to go on their own to parks, libraries and other community centers and to be 'grounded' as a punishment (Newson and Newson 1986).

Boys are more likely to play on the streets (Chapman *et al.* 1980, cited by Hargreaves and Davies 1996) to be described as 'outdoor children' by their mothers (Newson and Newson 1976, cited by Hargreaves and Davies 1996, p. 22) and to be less supervised than girls. Their 'Zone of Free Movement' as described by Valsiner (1985, cited by Hargreaves and Davies 1996, p. 25.) is larger than that of girls, who are generally kept under greater protection and lead more sheltered lives than boys (Newson and Newson 1986). They are more likely to describe themselves as more daring and adventurous than females (Longstreth 1970, cited by Block 1983). Looking at statistical data of road accidents it has been found that boys are twice as likely as girls to have road accidents of all levels of severity (Chapman *et al.* 1980, cited by Hargreaves and Davies 1996). They are also more likely to require hospital out-patient treatment (Newson and Newson 1986). Jeanne Block (1976) reports on one study of almost 9000 successive admissions to a hospital emergency ward, which found that boys had significantly more accidents at every age level between 4 and 18 years of age. The frequency of accidents also increased for boys with age, while it decreased for girls.

A number of studies and experiments have also been carried out to explore sex differences in risk-taking behaviours (RTB). Harvey Ginsburg and Shirley Miller

(1982) looked at children in a zoo at four risk-taking areas, namely: – the elephant ride area, the children's petting zoo, a steep embankment along the San Antonio River and a burro exhibit which had a special warning stating, 'Careful he bites' and which displayed a graphic illustration of a burro biting the hand of someone who had attempted to feed it. They found that boys were significantly more willing to take risks than girls in all of the 'risk-areas', and that older children of both sexes took more risks than younger ones.

Paul Slovic (1966), set up a risk-taking game at a country fair using spoonfuls of M&M's for prizes. He found that it was hard to get girls even to play the game. Just over 1,000 children played the game with nearly twice as many boys as girls volunteering. Overall, boys took greater risks in the game but girls won more spoonfuls of sweets on average. He found no sex differences among 6-10 year old children but males took more risks in the 11-16 age range. Czeslaw Walesa using urns and roulette-like tasks found that 8-10 year old males were more likely to take risks than females of the same age (Walesa 1975, cited by Hargreaves and Davies 1996).

The relationship between impulsivity-reflection and RTB has also been investigated using the Matching Familiar Figures Test. In this test, subjects have to identify a target figure from a selection of nine figures with slightly varying features. Kimiharu Sato (1983) found that impulsive boys took more risks than impulsive girls and reflective children.

Some researchers, however, report no sex differences in RTB or else have reported that girls took greater risks. Sidney Arenson (1978), for example, reports no sex differences in a risk-taking experiment in which subjects had to insert a stylus in one of three boards with differing payoffs. Helmut Lamm *et al.* (1979) found that when girls chose bets for another girl they took higher risks than boys. James Martinez (1995) carried out an experiment in which 90 undergraduates were given leadership assignments that were either labelled masculine, feminine or ambiguously labelled. He found that women made more cautious decisions when the assignment was

labelled masculine, while labelling a task as feminine did not affect their RTB. Males were more cautious in attempting a task labelled feminine, but their risk-taking judgments were not affected.

RTB research involving adults has been mainly concerned with driving, where males have generally been found to take greater risks. *Channel 4, The Cutting Edge, November 4, 1997* reports for example, that 94% of all motoring offences, 90% of all speeding offences, and 95% of all drunk driving offences are committed by men. Roger Hagen (1975) looked at thirteen measures of steering input, accelerator input, speed maintenance, and lateral placement in 89 male and 74 female licensed drivers using a driving simulator. He found that male drivers drove closer to the centerline, maintained a higher speed and used the accelerator more frequently and less consistently than female drivers. Ebbe Ebbesen and Michael Haney (1973) examined cars turning onto a row of oncoming cars at a T junction, and they found that males took more risks than females. David DeJoy (1992) in his examination of perceptions of accident risk found that males, compared with females, were more confident of their driving skills and perceived less risk in a variety of dangerous driving behaviours.

4.6.5 Dominance and compliance

Dominance can be described as the ability to control and manipulate the behaviour of others. The person who displays dominance may use direct or indirect methods in order to carry out a particular agenda, and as Dee Shepherd-Look has pointed out, this dominance may serve many motives. It can, for example, be used: "to satisfy needs of the ego, as an instrument to achieve one's goals, to assume leadership, to organize a group to strive cooperatively for a mutually rewarding goal" (1982, p. 411).

As Robert Cairns *et al.* has shown (1989, cited by Brannon 1996), girls and boys use different aggressive tactics, with boys more likely to use physical violence, and girls more likely to use social forces such as 'back-biting' or ostracising tactics to achieve

their aims. Boys tend to show more 'egotistic dominance', while girls "show more attempts to control another child's behavior in the interest of safety or some social value" (Shepherd-Look 1982, p. 411). During childhood, dominance appears to be associated with toughness, and so boys tend to be more likely to dominate both other boys in their play groups, and girls in general. However, given the sex-segregation that most commonly occurs from three years of age onwards (Maccoby 1990) boys have more opportunities to make these dominance attempts specifically on other boys.

Apart from aggressive tactics, people can try to influence others by verbal persuasion. Arising perhaps from gender differentiated socialisation practices, females and males differ in their strategies of verbal persuasion. Eleanor Maccoby (1990) found that girls find it hard to influence boys. Between the ages of 3½ and 5½, children increase the frequency of their attempts to influence their peers (Serbin *et al.* 1984, cited by Maccoby 1980). Girls do this by making polite suggestions to others, and by softening their directives while boys make more direct demands. When conflicts arise, girls tend to use 'conflict mitigating strategies', while boys use more threats and physical force (Miller *et al.* 1986, cited by Maccoby 1990). Over time, boys become less and less influenced by the indirect suggestions used by girls and come to ignore their requests. They are however, more likely to modify their behaviour according to the reactions of male peers (Fagot 1985). Girls on the other hand, are responsive to requests from other girls and from male play partners.

The strategies which girls tend to adopt however 'work' very well with other girls, and with teachers and other adults. In one experiment (Borja-Alvarez *et al.* 1991), girls and boys were brought into a playroom where other same-sex children were already playing a board game, and they were directed to try to join the game. Boys used very direct tactics, asking bluntly for a turn and trying to draw attention to themselves. The girls waited quietly, watched the game in progress and made occasional comments, until they were asked to join the game. Overall, the girls were more successful than the boys in gaining entry to the games.

Studies using a film projector have shown that: (a) females and males can each exert influence on same sex members, and (b) in cross-sex encounters males are more likely to dominate (Charlesworth and Lafreniere 1983, cited by Beal 1994; Charlesworth and Dzur 1987; Powlishta 1987, cited by Maccoby 1990). In one experiment (Charlesworth and Dzur 1987) groups of four boys or four girls were observed while they used a film-projector. One person could watch a movie provided another person held down a light button, and another turned a crank. In each of the girl groups and boy groups, one dominant girl or boy managed to have more viewing time than the others. Dominant boys tended to use physical strategies such as pushing other boys away, while the girls used physical strategies and verbal persuasion strategies to convince the others that they should watch the film. When mixed sex groups were involved (Charlesworth and Dzur 1987) boys were three times more likely to achieve the dominant viewing position than girls, who as Carole Beal points out, "were willing to yield a place on the expectation of a reciprocal turn that never came" (Beal 1994, p. 128).

In examinations of dominance in groups, males tend to adopt leadership roles immediately, but over time, dominance tends to shift to those who have expertise in areas related to the group's objectives (Shepherd-Look 1982). In an examination of leadership styles, it was found that women demonstrated a slightly greater tendency to use democratic approaches than men (Eagly and Johnson 1990, cited by Roth Walsh 1997). As already discussed (See Section 4.3.5), Judy Rosener (1997) found that males used a command-and-control model of leadership which resembled a military style of operation, while females used a more interactive style of leadership that was more collaborative and flexible.

Eleanor Maccoby (1990) has summarised research on the ability of females and males to influence others socially. Men tend to do more initiating, directing and interrupting than women (Brooks 1982, cited by Lott 1987). Their voices are louder and are listened to more than female voices by both sexes (West and Zimmerman 1985, cited by Maccoby 1990). Men are less influenced by the opinions of other group members

than women, and they exert more influence on the group process. Some research indicates that women adopt some of the mannerisms of men when they are in mixed groups and raise their voices, interrupt and become more assertive than they normally would with other women. Other research shows that they may wait patiently for a chance to speak, smile more than men (Dovidio *et al.* 1992) and give nonverbal signals of attentiveness while others hold the floor.

Sex differences have been reported in power structures within marriages and love relationships. When dating couples were questioned in one experiment (Peplau and Campbell 1989, cited by Brannon 1996) 95% of the women and 87% of the men reported that they believed in power equality in marriage. However, only 49% of the women and 42% of the men believed that they were in relationships with equal power. When couples have an unequal power structure it is more likely to be male dominated than female dominated (Blaustein and Olster 1989, cited by Carlson 1988). Interestingly, Janet Saltzman Chafetz's work (1989, cited by Brannon1996) on balances of power in love relationships suggests that equality of power tends to lead to conflict. She found that equal partners tend to have prolonged conflicts and less stable relationships than those with unequal power structures. When one partner dominates, and the other is subordinate, conflict tends to be avoided.

As Dee Shepherd-Look points out however (1982), dominance within marriages usually does not apply 'across the board', but tends to vary according to the particular task domain involved and it varies over time. Reflecting gender stereotypes prevalent in society at large, many men tend to make all the financial decisions while women make the household decisions (Peplau and Gordon 1985, cited by Brannon 1996). The employment of women in jobs outside the home is a factor that appears to affect the balance of power within relationships (Blumstein and Schwartz 1983, cited by Brannon 1996; Peplau and Gordon 1985, cited by Brannon 1996; Peplau and Campbell 1989, cited by Brannon 1996). As Linda Brannon points out:

> *"wives' income has a curvilinear relationship to power in marriage. Wives who earn no income have low power, wives who earn more money have increasing power to the point of equal incomes, but wives who earn more than their husbands have (or exercise) less power than their spouses."* (Brannon 1996, p. 250)

4.6.6 Competition

In their play, girls tend to avoid competition with its resultant winner-loser component, while competition plays an important part in boys' play structures. In one study of children's play patterns, boys played more competitive team games, while girls were more likely to be involved in competitive sports which involved indirect competition based on the quality of performance such as gymnastics or ice skating, or else they were involved in individual activities such as reading or listening to records (Lever 1978, cited by Beal 1994).

Research into competition and co-operation in children has been undertaken using Madsen's marble pull game. Two players play the game and the aim of this game is for both players together to gain as many marbles as possible. To play the game, the players stand on either side of a table and one of the players pulls the marble holder while the other player releases a string. This procedure enables one of the players to win a marble. However if both pull the strings at the same time, the marble holder splits and the marble is lost. In order to win therefore, both players have to co-operate. Research indicates that boy-boy pairs are the most competitive and so get the lowest scores, while girl-girl pairs develop turn-taking systems that enable them to win more marbles. Mixed-sex pairs win intermediate levels of marbles and the findings indicate that while participating in mixed-sex pairs, girls become more competitive and boys become more co-operative.

4.7 SEX DIFFERENCES IN MORAL DEVELOPMENT

Three leading theorists who have investigated moral development, Sigmund Freud, Jean Piaget, and Lawrence Kohlberg, have concluded that females are not as morally developed as males.

4.7.1 Sigmund Freud

As already discussed (See Section 3.4.1.1.5.3), Sigmund Freud admitted himself that he did not understand women very well. Towards the end of his life and after many years of study, extensive psychoanalytic work with female patients, and contact with female members of his family, female friends, benefactors and colleagues he still did not know "what woman wants" (Kurzweil 1995, p. 17). In one of his last statements about women Sigmund Freud acknowledges his lack of understanding of females and suggests: "If you want to know more about femininity, inquire from your own experiences of life, or turn to the poets, or wait until science can give you deeper and more coherent information" (Freud 1933/1964, quoted by Brannon 1996, p. 119). This acknowledged lack of understanding of females must be taken into account when assessing his claims about female moral inferiority.

4.7.1.1 The Freudian approach to moral development

From a Freudian point of view, one of the great psychological developmental tasks facing an individual is to learn how to channel the 'dynamic system' of psychological energy namely the 'libido'. At birth, this libido is represented by the 'id', which seeks pleasure and gratification. When children develop an 'ego' they learn to moderate their behaviour and to seek pleasure and gratification in ways that are socially and emotionally acceptable. The ego however is a practical, pragmatic structure that carries out actions which 'work', and functions without recourse to values and morals. Instead, moral development hinges on the development of the superego, or conscience.

Sigmund Freud described the resolution of the male Oedipus Complex in great detail and believed that males resolve their superegos completely, which enables them to: "develop a conscience, morals, and a way to incorporate the rules of society into their behavior" (Brannon 1996, p. 118).

He was much more imprecise in his descriptions of how a female develops a superego. As already discussed (See Sections 3.4.1.1.3.3; 3.4.1.1.4), he believed that the female is unable to effect a complete resolution of her Oedipus Complex. Since the female has already been 'castrated', the impetus that spurs her on to resolve the Oedipus Complex arises from fear of loss of love, rather than the preferable 'fear of castration' which the male experiences. As a result from a Freudian point of view,

> *"(the) women is morally feeble, culturally unproductive, and somehow "other" – a variation on the standard of masculinity, a deviation from the norm. Thus, the little girl's perception of herself as castrated, and her consequent envy, is responsible for her inferiority."* (Bootzin and Acocella 1988, quoted by Phares 1991, p. 84)

In addition, the male identifies more closely with his father and his values, while the female, having an inferior role model to identify with, introjects less fully the mother's values. This difference in strength of identification which the female experiences, results in a less developed superego or conscience which leads the female to show: "less sense of justice than man, less inclination to submission to the great exigencies of life, [while she] is more often led in her decisions by tender or hostile feelings" (Gay 1988, p. 516).

4.7.1.2 Anatomy is destiny

Central also to Sigmund Freud's view of female development is his belief that females feel a deep sense of loss because they lack a penis. As Viola Klein points out, Sigmund Freud believed that:

> *"All feminine character-traits, interests, attitudes, emotions and wishes are reactions, in some form or other, to this basic "defect" [ ] It is expressed in inferiority feelings, in contempt for their own sex, in revolt against their passive role, in envy of man's greater freedom, in the ambition to equal man in intellectual or artistic achievements, in strivings for independence, in tendencies to domineer over other people, and in all sorts of devices to make up for the social disadvantage of not being a man."* (Klein 1989, p. 72/73)

He concluded that females are not as rational and objective as males, and are too bound up in interpersonal relationships and emotional feelings to judge moral problems properly.

> *"The fact that women must be regarded as having little sense of justice is no doubt related to the predominance of envy in their mental life; for the demand for justice is a modification of envy and lays down the condition subject to which one can put envy aside [ ] There are no paths open to further development; it is as though the whole process had already run its course and remains thenceforward insusceptible to influence – as though, indeed, the difficult development to femininity had exhausted the possibilities of the person concerned."* (Freud 1933/1964, quoted by Brannon 1996, pp. 18/119)

4.7.2 Jean Piaget's theories of moral development

Jean Piaget (1932) carried out research on moral development in children and examined a number of areas such as game playing, rule understanding and children's attitudes towards lying, punishments and distributive and retributive justice. Jean Piaget tended to equate male development with child development and many of his experiments used only male subjects. There were however two main areas where he reports gender differences. These were in the areas of game rules and reciprocity in revenge.

4.7.2.1 Game rules

In his examination of games, Jean Piaget principally studied marble playing among boys and he carried out a less comprehensive investigation of 'îlet cachant' and

'Marelle' playing among girls. He was particularly interested in finding out how players learn to play games and the type of rules that govern these games.

He identified three stages of development in game playing.

4.7.2.1.1 Stages in game playing

4.7.2.1.1.1 Stage 1: The Motor or individual character of game playing

While Jean Piaget applied his stage theory for rule playing to a game like marbles, it also applies to other games. An increase in awareness of dangers in the area of child safety appears to have developed since Jean Piaget's (1932) investigations of marble playing took place. This factor, and perhaps cultural differences, may account for the acceptance and expectation by Jean Piaget that young children under two years of age would have wide experience of handling marbles. He identified the motor or individual stage of marble playing as a period when the young child handles marbles randomly, and builds up ritualised schemas for playing with them.

4.7.2.1.1.2 Stage 2: Egocentric game playing

This second stage begins when the child is exposed to some of the rules of marble playing and Jean Piaget found that this occurred between 2-5 years of age. During this period, the child plays by itself, even when surrounded by other marble playing children. The child may imitate aspects of other children's marble playing and incorporate these aspects into the play experience.

4.7.2.1.1.3 Stage 3: Cooperation in game playing

Between 7 and 8 years of age Jean Piaget found that marble players begin to try to win and so become concerned with establishing rules for the game. At this stage the players can make new arrangements during the game to cover various eventualities, and so the rules are not set. As a result, even within a single class in a school, Jean

Piaget and his researchers found that children at this stage of development varied widely in their assessment of the rules of marble playing.

4.7.2.1.1.4 Stage 4: Codification of rules in game playing

This stage occurs between 11 and 12 years of age and at this stage every detail of the procedures of the game is fixed. These rules are rules that are recognised within the society at large and are not confined to a particular group of children.

Jean Piaget also identified three stages in the development of rule consciousness in game playing.

4.7.2.1.2 Three stages in the development of consciousness of rules

1. During this first stage, children formulate rules that are based on purely motor actions, or, during the egocentric stage of game playing, they develop rules that are simply regarded as an interesting way of playing with the marbles.

2. This stage begins during the later half of the egocentric stage of game playing and lasts until the middle of the cooperative stage at around 9-10 years of age. To the child in the second stage of rule consciousness development, rules are sacred and untouchable and cannot be changed. The rules are seen to emanate from adults and last forever.

3. In this third stage, rules are now seen as laws decided by mutual consent that must be respected but which can be changed by general consent.

Having researched the basic format of the development of game playing and rule consciousness largely through the study of boys, Jean Piaget found that girls' games did not involve the same degree of rules which boys' games did.

> *"in the main the legal sense is far less developed in little girls than in boys. We did not succeed in finding a single collective game played by girls in which there were as many rules and, above all, as fine and consistent an organization and codification of these rules as in the game of marbles examined above."* (Piaget 1932, p. 69)

He found for example, that instead of developing further the basic rules of the game 'Marelle' (a sort of hop-scotch game) girls concentrated on designing new chalk designs to hop over, using for example, straight line, parallel line, spirals, circles, and ovals. When girls did play marbles, they seemed "more concerned with achieving dexterity at the game than with the legal structure of this social institution" (Piaget 1932, p. 70). Jean Piaget found that girls have a more pragmatic attitude towards rules than boys and they are more flexible, prepared to compromise, make exceptions and accept innovations. For girls, "[a] rule is good as long as the game repays it" (Piaget 1932, p. 76).

He also found that girls playing îlet cachant reached the third level of rule consciousness at around age 8 while boys did not reach this stage until after 10 years of age. Jean Piaget however is uncertain whether the greater tolerance of 'little girls' arises from: "the somewhat loosely-knit character of the game of 'îlet cachant' or to the actual mentality of little girls" (Piaget 1932, p. 76).

4.7.2.2 Reciprocity in revenge

In this area of research Jean Piaget relied on research by a colleague Mlle. M. Rambert (Piaget 1932). Mlle. Rambert presented two situations to 167 children and interviewed them to find out their attitudes towards revenge reciprocity. Situation 1 presented the following moral problem:

> *"There was a big boy in a school once who was beating a smaller boy. The little one couldn't hit back because he wasn't strong enough. So one day during the recreation he hid the big boy's apple and roll in an old cupboard. What do you think of that?"* (Piaget 1932, p. 297)

Her results showed that as children increase in age, they are more likely to believe that it is just to reciprocate and pay back wrongdoing with a similar level of punishment. While no gender information is provided in these results Mlle Rambert reports that for example at 6 years of age 19% of the subjects agreed that "The little one was quite right to pay him back", by age 9 this had increased to 72% and by 12 years 95% of the subjects agreed with this statement.

In the second situation the following question was asked: "If anyone punches you, what do you do?" (Piaget 1932, p. 297). The results of this experiment show gender differences in attitudes towards reciprocity in revenge because with increasing age boys were more inclined to 'give back more' while girls were more inclined to 'give back less'. (See Chapter 6, Study (C) which reports on further analyses of this experiment) Here are two examples which Piaget presented of the responses of one boy (who wanted to 'give back more') and one girl (who wanted to 'give back less'):

> *Je (7) : "What do you do when anyone gives you a punch? – I give 'em back two. – And if they give you three? – I give them back four. – Is it fair to do that? – Yes."*

> *Boe (8;5), G. : "You ought to hit back. – If they hit you three times? – I hit back once. – Why not three times? – That would be naughty (méchant). – Is it fair to hit back? – No, you oughtn't to hit back."* (Piaget 1932, p. 304)

4.7.3 Kohlberg's Theory of Moral Development

Lawrence Kohlberg (1981, cited by Gilligan 1982) based his theory of moral reasoning primarily on research conducted on seventy-five boys who were interviewed at three year intervals, starting when they were in early adolescence (10-16 years) and continuing until they were adults (22-28 years). In addition he also

carried out cross-cultural research on, for example, a comparison of an Atayal (Malaysian aboriginal) and Taiwanese village, a study of middle-class urban boys in the United States, Taiwan and Mexico, and two isolated villages in Turkey and Yucatan.

His work was influenced by Socrates, Kant, Dewey and in particular, Jean Piaget who inspired his cognitive-developmental approach to moral development. Lawrence Kohlberg accepted Jean Piaget's ideas of stage development and his belief in the child as a 'philosopher'. According to Lawrence Kohlberg, progress through stages of moral development is sequential, and is related to cognitive developmental stages. However, while a particular stage of moral development is dependent on a related stage of cognitive development, an individual's moral development may lag behind cognitive development. Research for example carried out by DeVries and Kohlberg (1977, cited by Kohlberg 1981) shows that 93% of 5-7 year olds tested who had passed a moral reasoning task at Stage 2 passed a corresponding task of logical reversibility. However, 52% of children who passed the logical task did not pass the moral task.

Kohlberg identifies three distinct levels of moral thinking, and within each of these levels, he distinguishes between two stages. Each of the levels and stages he regarded as having separate moral philosophies, which represent distinct views of morality (Kohlberg 1981, cited by Gilligan 1982).

1. The first level is called the Preconventional Level. At this level the individual uses cultural rules and labels of good and bad to judge moral problems and is influenced by the consequences of actions such as punishment, reward or reciprocal favours.

   Stage 1. The Punishment and Obedience Orientation.

   Moral decisions are based on avoiding punishment and following instructions from more powerful individuals.

Stage 2. The Instrumental Relativist Orientation.

At this stage the right course of moral action hinges on satisfying one's own needs and sometimes meeting the needs of others.

2. At the Conventional Level individuals make moral decisions that are based on conforming to expectations of the family social group and culture.

Stage 3. The Interpersonal concordance or 'Good Boy-Nice Girl' Orientation.

At this stage the individual makes moral decisions that are designed to please and help others and meet with their approval.

Stage 4. Society Maintaining Orientation.

Maintaining social order and the importance of fixed rules dominates moral reasoning at this stage.

3. Individuals operating at the Postconventional, Autonomous, or Principled Level, make moral decisions that are based on an objective recognition of moral values and principles apart from the authority of groups or personal circumstances.

Stage 5. The Social Contract Orientation.

A balance between the rights of an individual and agreed procedures and standards for society influence moral thinking at this stage. While an emphasis is placed on the 'legal point of view', laws are not always seen as immutable, but rather can be changed to rectify injustices.

Stage 6. The Universal Ethical Principle Orientation.

> At this stage the individual follows moral decisions based on self-chosen ethical principles that demonstrate universal principles of justice, an understanding of the reciprocity and equality of human rights and the dignity of human beings as individuals.

In carrying out his experiment, Lawrence Kohlberg presented his subjects with stories that concerned a moral dilemma involving the rights of an individual. The 'Heinz dilemma' is one such story, which was presented as follows:

> *"In Europe, a woman was near death from a very bad disease, a special kind of cancer. There was one drug that the doctors thought might save her. It was a form of radium that a druggist in the same town had recently discovered. The drug was expensive to make, but the druggist was charging ten times what the drug cost him to make. He paid $200 for the radium and charged $2,000 for a small dose of the drug. The sick woman's husband, Heinz, went to everyone he knew to borrow the money, but he could get together only about $1,000, which was half of what it cost. He told the druggist that his wife was dying and asked him to sell it cheaper or let him pay later. But the druggist said, "No, I discovered the drug and I'm going to make money from it." Heinz got desperate and broke into the man's store to steal the drug for his wife."*
> (Kohlberg 1981, p. 12)

Variations of this moral problem that were more culturally suited to subjects from other cultures were also presented. On the basis of replies to the question "Should Heinz have stolen the drug?" Lawrence Kohlberg assigned subjects to a particular level and stage of moral development. He found that females were likely to judge moral issues in terms of interpersonal relations and so they were developmentally fixed at Stage 3 of moral development. He suggests (Kohlberg and Kramer 1969, cited by Gilligan 1982) that women are only able to see the inadequacy of their moral perspectives if they become involved in male activities. Then they can progress to higher stages of development where relationships are subordinated to rules (Stage 4) and rules are subordinated to universal principles of justice (Stages 5 & 6). These early conclusions however were later modified by Colby *et al.* (1983, cited by Brabeck and Lerned 1997) who found that females were just as likely as males to

progress in sequential order through Lawrence Kohlberg's moral developmental stages.

4.7.4 Carol Gilligan's 'different voice' theory

Carol Gilligan (1982) has been particularly critical of the fact that Kohlberg carried out his research almost exclusively on males, and yet assumed from his limited research into female moral development that females were deficient in moral development.

Gilligan carried out a number of experiments interviewing people, discussing moral problems such as abortion, and posing moral questions. She found that using Kohlberg's moral development model, women do not reach as high a stage of moral development as males. However, she concludes that the 'male' 'rights and rules' based approach of reasoning which emphasises 'separation' is not necessarily superior to the 'female' 'morality of responsibility' which emphasises connection.

The transcripts of two eleven year old children, Jake and Amy who took part in one of Carol Gilligan's experiments can be used to illustrate her approach. Each of the children are described as being 'highly intelligent', 'bright and articulate', and at the time of the experiment they were participating in a course on 'Rights and Responsibilities'. In this experiment she presented the children with the Heinz moral dilemma. It is not clear whether Carol Gilligan presented the complete dilemma as presented by Kohlberg (1981, cited by Gilligan 1982) or whether she presented a modified version that excluded information on Heinz's' efforts to borrow money from friends and persuade the druggist to lower the price of the radium.

In response to the dilemma, Jake replied that Heinz should steal the drug because his wife's life is worth more than money. "For one thing, a human life is worth more than money, and if the druggist only makes $1,000, he is still going to live, but if Heinz doesn't steal the drug, his wife is going to die" (Gilligan 1982, p. 26). Jake recognised

that although Heinz would be breaking the law: "the laws have mistakes, and you can't go writing up a law for everything that you can imagine" (Gilligan 1982, p. 26). For this reason, even if he is caught stealing, a Judge would recognise his need to steal and "would probably think it was the right thing to do" (Gilligan 1982, p. 26). The Judge would also be likely to impose the 'lightest possible sentence' on Heinz (Gilligan 1982, p. 26).

Amy felt that Heinz should not steal the drug because, while he might save his wife, he also risked being sent to jail which would upset the wife, thus causing her to become more ill. She felt that the wife has a continuous need for Heinz, and the stealing of some drugs would represent a short-term solution to the problem. Instead, she felt that Heinz should talk to the chemist (druggist) and reach some solution. "if Heinz and the druggist had talked it out long enough, they could reach something besides stealing" (Gilligan 1982, p. 29). She also suggests that he should try to borrow the money from somebody. "I think there might be other ways besides stealing it, like if he could borrow the money or make a loan or something" (Gilligan 1982, p. 28).

Using Kohlberg's interpretations of stages in moral development, Gilligan found that Amy scored as a mixture of Stages 2 and 3, a full stage lower in maturity than Jake. Her responses were seen to demonstrate:

> *"a feeling of powerlessness in the world, an inability to think systematically about the concepts of morality or law, a reluctance to challenge authority or to examine the logic of received moral truths, a failure even to conceive of acting directly to save a life or to consider that such action, if taken could possibly have an effect."* (Gilligan 1982, p. 30)

Her belief that you can talk through any problem also appears to be naive and cognitively immature.

Jake scored as a mixture of Stages 3 & 4. His responses showed an ability to use deductive logic in solving moral dilemmas and he differentiated between morality

and the law, recognising that laws can make mistakes and can be changed. He saw that there are certain universal values in society which "allows one to know and expect others to recognise what is "the right thing to do." He therefore demonstrated "the principled conception of justice that Kohlberg equates with moral maturity" (Gilligan 1982, p. 27).

Carol Gilligan goes on to point out however that Amy's approach demonstrates her understanding of relationships, connections and shared responsibilities between people. Her judgments arise from "an ethic of care, just as Jake's judgements reflect the logic of the justice approach" (Gilligan 1982, p. 30). However, Lawrence Kohlberg's question presents two different moral questions to the two children, and so they are answered in two different ways. Jake tried to answer the question, "Should Heinz *steal* the drug?" while Amy answered the questions, "*Should* Heinz steal the drug?" Amy's responses and her 'different voice' "fall through the sieve of Kohlberg's scoring system" and so she is rated at a lower stage of moral development. Both approaches, the 'ethic of care' and the 'ethic of justice' are parallel developments in moral reasoning that are valid in themselves but display: "different modes of moral understanding, different ways of thinking about conflict and choice" (Gilligan 1982, p. 32).

Mary Brabeck and Ann Lerned (1997) have reviewed recent research into moral development that have not corroborated Carol Gilligan's conclusions. They cite a meta–analysis (Bebeau and Brabeck 1989) that found a high degree of similarity between male and female moral reasoning, and a longitudinal study (Colby *et al.* 1983) that found that female and males progressed similarly through the sequential order of development predicted by Kohlberg. Another meta–analysis (Walker 1984) failed to find consistent differences in males' and females' moral reasoning, while a subsequent meta–analysis (Walker 1986) found that gender accounted for only one-twentieth of one percent of the variance in moral reasoning scores. In addition they cite a meta–analysis by Thoma (1986) which looked at 56 research samples involving over 6,000 subjects and which found that education was 250 times more powerful in

predicting moral reasoning developmental levels than gender. Carol Gilligan herself seems to be moving away from her earlier hypothesis that females and males have unique and different moral ways of thinking. In a 1988 study that she carried out with Jane Attanucci, they acknowledge that the 'female' 'voice of care' and the 'male' 'fairness and justice' perspectives of moral thinking are both "constitutive of mature moral thinking" (Gilligan and Attanucci, cited by Brannon 1996, p. 133).

4.8 DIFFERENCES IN GENDER ROLES

Traditionally every society has used sex, to one degree or another, in allocating tasks, activities, rights and responsibilities. In some societies (for example, those with a traditional Moslem culture) the division of labour along gender lines is more rigid and polarised than in others (for example, in hunting and gathering social groups)

The view that women are more suited to child rearing and housekeeping duties and do not possess great intellectual abilities has been prominent in Western societies up to recently. This has influenced theories about gender differences and male and female capabilities. Roussel, an 18th century psychologist describes a woman as follows:

> *"she masters nothing, has no gift for the Fine Arts, and is incapable of creativity; [ ] Her imagination is too mobile for her to devote her study to the abstract sciences, but instead it renders her affectionate and gentle. "*
> (quoted by Czerniewska 1985, p. 7)

Stereotyped assumptions about the capabilities, characteristics and interests of females and males have usually led to the development of separate curriculums for girls and boys whenever educational programs have been established. Traditionally, the aim of education for girls has been to prepare them for marriage and motherhood, while boys have been prepared for work, fighting, jobs and careers. The 1963 Newsom Report, for example, concluded that: "the incentive for girls to equip themselves for marriage and home-making is genetic" (Czerniewska 1985, p.8).

Educational curriculum sex differentiation and the non-prioritisation of aspects of female education have contributed to a situation where world wide, women hold very few positions of authority and power and generally are economically worse off than males. For example, worldwide women hold 14% of administrative and managerial jobs (Webb 1995). They grow 80% of Africa's food but own virtually none of the land (Webb 1995). Women make up 70% of the world's poor, and two-thirds of the illiterate (Pearce 1995). They hold only 10 per cent of parliamentary posts, and are allocated less than a tenth of the world's bank credit. Globally, two-thirds of women's work is unpaid, compared to a third of men's work, and in every nation women work longer hours than men (Webb 1995). The United Nations Development Programme 1995 Report also points out that there is no country in the world where women fare better than men (Webb 1995).

The United Nations Development Programme 1995 Report (Pearce 1995) shows however, that except for parts of Eastern Europe and the former Soviet Union, the work of men and women is becoming more equal. It is also true that women in rich countries are generally further along the road to equality, than those in poor countries. Those women who are able to get a good education are also more likely to have an improved standard of living, and gain control of their own health and fertility, and their children's health and survival (Webb 1995).

4.8.1 Fear of success

A considerable body of research has found that although the average female gains as high, if not higher grades in many subjects as the average male, they do not expect to do as well as males in future examinations and have lower career expectations. Men tend to overestimate their future successes relative to their ability level, while females tend to underestimate their future performances (Hanson Frieze 1975). Sandra Acker (1977) in her study of female and male graduates of similar academic backgrounds and achievement levels found that men were more ambitious than women. Irene Hanson Frieze (1975) lists some of the research findings which show that males have

higher expectations for success than females. For example, high school boys anticipated better performances than their female classmates on addition tasks, verbal intelligence tests, and along with elementary level boys they chose more difficult tasks than girls. Meanwhile at college level, males had higher expectancies for success in solving anagrams and addition problems, and they expected to achieve higher grades in a statistics class. These findings could be important when it is remembered that how well you expect to do in a task appears to affect how you actually do perform the task. For example, when people were randomly assigned to high expectancy groups they tended to perform better than low expectancy groups (Tyler 1958, cited by Hanson Frieze 1975).

Looking specifically at graduate students, Sandra Acker (1977) has pointed out some of the problems that have, for traditional stereotyped reasons, affected women more than men. These problems include: – lack of role models and a supportive academic environment, multiple responsibilities which can involve considerable home and family commitments as well as academic commitments, the lack of child care facilities and part-time enrolment facilities and deference to their partner's career needs, which 'requires' "unhampered geographical mobility" (Acker 1977, p. 286). She points out that if a woman is to achieve 'success' she must:

> *"push temporarily to the back of her mind her probable belief that ultimately her own work will and should take second place to her husband's (or future husband's) career needs."* (Acker 1977, p. 297)

Martina Horner's theory (1969, cited by Brannon 1996) which proposes that women have a 'fear of success' or a 'motive to avoid success', has been suggested as an explanation for low female take-up of mathematical and scientific subjects at school and university and low presence of females in high status positions in many business, industry and professional careers. She presented women and men subjects with short story-lines, and asked them to complete stories based on these settings (Horner 1968, cited by Katz 1976). For example, they were provided with some short story lines such as, "Tom is looking into his microscope". Males were asked in another example

to write a story about a person called 'John' while females were asked to write about a person called 'Anne' who was very successful in their university studies. The story started in this way, 'At the end of first term finals, Anne /John finds herself/himself at the top of her/his medical school class.'

Martina Horner found that women often described negative consequences for the successful female medical student, while men predicted positive outcomes for the successful male medical student. 62.2% of her female subjects compared with only 9.1% of her male subjects predicted negative consequences for the successful medical student

From these data, Martina Horner suggested that women fear success and are anxious about success because it conflicts with their concepts and society's concepts of femininity. As a result:

> *"many achievement-oriented women, especially those high in the motive to avoid success, when faced with the conflict between their feminine image and developing their abilities and interest, compromise by disguising their ability and abdicating from competition in the outside world"* (1972, quoted by O'Leary and Hammack 1975, p. 226)

Some support for these hypotheses comes from the research of Hedwig Teglasi (1978) and Virginia O'Leary and Barbara Hammack (1975) who investigated traditional and non-traditional sex-role orientations among women. In general they found that females who were more traditionally orientated demonstrated higher levels of success avoidance behaviours than less traditionally oriented females.

Martina Horner proposes that women understand the negative consequences of success for females in this society, especially in male-dominated career areas. Women do not like competing, especially with men, and work better by themselves. Men on the other hand perform better in competition than on their own. For these reasons she concludes, women view competition and achievement in different ways than men and

these factors lead directly to female under-representation in high-status and male-dominated areas of activity.

Frances Cherry and Kay Deaux (1978, cited by Brannon1996) investigated 'fear of success' in both females and males. They found that depending on the gender appropriateness of the occupation presented in the story-line, both females and males demonstrated fear of success. Men for example, demonstrated awareness of the negative consequences of male success in a nursing school, but not for male success in a medical school. Fear of success was demonstrated by females in the case of medical school success, but not for nursing school success. As Linda Brannon points out, fear of success seemed to be related to: "misgivings about violating gender stereotypes related to occupations" (Brannon 1996, p. 315). Further support for this point of view was provided by Michele Paludi (1984, cited by Brannon 1996) who reviewed sixty-four studies in this topic and found that 49% of women and 45% of men demonstrated fear of success. David Tresemer (1976) in a review of nearly 200 studies investigating fear of success, did not find evidence to support the hypothesis of gender differences in this area. More recently, Nancy Henley in her general review of 'fear of success' concluded that "In sum, the hypothesis of gross gender differences in the fear of success, in any simple form, does not stand up under examination" (1992, p. 32).

4.8.2 Glass ceilings and glass escalators

The term 'glass ceiling' was first used in 1986 by Hymowitz and Schellhardt (cited by Roth Walsh 1997) in an article which they wrote for the Wall Street Journal, in which they described an invisible 'glass ceiling' that blocked women from attaining high work positions. Worldwide, an extensive range of research has shown that women are underrepresented in top business, technical, manufacturing and managerial positions and overrepresented in lower-paid, part-time and low status occupations. For example, the US Glass Ceiling Commission Issues Update, February 1996 (Women in Computer Science 1996) reports that in two surveys of 1000 firms women represented

7%-9% of senior managers. In a report on the position of women and men in the European Union (ECSC-EC-EAEC 1995) women are shown to have lower pay and higher levels of part-time work than men and to represent, for example, 90.4% of domestic service workers.

Christine Williams (1995) carried out a study of men working in the fields of nursing, elementary school teaching, librarianship and social work. Although Rosebeth Moss Kanter (1977, cited by Williams 1995) originally proposed that tokenism arising from numerical minority positions contributes to female marginalization, stereotyping and role entrapment, Christine Williams found this did not apply when males occupied minority positions in these occupations. Instead, men experienced the 'glass escalator effect' that moved them along an invisible 'up' escalator to higher pay and status than their female colleagues. Men were in fact elevated by their token status. She also found that stereotyped sex differentiation tends to occur when males enter occupations presently associated with females. So, for example, male nurses tend to be employed in 'high tech' areas of nursing such as intensive care and emergency room nursing or in areas which are viewed as requiring a high degree of physical strength such as psychiatric and orthopaedic nursing, while they are also overrepresented in administration. Even when men wish to remain in more 'feminine' speciality areas, they are pressured to accept job promotions to more 'masculine' areas of work. "Like being on an invisible "up" escalator, men must struggle to remain in the lower (i.e., "feminine") levels of their professions" (Williams 1995, p. 12).

The attractiveness of an occupation varies according to the proportion of females and males employed. Madeline Heilman (1979) found that males are attracted to already male dominated occupations and express interest in occupations that are predicted to have future female participation at the 10% to 30% level. They are not however, interested in careers that have a predicted 50% or more participation by females. Females tend to avoid occupations that are already male dominated, but are more attracted to these jobs when the predicted future female participation increases above the token level (10%).

The status of an occupation varies according to the proportion of females and males employed. In a longitudinal study of changing sex ratios in occupations (Gross 1967, cited by Touhey 1974b) increased participation by females in an occupation coincided with the departure of males from the same occupations. When the majority of workers in a field are female, the apparent 'professionalism' and image of these occupations change. This occurs even in occupations which within certain cultures and societies have high status. As Linda Mealey (1995) has shown in the case of doctors, when men form the majority of those employed as doctors, this profession is seen as a high-status job, but when women form the majority, the job attains low status. At this stage, males are often actively recruited to redress the balance and improve the 'status image' of the job. This is because as John Touhey's research (1974a;1974b) has shown

> *"occupational prestige and desirability may be directly related to the proportion of men that are expected to enter an occupation."* (Touhey 1974 p. 334)

Attributes such as increased activity, security, usefulness, success and wealth are more readily applied to occupations admitting additional men. On the other hand, female dominated occupations are less attractive to both males and females.

The author has proposed (Connolly 1997) that when members of one sex try to enter a field that is already dominated by the other sex, 'impeding' or 'promoting' mechanisms such as the glass ceiling and the glass escalator may operate. It is proposed that these mechanisms act as filters controlling access to these occupations, which helps to explain sex differentiation within occupations. (See Chapter 7)

4.9 LINGUISTIC DIFFERENCES BETWEEN MALES AND FEMALES.

As Deborah Cameron and Jennifer Coates (1990) point out, awareness of sex differences in language use stretches back into our folklinguistic heritage. However,

within this debatable area, contradictory arguments have been used both to prove and to disprove the existence of these differences.

One of the first linguists to identify sex differences in language use was Otto Jespersen (1922, cited by Aries 1987) who found that women used more refined, euphemistic and hyperbolic expressions, while men used more slang and 'innovative' language. Women were also found to be more likely to: "break off without finishing their sentences, because they start talking without having thought out what they are going to say" (Aries 1987, p. 149). Since then a wide range of research has investigated sex differences in various areas of linguistic speech styles and forms.

4.9.1 Cross-cultural research into sex differences in phonology and grammatical variation

Janet Holmes has reviewed cross-cultural research which indicates that "[w]omen and men do not speak in exactly the same way as each other in any community" (1992, p. 164). She reports on research into the language of the Amazon Indians, where men must marry outside their own tribe and each tribe is distinguished by a different language. As a result, females and males in this society speak different languages. Among the Gros Ventre American Indian Tribe of Montana and speakers of Bengali in India, pronunciation differences between the sexes are reported. Sex differences have also been found in the use of affixes and suffixes placed on words. For example, female and male forms of words have been identified in Yana (a North American Indian language), Chiquita (a South American Indian language) and Japanese.

4.9.2 Sex differences in adoption of prestige standard and vernacular speech forms

Sociolinguistic research in the USA, Britain, and other western industrialised countries indicates that on average, females tend to use more prestige standard forms of speech than males, who tend to use more vernacular forms. (There are some

exceptions however, illustrated by research reported by Janet Holmes (1992) on a small Welsh mining community called Pont-rhyd-y-fen and Brazlândia, a satellite city of Brasília, where the women use more vernacular forms than men.) In general however, the tendency for females to use standard forms and males to use vernacular forms is found, even in children as young as six years old (Holmes 1992).

These findings have led to a wide range of research which has investigated 'why women use more prestige standard forms of speech than men'. As Janet Holmes points out, an equal or indeed more valid question could be, 'why men do not use more prestige standard forms of speech' Somehow, men's speech is taken as the 'norm' and explanations must be offered to explain why women use standard forms and are therefore different from men.

Vernacular forms have macho connotations of masculinity and toughness (Mills 1995). Peter Trudgill, from his study of a working-class community in East Anglia, suggests that vernacular forms confer 'covert prestige', while standard forms confer 'overt prestige' (Trudgill 1972, cited by Mills 1995). Among the Norwich men whom he interviewed, those who were judged to be most likely to win in a street fight used the highest levels of vernacular forms. Similarly, Jenny Cheshire, found that among the adolescent girls and boys whom she studied, the boys who used vernacular forms most frequently, had the highest scores on a scale based on toughness (Cheshire 1989, cited by Holmes 1992).

Men in Peter Trudgill's sample, were likely to claim that they used more vernacular forms than they actually did, which indicates that vernacular speech was valued positively. While Peter Trudgill believed that vernacular forms were associated with the working-classes and masculinity, this association was not extended to include femininity. Working-class women are seen to be "*outside working-class culture*" (Cameron and Coates 1990, p. 17) (author's own italics). In contrast, Janet Holmes (1992) suggests that standard forms of speech tend to be associated with femininity and female values. In our 'genderised' society she suggests that boys may react

negatively to the influence of the "overly influential female norms" displayed by, for example, female teachers and, as a result they adopt "a preference for vernacular forms" (Holmes 1992, p. 175).

While it is generally accepted that females do display a higher level of standard speech forms than males, arguments rage over possible causes and origins of this sex difference. However, Janet Holmes (1992) suggests that factors associated with the actual experiment and the experimenter may be influencing data and their interpretations.

4.9.2.1 The influence of the researcher

As Janet Holmes (1992) has pointed out most researchers are middle-class, well-educated academics. If people wish to be co-operative with people whom they are speaking to, they tend to accommodate themselves to the speech of that person. Since females tend to be more co-operative as conversationalists than males, they, therefore, would be likely to adopt standard forms of speech when being interviewed by researchers. Males on the other hand may tend to be less responsive to the conversational needs of others, and working class males may even adopt more vernacular forms "to distinguish themselves from the interviewer", or as a reaction against the 'middle-class' 'academic' speech style of the researcher (Holmes 1992, p. 177).

4.9.2.2 The sex of the researcher

Many early dialectologists were male, and so as Janet Holmes explains, the context for female and male subjects was different. While males may have felt more comfortable talking to another male, and may have felt a degree of male solidarity, females were being interviewed "by a male stranger, a highly educated member of the dominant group in the society" (Holmes 1992, p. 178). She reports on one social dialect survey in which the male interviewers asked the male subjects questions that

differed from the female subjects. The women were asked about their childhood games and skipping rhymes, while the males were asked about fights, terms for girls and in some cases terms for a girl's sexual organs. In this situation it was not too surprising that the males used more vernacular speech forms than the females.

> *"With the best will in the world, it seems unlikely that a discussion of skipping rhymes could induce the rapport of two men talking about smutty words"* (Holmes 1992, p. 178)

4.9.2.3 The influence of the context

In general terms, people use standard forms of speech in formal rather than in informal situations. According to Janet Holmes (1992) when people meet in 'formal' situations and do not know each other very well, they adopt speech forms that conform to their perceived social status and roles. In this way for example, the customer and shopkeeper, the teacher and pupil, and the interviewer and interviewee speak in ways that reflect their social roles, rather than relating to them as individuals. Given the 'lower' status of females within society in general, and particularly during the periods when early linguistic research of this type was being carried out, it is possible that the females interviewed may have been sensitive to the formal context of the interview and adopted standard forms of speech which reflected their social distance from the researcher.

4.9.3 Theories concerning sex differences in the use of standard and vernacular speech forms

4.9.3.1 Conservatism

This explanation suggests (debatably) that females are more conservative than males in many areas of functioning and that this conservatism extends naturally to language. Otto Jespersen for example, proposed that women do not make innovations in language due to their 'conservatism and modesty', while he praised men for inventing "new fresh expressions" (Jespersen 1922, quoted by Cameron and Coates 1990, p.14).

It is not clear however, whether females can be categorised as linguistically 'conservative'. As Deborah Cameron and Jennifer Coates (1990) point out, while many dialectologists in their research used females as subjects because they believed that they were more conservative than males and so were reliable informants, others such as Gilliéron in France and Orton in England believed that women were not good informants because they were not conservative. Research in linguistic communities in Belfast and Edinburgh (Cameron and Coates 1990) has shown that women were involved in linguistic change when it was in the direction of the prestige standard. Females also demonstrate more evidence of patterns of 'styleshift' which further contradicts the supposed conservatism of females (Cameron and Coates 1990).

4.9.3.2 Social status

William Labov (1972) and Peter Trudgill (1974, cited by Cameron and Coates 1990) propose that linguistic differences arise due to social stratification. According to Peter Trudgill (1983, cited by Deuchar 1990) females use more standard forms because they are more status conscious. Prestige standard speech forms are usually associated with high social status. Since many of the women whom he surveyed were not employed outside the home, he suggested that females are often rated more by how they appear, than by what they do and pronunciation forms a component of that appearance. They also do not acquire a 'ready-made' status from paid employment and so adopt this style of speech to compensate for their undefined or low status. "Their sensitivity to linguistic norms is associated with the insecurity of their social position" (Cameron and Coates 1990, p. 15).

Research findings however, do not support this hypothesis. Janet Holmes (1992) reports on an American study that compared the speech of women in service occupations who were working in garages and hotels, with the speech of women working at home. This study found that those in paid employment used more standard speech forms while those working at home used more vernacular forms. She also reports that the same types of results were found in a study of Ballymacarrett, a

working-class community in Belfast. In this case women who worked outside the community used a higher percentage of linguistic features that were associated with high status than the older women who were working at home.

4.9.3.3 Face and Power

Margaret Deuchar (1990) offers another explanation for the greater use of standard speech by females, using Brown and Levinson's model of politeness and their theories of 'face and power' (Brown and Levinson 1978, cited by Deuchar 1990).

'Face' has been described by Brown and Levinson as: "the public self-image that every member wants to claim for themselves" (1978, quoted by Deuchar 1990, p. 29). According to this theory, people have two 'faces', a positive one which seeks approval and a negative one which desires freedom of action and freedom from imposition. 'Power' is described as "an asymmetric social dimension of relative power" (Brown and Levinson 1978, quoted by Deuchar 1990, p. 29). When an interaction takes place, the speaker and addressee may vary in relative power.

Augmenting Brown and Levinson's theories, Deuchar (1990) proposes that the following four assumptions must be made in order to explain females' greater use of standard speech.

1. Participants in an interaction wish to protect their own face.

2. Attention to the other's face is affected by relative power in relation to the other.

3. Attention to the other's face may involve damage to one's own.

4. Women have less relative power than men.

Central to these theories is the assumption that subordinate or relatively powerless individuals will be polite. As Janet Holmes points out, "Children are expected to be polite to adults. Women as a subordinate group, it is argued, must avoid offending men – and so they must speak carefully and politely" (1992, p. 173). 'Subordinate' people must also pay attention to the 'face' of others by, for example, apologising for interrupting them. To make such an apology involves using 'negative politeness', which threatens the speaker's own face through an admission that the speaker is at fault in some way. Deuchar (1990) suggests that females, as relatively powerless speakers, adopt upward accent convergence speech forms that move towards the standard, thereby protecting the speaker's face (by presumably raising her own social status) while at the same time not threatening the addressee. This theory of course assumes (debatably) that the female is speaking to an addressee who has higher and not lower status.

4.9.3.4 Sex differentiated standards in speech

It has been suggested that sex differences in the use of standard and vernacular forms of speech arise because higher standards, including linguistic standards, are expected from girls rather than from boys. Katherine Clarricoates for example, reports the comments of one teacher who said: "I expect a high standard of behaviour from my girls and fighting and swearing is totally inexcusable" (1980, p. 33). Janet Holmes (1992) points out that society expects women to speak more correctly and standardly than men, especially when they are dealing with young children and therefore serving as models for their speech.

4.9.3.5 Solidarity

According to the 'solidarity 'explanation offered by for example, Lesley Milroy (1980, cited by Cameron and Coates 1990) a tight-knit network is an important mechanism in language maintenance. Working-class male networks are assumed to be 'tighter' than those of females and so this maintains vernacular norms. Deborah

Cameron and Jennifer Coates (1990) criticise the criteria which Lesley Milroy used to define networks. They believe that these criteria, assuming as they do, participation in paid employment and clearly demarcated work and leisure periods, reflect a male life-style pattern. When these criteria can be applied to females, they apply only to women who adopt 'male roles', and do not allow for parallel criteria which recognises the conditions under which many females in the sample group lived. For example, degrees of multiplexity within networks depended on working in the same place as at least two members of the group, and spending leisure hours with these workmates. Women who did not have paid employment outside the home or whose family commitments prevented them from enjoying flexible leisure time, were automatically categorised as participating in 'loosely-knit' networks. As Deborah Cameron and Jennifer Coates say:

> *"Women and men differ in their speech patterns, that is agreed; but a scoring system that throws the differences into relief by giving women low scores unless they take on male roles may be skewing our understanding of sex-linked speech patterns."* (1990, p. 21)

4.9.3.6 Educational, work and social aspirational factors

One of the problems with the earlier linguistic research of for example, Peter Trudgill, and William Labov is their reliance on occupation as an indicator of social class. In these studies females were categorised according to their husband's or father's occupations. Therefore, although females may have had a better job or more education than their husbands or fathers, the male status dictated their status and so miscategorisation may account for higher prestige standard speech forms among females. Research which indicates that a discrepancy in educational attainment levels may be a factor in explaining this sex difference was carried out by Marie Haug (1973, cited by Cameron and Coates 1990). She found that more than 50% of the young and middle-aged working class women in her study of working couples had higher levels of education than their husbands.

Another factor that may account for sex differences in speech forms is social ambition, which one study (Douglas-Cowie 1978, cited by Holmes1992) suggests is a better predictor of linguistic behaviour than occupation or educational levels. The results of this study indicate that unless an individual has a very high level of educational experience, for example, to university level, linguistic behaviour is: "clearly related to social ambition rather than [ ] social status in traditional terms" (Douglas-Cowie 1978, quoted by Holmes 1992, p. 19).

Patricia Nichols (1983, cited by Cameron and Coates 1990) in her study of changing speech patterns among two Black communities in South Carolina suggests that 'market forces' affect speech forms. She found that young women were moving into new jobs within white collar and service job areas that required and encouraged the use of standard English, and brought the employees into contact with people who spoke in this way. Older women who were employed within domestic and agricultural job areas, and men who were employed in the construction industry, used a low-prestige variety of English called 'Gullah'.

4.9.4 Sex differences in speech styles

4.9.4.1 Female hesitant speech

A great deal of research in linguistic 'gender' differences has been triggered by Robin Lakoff's book entitled, *Language and Women's Place* (1975, cited by Cameron *et al.* 1989). In this book she suggested that females demonstrate a hesitant style of speech that is marked by a number of linguistic features. Janet Holmes summarises these features as follows:

(a) Lexical hedges or fillers, e.g. you know, sort of, well, you see.

(b) Tag questions, e.g. she's very nice isn't she?

(c) Rising intonation on declaratives, e.g. its really good.

(d) 'Empty' adjectives, e.g. divine, charming, cute.

(e) Precise colour terms, e.g. magenta, aquamarine.

(f) Intensifiers such as just *and* so, *e.g.* I like him so much.

(g) 'Hypercorrect' grammar, e.g. consistent use of standard verb forms.

(h) 'Superpolite' forms, e.g. indirect requests, euphemisms.

(i) Avoidance of strong swear words, e.g. fudge, my goodness.

(j) Emphatic stress, e.g. it was a BRILLIANT performance.

Source: (Holmes 1992, p. 314)

Robin Lakoff proposed that these linguistic features weaken the force of statements and create the impression that women are weak, unassertive, and lacking in authority. According to Robin Lakoff, women are born into a male-dominated society. They are therefore trained to avoid linguistic styles that are assertive, authoritarian and forceful and which imply masculine qualities. They must instead conform to female norms and use a subordinated, 'nonforceful' linguistic style.

4.9.4.2 Powerless language

Robin Lakoff based her hypothesis on anecdotal observation and personal intuitions rather than on empirical research. It has been left to other researchers to try to prove or disprove the Lakoff hypothesis.

- Some researchers have found evidence which supports Lakoff's hypothesis and shows that women's speech is less assertive and more polite than that of men (Crosby and Nyquist 1977, cited by Bellinger and Berko Gleason 1992; Haas 1979, cited in Bellinger and Berko Gleason 1992).

- Research findings that contradict Robin Lakoff's hypothesis however have been provided by other researchers. For example, one study on the use of tag questions at an academic conference (Dubois and Crouch 1975, cited by Cameron *et al.* 1989) found that men used more tags than women. According to other researchers (O'Barr and Atkins 1980, cited by Cameron *et al.* 1989) hesitant-style speech indicates 'powerless' language rather than women's language per se. They examined hedges, intensifiers, tag questions and exaggerated polite forms used by witnesses in a courtroom, and scored subjects for each of these linguistic features. They concluded that the status of a person, and their level of experience with courtroom procedures determined the level of 'hesitant' speech. Some professional women who were expert witnesses scored lower than some men. High-scoring women tended to be unwaged 'housewives' or to be employed in low-status work. Deborah Cameron and her colleagues (Cameron *et al.* 1989) have queried Robin Lakoff's assumptions that tags are necessarily a sign of weakness and subordination. They found that tag questions can be used in asymmetrical discourses between, e.g. a doctor and patient, a boss and employee, and can instead be viewed as a marker of power and control in the conversation. For example, 'You didn't try very hard, did you?'

It therefore becomes obvious that Robin Lakoff's simplistic explanations are questionable, and arise from debatable assumptions that women will tend to assume subordinate and facilitative positions within discourses. The wide range of differing interpretations of even just one linguistic device such as tag questions, demonstrates the subjective nature of interpretation of discourse by researchers. It must also be recognised that women do not form a homogeneous group, and that factors apart from

gender such as status, and changing roles within situations and during conversational exchanges, need to be taken into account when looking at individual conversations.

4.9.4.3 Cultural difference theories

Some theorists, for example, Eleanor Maccoby (1990) and Jennifer Coates (1986) believe that females and males have different linguistic styles because from early childhood they receive gender-specific socialisation training from parents and society at large and are schooled, play and work within gender-specific sub-culture groups. David Bellinger and Jean Berko Gleason for example, found that parents provide sex differentiated modelling in the use of imperatives and directive speech to their children, with fathers using these patterns more than mothers. They found that by four years of age, the children were using "directive forms with frequencies very similar to those of their same-sex parent" (Bellinger and Berko Gleason 1992, p. 318).

A number of research findings indicate that when children start school and join peer groups, they appear to receive further reinforcement in sex-differentiated linguistic styles. Research indicates for instance that within girl peer groups, girls used speech to (a) create and maintain relationships of closeness and equality (b) criticise others in acceptable ways, and (c) interpret accurately the speech of other girls. On the other hand within boy peer groups, boys used speech to (a) assert their position of dominance (b) attract and maintain an audience, and (c) assert themselves when others have the floor (Maltz and Borker 1982, cited by van Alphen 1987). The sex segregated play groups of children are believed to socialise children so that they acquire "distinctive interaction skills that are adapted to same-sex partners" (Maccoby 1990, p. 516). These 'distinctive interaction skills' can be seen in further research carried out by Daniel Maltz and Ruth Borker (1983, cited by Maccoby 1990) and summarised by Eleanor Maccoby. They found that boys in all boy groups were more likely than girls to:

> *"use commands, threats, or boasts of authority; refuse to comply with another child's demand; give information; heckle a speaker; tell jokes or suspenseful stories; top someone else's story; or call another child names." Girls in all girl groups were more likely than boys to: "express agreement with what another speaker has just said, pause to give another girl a chance to speak, or when starting a speaking turn acknowledge a point previously made by another speaker."* (Maltz and Borker 1983, cited by Maccoby 1990, p. 516)

Some researchers propose that as females and males grow older they continue to use these types of sex-differentiated speech styles, so that by adulthood they are seen to have two very different ways of communicating. Jennifer Coates (1986) identifies some of the differences in the speech styles that she believes, distinguishes the speech of females and males.

> *" men typically adopt a competitive style in conversation, treating their turn as a chance to overturn earlier speakers' contributions and to make their own point as forcibly as possible. Women [ ] in conversation with other women, typically adopt a co-operative mode: they add to rather than demolish other speakers' contributions, they are supportive of others, they tend not to interrupt each others."* (Coates 1986, p. 11)

Because females and males are believed to experience different types of speech communities, some theorists suggest that they develop different 'worldviews' (Mulvany 1994) and ways of thinking (Gilligan 1982; Goldberger 1997). Cross sex communication therefore becomes: "a form of intercultural communication" (Mulvany 1994).

Among those researchers who accept that there are real differences in the communication styles of females and males, two different approaches have been suggested to account for these differences. They have been called the 'dominance' approach and the 'cultural' approach (Tannen 1996).

4.9.4.3.1 The 'dominance' approach

Researchers who adopt this approach believe that many misunderstandings and problems that occur in conversations arise from unequal levels of power or dominance between the participants. Studies of power differences between employers and employees, teachers and pupils, dominant and sub-dominant ethnic or other groups have been examined using this approach. For example, Deborah Cameron and her colleagues (Cameron *et al.* 1989) report on a study (Goodwin 1980) which examined directives among Philadelphia single-sex peer groups. Boy groups were found to be organised along hierarchical line, in which the status of an individual boy was reflected in directive use. Those who were dominant members of the group used directives such as "Gimme the pliers" while subordinate members avoided these forms completely (Goodwin 1980, cited by Cameron *et al.* 1989, p. 79). Girl groups were organised in a more egalitarian manner, and they used less direct commands, favouring instead 'suggesting' moves utilising words such as "let's" (Goodwin 1980, cited by Cameron *et al.* 1989, p. 79).

Many studies have examined the (debatable) way in which males tend to 'dominate' females, who are seen to be 'sub-dominant' within our society. One area where males are seen to 'dominate' females is in the area of interruptions. There is evidence, even from an early age, that girls are interrupted more frequently than boys. Esther Blank Greif (1992) found that within families, fathers were more likely to interrupt their children and to use simultaneous speech, while both parents used these linguistic strategies more frequently with their daughters than with their sons.

> *"The message to girls is that they are more interruptible, which suggests, in a subtle way, that they are also not very important, or at least less so than boys. [and again] Children are learning from observations that males and females behave differently, and that males are more dominant."* (1992, p. 326)

Don Zimmerman and Candace West (1977, cited by Lott 1987) carried out research in which they recorded private conversations in coffee bars, shops and other public

places. They found that in same-sex interactions interruptions were evenly divided between the speakers, but in cross-sex interactions however, males carried out 96% of the interruptions and 100% of the overlaps.

Research findings indicate that in mixed sex conversations males tend to interrupt females, drop or ignore their topics (Fishman 1978; 1980; 1983, cited by Aries 1987) adopt topics of interest to themselves, talk more than females (Spender, 1980) and produce long sentences in order 'to hold their floor', known as the 'Wurmsentence' Syndrome (Zumbügl 1984, cited by van Alphen 1987). All of these conversational characteristics have been taken as evidence that males wish to 'dominate' females and keep them silent and 'in their place' (Spender 1994). According to Dale Spender, "in a sexist society, almost any talk a woman engages in can be considered too much!" (Spender 1980, p. 148).

Dale Spender's definition of an 'interruption' reflects her belief that males basically wish to dominate and suppress females (Spender 1994). She describes an interruption as "a mechanism by which (a) males can prevent females from talking, and (b) they can gain the floor for themselves; it is therefore a mechanism by which they engineer female silence" (Spender 1994, p. 44). From this point of view, males, like other 'superiors', feel free to talk and interrupt females, while females from their sub-dominant position in society, enable this to occur.

> *"Males, in the patriarchal order, are accorded 'superiority' by virtue of their sex; they have this 'superiority' consistently confirmed in interaction with females who abdicate in favour of males by restricting their own opportunities for expression, by deferring to male interests and definitions, and by concentrating on supporting male efforts."* (Spender 1994, p. 49)

This type of approach is similar to that originally taken by Robin Lakoff (1975). She believed that the male-domination of our society forced females to adopt a 'feminine' style of speech and "display the 'feminine' qualities of weakness, passivity and deference to men" (Cameron *et al.* 1989, p. 76). Females learn to avoid the type of

assertive and forceful styles of speech used by males, although they can learn to 'code-switch' like other 'subdominant' individuals and so use a more 'masculine' interactive style, when, for example, they are in a work, business or political environment. However, while some researchers believe that females and males develop 'different' styles of speech because they spend long periods during childhood playing in single-sex groups, Robin Lakoff, suggests that these differences arise because the two sexes, "live in close contiguity, which constantly causes comparisons and reinforces the need for polarization – linguistic and otherwise" (1990, p. 202).

4.9.4.3.2 The 'cultural' approach

The 'cultural' approach recognises that dominance, whether by race, status or gender may be an issue in problematic conversational encounters. However it does not assume that individuals necessarily approach conversations with the intention to dominate. "The effect of dominance is not always the result of an intention to dominate" (Tannen 1996, p. 10). This approach therefore examines other alternative sources of misunderstandings apart from dominance, which arise from various 'cultural' differences between individuals.

John Gumperz (1982a, cited by Tannen 1996) has been instrumental in developing the field of 'interactional sociolinguistics'. This approach recognises the interactional nature of conversation and the interactive consequences of differences in cross-cultural and cross-gender communication styles.

Daniel Maltz and Ruth Borker (1982) whose work is reported by Deborah Cameron *et al.* (Cameron *et al.* 1989) suggest that women and men have different discourse norms. They give an example of minimal responses such as 'mmm', 'uh-huh', which females use more than males. They suggest that females take these responses to mean "I hear you" while males use them when they mean "I agree with you" (Maltz and Borker 1982, cited by Cameron *et al.* 1989, p. 80). Since females and males regard these responses in different ways they tend to misinterpret each other, which can

cause communicative breakdown (Maltz and Borker 1982, cited by Cameron *et al.* 1989).

Deborah Tannen (1990; 1996; Cohen 1991) has written widely on 'subcultural' differences in linguistic styles between the two sexes and between conversationalists from different ethnic backgrounds, social class, geographical regions and age groups. Although she recognises that in some conversations, participants may use dominance strategies to exert power or control over other participants, she also acknowledges the ambiguous and polysemous nature of many linguistic strategies. "[I]ntention and effect are not always synonymous, and [ ] there is never an enduring one-to-one relationship between a linguistic device and an interactive effect" (Tannen 1996, p. 20). She believes that a linguistic strategy that, in one context. is interpreted as indicating an exercise of dominance, may actually have been intended as an attempt to establish rapport, or visa versa. This occurs because: "power and solidarity are bought with the same currency: The same linguistic means can be used to create either or both" (Tannen 1996, p. 24).

The dichotomous nature of research into sex differences in communication within western societies has led to the situation where linguistic styles are interpreted in a polarised manner. If, for example, the linguistic style of females is believed to be hesitant, and non-assertive, males are seen as assertive and dogmatic, and when females are believed to use more prestige speech, males are believed to use more vernacular forms.

Deborah Tannen carried out research that highlights dichotomous linguistic styles that are not based on sex categorisation but on regional categorisations. She carried out an analysis of the conversations that took place at a Thanksgiving dinner party and at which three guests were from New York Jews, two Californians and one from England. From this evidence she identified two distinct conversational styles. The first style she called 'High Involvement' and it is typical of the New York Jews who were present at the party. They talk with enthusiasm and passion, argue with others

and interrupt frequently. They use fast-paced, overlapping questions which she describes as 'machine-gun questions' and which she interprets as a show of interest and rapport. She classifies herself as a High Involvement person. The second conversational style is called 'High Consideratedness'. These people listen attentively to what others have to say, do not interrupt or argue, or intrude by asking personal questions. Deborah Tannen points out that each of the styles reflects different cultures.

Cultural variation in the length of inter-turn pauses can cause misunderstandings, since for example, the inter-turn pause expected by a New Yorker will be different from that expected by a Finn. To a Highly Considerate speaker, High Involvement speakers seem to be aggressive show-offs. However, to the Highly Involved, the Highly Considerate do not seem considerate at all but instead seem aloof, unfriendly and cold. Cultural variation in these cases can result in misunderstandings. She does not however, imply that either of the styles is inferior to the other.

Although Deborah Tannen suggests that these two styles represent two different cultures, she also acknowledges that the styles are context dependent. She suggests for example, that there will be situations where a High Considerate speaker could be viewed as a 'High Involvement' speaker, if they were communicating with an individual who had a much slower style of speaking. Likewise a High Involvement speaker may be classified as a High Considerate speaker if they 'cannot get a word in edgeways' during a conversation with a more vocal, faster talking individual. However, it is interesting that with some modifications the High Involvement style could be interpreted as a typical 'male' style of discourse and the High Consideratedness style as a typical 'female' style of conversation.

Deborah Tannen (1991) has further defined speech patterns into two styles of discourse (a) the 'rapport' style which is a co-operative, intimate style and occurs when people either are already, or are trying, to get close, and (b) the 'report' style which is based on information giving, making statements, and asserting oneself.

Again, it is possible to identify the rapport style with a typical 'female' style and the report style with the typical 'male' style of communication. Indeed, Deborah Tannen did find that men were more likely to engage in a report style of discourse and women to adopt a rapport style. Tannen's work in this area is therefore of interest because it offers another, more general interpretation of differences in discourse apart from purely gender interpretations.

4.10 CONCLUSIONS

- The large degree of overlap between the sexes in the measurement of characteristics, skills and behaviours is frequently ignored and instead emphasis tends to be placed on data that confirm 'differences' between the sexes. These 'differences' may be termed 'significant' even if there is only a very small difference between the scores of females and males.

- The reliability of gender difference data is often questionable since the tools used to measure 'differences' can vary and produce data which support opposite points of view, and in addition, over time a sex advantage in an area can 'fade'.

- The effects of different socialisation and training practices on performance in tests also highlight the insecure nature of many gender difference findings.