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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5. PRESENT AND HISTORICAL DEVELOPMENT OF COMPUTERS, THE INTERNET AND TECHNOLOGY

5.1 INTRODUCTION

In this generation, media such as TV, cinema, newspapers and radio have been responsible for major cultural and social changes. As Marshall Mc Luhan points out, "The use of any kind of medium or extension of man alters the patterns of interdependence among people" (McLuhan 1964, p. 90). Many people believe that the Internet will be the main medium for cultural and social transformation in the 21st century. The Internet and computer-mediated communications (CMC) are now the most rapidly growing areas of communications. For example, in 1996 it was estimated that there were between 16 and 40 million Internet users. Currently the total number of Internet users could be as high as 112 million (Nua 1998). With nearly 30 million domain names[6] registered on the Internet, there are now not enough strings of letters, words or numbers to meet the demand for new sites. (Ward 1998) (See Appendix A which shows a graph of domain names growth from 1981 to 1998)

It is generally assumed that the Internet is inherently more democratic than other communication media since it provides equal opportunities for communication between women and men in the absence of status and gender-marked cues. However, current research by the Graphics, Visualization and Usability Center (1994a; 1994b; 1995a; 1995b; 1996a; 1996b; 1997a; 1997b) and others, highlights a major problem, which is that women represent between 10% – 38% of Internet users.

[6]Computers access Internet web pages by recognising a series of specific numbers which identify a particular site. Internet users however, find it more difficult to deal with long strings of numbers than they would with a name such as 'weather'. Individuals, groups and companies can therefore register their own 'domain name' The domain name is preceded by **www.** and it is followed by **.com, .org, .edu** or **.net** depending on the particular business or characteristics of the registering individual or group. In this way the Internet user can use an easily remembered domain name to access the required site quickly.

In order to investigate the factors that could contribute to this situation, this chapter will look at genderization processes affecting aspects of science and technology, with particular reference to computer technology and the Internet. The effectiveness of CMC as a medium of communication will then be examined. Over the last 20 years, the development of research into discourse analysis has highlighted 'gender' differences between oral communicators. Discourse analysis has recently been extended to CMC and so the significance of gender differences in Internet discourses along with other factors that may be contributing to female under-representation on the Internet will also be examined.

5.2 THE DEVELOPMENT OF COMPUTER TECHNOLOGY

The ideas and inventions of many individuals have contributed to the evolution of the computer as we now know it. While along the way inventions such as the punched card or vacuum tube were used for a while and than discarded, they formed temporary developmental platforms from which new ideas sprang.

5.2.1 Mechanical calculating devices

Computer technology had its origins in the early mechanical devices used for numerical calculations. The earliest of these devices was the abacus, which was devised by the early Babylonians about 5,000 years ago and is still in active use today by business people and accountants in central Asia, and particularly in China, Japan and Russia. In 1642 Blaise Pascal the French scientist-philosopher invented a machine which had a series of ten-toothed wheels with each tooth representing the numbers from 0 to 9. It could carry out basic operations in addition and subtraction with up to eight columns of digits. Gottfried Wilhelm von Leibniz, the German philosopher and mathematician, developed a more advanced version of Pascal's machine that was known as the 'Stepped Reckoner'. As well as carrying out addition and subtraction, it could also carry out multiplication and division and it could be used to calculate square roots.

5.2.2 Punched Cards

The next key discovery in the development of computer technology, involved the use of punched data cards. The first mechanical device that used pre-programmed cards (or in this case thin wooden boards) was the Jacquard Loom which was invented by Joseph Marie Jacquard in the early 1800's. His invention was used to produce the complicated Damask patterns on silk tablecloths. A space was punched or not punched in a board for each warp thread position. When each board was fed through the Jacquard head, the presence or absence of a hole determined whether a warp was raised or lowered.

The Jacquard Loom acted as an inspiration for Charles Babbage the 19th century British mathematician and inventor who was commissioned by the British government to develop a device to calculate the rise and fall of the tides. He designed the 'Analytical engine' which had an array of gears, levers, and counter wheels. The engine design had a data input stream in the form of punched cards, a 'store' for saving data, a 'mill' for arithmetic operations, and a printer to produce a permanent record of the calculations.

Augusta Ada, Countess of Lovelace, worked closely with Babbage and is credited with developing a binary system of programming and with becoming the world's first computer programmer. She also translated and annotated an article on the Analytical Engine written by an Italian mathematician, L.F. Menabrea, adding many explanatory notes of her own. Due to limitations in the technical skills of the artisans of the time, Babbage never succeeded in building his full-size Analytical Engine, which is recognised nowadays as a forerunner of the modern computer. It was left to others to prove that Babbage's machine could work, and could actually carry out addition, subtraction, multiplication, division and many other types of calculation. A number of small-scale and large-scale models were successfully completed, notably by the Swedish engineer, Pehr Georg Scheutz, who displayed a full scale model of the Analytical Engine at the Paris Exposition of 1855.

The punched card system used originally in the Jacquard Loom and Babbage's machine was brought a step further by Herman Hollerith who was an engineer working for the U.S. Census Office. He was asked to design calculating machines which could be used during the 1890 Census. He designed machines that could 'read' punched cards by passing them through electrical contacts. Closed circuits indicated the hole positions and these were then counted. The cards could hold up to 288 holes. The Census handled information from 63,000,000 people and his machines were so successful that they were soon being used world-wide both by governments and industries. In 1896 Hollerith formed the Tabulating Machine Company that was eventually to develop into the International Business Machines Company (IBM).

5.2.3 Switch-based computing machines

Early calculating machines used gears, wheels and levers to carry out calculations. The development of punched cards with their on/off, punched/ or not punched systems led to the use of binary switch-based machines. In 1941 in Germany, Konrad Zuse, a military aircraft engineer designed the first fully functioning digital computer called the Z3. It was made from surplus telephone exchange relays and its logical operations were alterable by switching among the relays.

Between 1939 and 1944 in Harvard University, IBM, under the direction of Howard Aiken, built a machine called the Automatic Sequence Controlled Calculator or Mark 1. The Mark 1 was a relay computer similar to the Z3, which meant that it was slow and noisy and consumed a great deal of power. It contained more than 750,000 parts, and its components were mostly mechanical. It had 3,304 on-off switches, and punched cards or punched tape was used to supply input data. The machine performed calculations for the Manhattan Project, which was involved in the development of the atomic bomb.

5.2.4 Vacuum tubes

In 1939 John Atanasoff built the first vacuum-tube computing device. Vacuum tubes were a major advancement on the mechanical devices used in early calculating machines. However, they also caused problems since they were prone to over-heating and often burned out, making the operation of the machine unreliable.

During World War Two Germany developed electro-mechanical Enigma machines to transmit top secret messages. Paul Strathern (1997) has described how these machines worked. Two machines were used to send and receive messages. The sending machine was set to a key, the message was typed in, and was automatically scrambled initially by three and later by up to twelve independently spinning electric rotor arms that were capable of carrying out billions of permutations. The receiving machine was set to the same key and it unscrambled the message and printed it out in decoded form. Thousands of messages were sent every day and the key was changed three times a day.

Robert Lewinski, a Polish engineer, had worked at a factory in Germany where the code signalling machines were manufactured. He memorised the construction of this machine and when he escaped to Paris, he was able to supervise the building of one of these machines. British intelligence personnel, using Lewinski's information, set about decoding German Enigma messages. The Lorenz, Schlüssel-zusatz 40 machine, or 'Tunny' as it was called in Britain, was then developed by the Germans and since it had twelve code wheels it further increased the possible permutations of codes. This machine resembled a cash register and it was plugged into a teleprinter (Fox and Webb 1997).

Alan Turing was asked to help decipher these codes and with a team of experts he set about building an electro-magnetic machine that could unscramble the German messages. In December 1943 the Colossus machine was completed. This original Colossus was a parallel-architecture computer which meant it could process five

different instructions at the same time. It was technically known as a 'large electronic valve programmable logic calculator'. It had 2,400 vacuum tubes and could scan 25,000 characters a second. One message from a Lorenz machine could be decoded using three decoding experts in six weeks. Eventually the Mark 11 Colossus was developed which could do the same work in two hours. By D-Day there were 10 Colossi in action deciphering Lorenz codes.

The word 'computer' was first applied to the women who were employed by the United States Army to compile ballistic tables. These tables calculated firing and bombing speeds to assist gunners in targeting high speed aircraft. The army needed speedier calculations and so the U.S. Army Ballistic Research Laboratory and Moore School of Engineering, developed the Electronic Numerical Integrator and Computer (ENIAC) which was able to produce ballistic tables quickly. The ENIAC was the first all-purpose, all-electronic digital computer. It was very large and occupied 3,000 cubic feet of space, used 140,000 watts of power and weighed 30 tons. The ENIAC was completed in 1945 and for its test run, it carried out successfully an extensive calculation for the Manhattan Project.

5.2.5 The stored-program concept

Computers such as the ENIAC were externally programmed machines that required the manual manipulation of a complex array of plugs and switches each time a new operation was undertaken. Reprogramming was also required if any of its 17,468 vacuum tubes needed to be manually replaced due to the burn out or malfunctioning of a tube. Maintenance delays such as these were time-consuming and meant that these types of computers were only able to function in short bursts.

In 1945 the mathematician John von Neumann wrote a paper describing how instructions could be treated in the same way as numerical data and so could be stored electronically in a computer's memory. This 'stored-program concept' led to the development of self-modifying computer programs, and thus greater flexibility in

programming. The Electronic Delay Storage Automatic Calculator (EDSAC) built in Cambridge University, in 1949 was the first working version of the stored-program computer and was modelled on von Neumann's paper. The team led by von Neumann completed their stored program computer, called the EDVAC, in 1952.

5.2.6 Transistors

The next significant quantum leap in computer development came with the invention of the transistor in 1947 which replaced the vacuum tube. A team of scientists, led by John Bardeen, Walter Brattain and William Shockley developed the first transistor at Bell Telephone Laboratories. Early transistors were only 1/200 the size of vacuum tubes. Since they were smaller, electrical impulses had shorter distances to travel within the transistor and so they could carry out operations much faster than vacuum tubes. They also required less power and generated less heat.

The technology for manufacturing transistors steadily improved and in 1959, the first Integrated Circuit (IC) was produced, which allowed many transistors to be fabricated onto one silicon substrate. Gradually more and more elements were included on a single chip, leading to the development of the microprocessor with the introduction of the Large Scale Integration Circuit (LSI) and the microchip with the development of the Very Large Scale Integration Circuit (VLSI) which can compress hundreds of thousands of transistor circuits onto a minute silicon chip.

5.2.7 The Personal Computer

The development of the MITS Altair computer in 1975 and the Apple 11 in 1977 paved the way for the development of the personal 'home' computer designed to be used by individuals rather than large corporations. One of the first inexpensive personal computers to come on the market was the ZX80. This computer was first marketed by Clive Sinclair in 1980, through electronics hobbyist magazines such as *Wireless World* (Kirkup 1992d). Electronics has tended to be a male dominated hobby

and at that time the magazines catered for hobbyists interested in building short-wave radios and radio-controlled aeroplanes. It was subsequently advertised more widely in the national papers. The ZX80 was a success because it was cheap and because it enabled people outside large business and organisations to experience "the mystique and some of the power of the old mainframe" in their own homes (Kirkup 1992d, p. 272). Further developments within the area of personal computers by Acorn, Commodore, Apple and IBM during the 1980's and 1990's led to the production of very powerful, efficient and fast personal computers that exceed the capabilities of early mainframe computers at a fraction of their costs.

5.2.8 Networking and mobile computers.

It is impossible to predict exactly where the development of the computer will lead. At the moment miniaturisation has led to desk-top, lap-top, and even palm held personal computers. Mobile computers, along with the development of intranets, the Internet and network computers (NC) allow users to access data banks of information from various locations. With falling computer prices resulting from reductions in computer production costs and with the development of graphical user interfaces, computers have come within the reach of 'ordinary people'. This has resulted in a process of demystification of many aspects of the computer so that as Lawrence Tesler points out, "The priesthood of programmers" has been "replaced by a single user [ ] for whom the computer [is] a tool, not a calling" (Tesler 1995, p.10).

5.3 THE DEVELOPMENT OF THE INTERNET

While the development of the computer continued, researchers around the world were interested in networking information between computers, both for military and commercial reasons, primarily, so that duplication of information could be avoided and the sharing of data facilitated. Just as in the development of the computer, a number of people came up with ideas around the same time that eventually led to the development of the Internet.

For example, in the 1960's, Paul Baran, an engineer, wrote a series of papers that predicted the structure of the Internet (Hafner and Lyon 1996). Soon after that Donal Davies, a physicist at the British National Physical Laboratory independently came up with many of the same ideas. As Katie Hafner and Matthew Lyon state, "All told, dozens of people helped invent the Internet, improving on the central concept, now known as packet switching" (Hafner and Lyon 1996, p.32).

The credit for the invention however goes to the U.S. Defence Advanced Research Projects Agency (DARPA). In the 1960's a research team including Vinton Cerf designed a network system specifically to withstand a nuclear attack, using minicomputers as packet switches and dedicated 50-kilobit-per-second telephone lines to connect them. This network was called ARPANET and it went into action in early October 1969, enabling researchers in the University of California, Los Angeles (UCLA), Stanford Research Institute in Menlo Park, California (SRI), University of California Santa Barbara (UCSB) and the University of Utah in Salt Lake City to communicate and share information with each other. Similar projects were started in other countries such as England and France.

Meanwhile, in the United States, ARPANET split into two separate networks, MILNET, which handled military affairs, and ARPANET which was concerned with networking research. By 1990, ARPANET was discontinued and the Internet, as it is commonly called, developed from a wide range of international networking systems.

5.3.1 What can you do on the Internet?

The Internet can be defined as a 'network of networks'. Each subsidiary net allows data to pass transparently among computers attached to the Internet, even though the various networks may use different data formats and transmission rates (Cerf 1995).

At present there are four main types of activities that can take place on the Internet:

- **e-mail** This is electronic mail that can be composed and edited on a computer terminal and then sent to one or more persons anywhere around the world, provided they are connected to the Internet. In the beginning e-mail was used by research and military personnel. Then as business computers became more and more networked, e-mail became an everyday way of transacting business. Now with the rise of personal computers, e-mail has become an efficient and cheap means of local and international communication for all types of Internet users. This type of communication has helped to turn the world into a 'global village', a term first coined by Marshall McLuhan (1964).

- **Accessing the World-Wide Web.** The Internet can be used to access the World-Wide Web (Web) through the use of search and data retrieval tools such as Alta Vista, Archie or Gopher, which allow you to browse through and download software programs, data or text files. The Web was developed in Switzerland at the European Laboratory for Particle Physics in 1990 as a way to publish and retrieve information from the Internet. Estimates indicate that every 10 weeks the number of computers providing information to the Web doubles (Arthur 1994).

- **Newsgroups and mailing lists.** Internet users can use newsgroups and mailing lists in order to make contact with people who share their specialist interests. Anyone can join a newsgroup, read the messages that are posted there and join the discussion by sending in a reply. Mailing lists, also called discussion lists and Listservs, are designed primarily for professional interests. Many are based on academic topics and offer people from a wide range of disciplines, the opportunity to discuss important issues, and even take part in conferences. Most mailing lists are moderated and communication takes place exclusively by e-mail.

- **Interactive games.** Interactive games such as MUD (short for 'multiple-user domains' or 'Multi-user Dungeons/Dialog/or Dimension') and MOO (MUD object-oriented) offer users access to a virtual landscape and to other simultaneously connected users. Players join the game from anywhere on the

Internet by telnetting into the program where the game is stored (Randall 1994). Text descriptions tell users what they see as they move around the virtual environment, which may be modelled on a house, a town, or even a planet (Cherny 1994). Users interact with the virtual environment, and with one another, through the use of characters that have nicknames, genders (feminine, masculine, neuter or 'plural' as in the case of Mutt and Jeff) and 'virtual' personalities determined by the users. This flexibility enables users, theoretically at least, to interact with other users in any way which their creativity allows. As a cartoon in *The New Yorker* says: "On the Net no one knows you're a dog" (Internet Special 1998, p. 76).

5.3.2 How effective is computer-mediated communication?

Since the increase in popularity of computer use within business and organisations, researchers have looked at how people communicate through computers, and whether this medium hinders or enhances communication and interpersonal relationships. Three main areas of research have been investigated:

- Media richness theory
- Flow theory
- Socioemotion in computer-mediated communication

5.3.2.1 Media richness theory

Research has been carried out into the relative advantages and disadvantages of using organisational e-mail versus face to face conferencing, or other mediums such as videoconferencing, telephone, voice-mail, letters and memoranda, etc. (Connolly *et al.* 1990, cited by Walther 1992).

This area of research centers on media richness theory which sees communication mediums as having various 'richness' levels depending on the band width or number of cue systems available within them. For example, face-to-face (FTF) communication is seen as the 'richest', because, as Sara Kiesler *et al.* say: "head nods, smiles, eye contact, distance, tone of voice, and other nonverbal behavior give speakers and listeners information they can use to regulate, modify, and control exchanges" (1984, p. 1125). Computer-mediated communication (CMC) is seen as a very 'lean' channel, because of its lack of non-verbal cues and social presence, while formal letters and memoranda are seen as the 'leanest' (Connolly *et al.* 1990, cited by Walther 1992). Some research has indicated that when the bandwidth narrows, the communication is then likely to be described as "less friendly, emotional, or personal and more serious, businesslike, or task oriented" (Rice and Love 1987, p. 88).

According to Sara Kiesler *et al.* (1984) the lack of 'social presence' and 'social context cues' such as status, power and gender 'depersonalises' communicants in CMC. This is seen to have a democratising effect that reduces inhibitions and normal forms of etiquette, which would be expected in FTF communication. Research carried out by Sara Kiesler *et al.* (1984) compared people working in CMC groups with FTF groups which were both set up to reach consensus on a choice-dilemma. They found that the CMC groups used more uninhibited verbal behavior, involving swearing, insults, name calling and hostile comments. This can help to explain the types of provocative, uninhibited and aggressive styles of communication sometimes found on the Internet. (See Sections 5.3.5.6; 5.3.5.7) Indeed, many Internet users value this medium precisely because it provides the opportunity for free speech and non-censorship, and this ethos has permeated the Internet from its inception until recent times.

This 'lack of social context cues' can have positive as well as negative effects. For example, Keay Davidson reports that e-mail users tend to "talk more frankly and more equally than they do in face-to-face conversations" (Davidson 1995, p. 39) because the lack of social cues, 'equalises' human relationships and allows people to

speak on more equal footings. This positive aspect of the Internet is discussed by one user on an academic discussion list who wrote:

> *"One of the greatest strengths of e[lectronic]-mail is its ability to break down socio-economic, racial, and other traditional barriers to the sharing and production of knowledge. You, for example, have no way of knowing if I am a janitor or a university president or an illegal alien [ ] we can simply communicate on the basis of our ideas, not on any preconceived notions of what should be expected (or not expected) from one another."* (Herring 1993, p. 2)

In face-to-face (FTF) communication, higher-status people are more likely to speak first, but over a computer network, communication is both instantaneous and asynchronous, and this, in theory anyway, allows everyone to have an equal opportunity to participate fully and to have their voice heard. This theory is supported by the research of Bellman *et al.* (1993, cited by We 1993) who found that Latin American women, who were allowed to post anonymously in class, "contributed "strong assertive remarks" even though "they did not engage in heated debate" or critiques in their face-to-face classes" (Bellman *et al.* 1993, quoted by We 1993, p.1).

Internet research by Susan Herring (1993; 1994), Leslie Regan Shade (1993) and Gladys We (1993) has found however, that the democratic right to have your 'voice heard' appears to apply more 'equally' to some users than to others. Susan Herring (1993), for example, found that a small male minority tended to dominate the discourse of two bulletin boards, – LINGUIST and Megabyte University (MBU), both in terms of the 'amount of talk' and through their aggressive and self-promotional styles of postings. In addition, the climate of non-censorship, free speech and the lack of consensus on net etiquette, along with gender differentiated practices prevalent within society, appear to contribute to the underrepresentation of females on the Internet. (See Sections 5.3.5.6; 5.3.5.7)

5.3.2.2 Flow theory

The 'flow' construct is derived from flow theory (Csikszentmihalyi 1975, cited by Trevino and Webster 1992) and refers to the playfulness and level of exploration which participants perceive to be involved in CMC. This area of research concentrates on ways in which the level of flow affects the users' evaluation of CMC, and how this in turn affects work outcomes, frequency and ease of use (Trevino and Webster 1992). The theory suggests that if an individual finds the CMC experience to be a playful, exploratory experience, she or he will be motivated to repeat the experience, and therefore be more likely to use CMC subsequently (Miller 1973, cited by Trevino and Webster 1992).

Linda Trevino and Jane Webster (1992) proposed that there are four dimensions of flow that are interdependent:

5.3.2.3 Control

> According to theories of intrinsic motivation, e.g. (Deci 1975, 1981, cited by Trevino and Webster 1992) people seek to control their own actions and choices. Therefore, people will be more likely to use computers that are user-friendly and which they feel they can control. Obviously levels of computer practice and training must be taken into account here. For example, research indicates (Gardner *et al.* 1989, cited by Trevino and Webster 1992) that initial levels of anxiety when dealing with a new technology or computer system can be reduced following practice or training. When a person gains a level of competence in an activity, they also take part in the activity more playfully (Lieberman 1977, cited by Trevino and Webster 1992). Therefore, prior experience levels affect perceptions of control and flow.

5.3.2.4 Level of Attention

If an individual is absorbed in what they are doing, they will wish to persist with the activity and will perceive higher levels of flow.

5.3.2.5 Curiosity

Computer programmes which allow the user to select from a range of options and that encourage exploration and competence attainment, stimulate an individual's cognitive curiosity and so have higher perceived levels of flow. The use of sound, video and colour in computer programming also encourages sensory curiosity, which in turn improve perceptions of flow.

5.3.2.6 Level of Interest

When individuals are in the flow state they find the interaction intrinsically interesting (Csikszentmihalyi 1975, cited by Trevino and Webster 1992) and they will continue with the activity for the pleasure and enjoyment it provides.

Flow theory therefore focuses on the importance of enjoyment, interest, training and feelings of control when considering factors involved in computer use. Flow will occur when the technology provides the optimal level of challenges for a user (Csikszentmihalyi 1975, cited by Trevino and Webster 1992). Technologies that are too demanding can result in anxiety, rather than flow, while technologies that are not challenging enough can result in boredom (Csikszentmihalyi 1975, cited by Trevino and Webster 1992). This theory is of obvious significance when it is considered that females are under-represented on the Internet, and yet many males may even be 'addicted to the Net' and suffer from Internet Addiction Syndrome (IAS) (Brenner 1996, cited by Glaskin 1996).

5.3.2.7 Socioemotion in computer-mediated communication

The socioemotional content of CMC messages has concerned other researchers. Although CMC has been seen as a 'lean' communication medium, some researchers have reported on the existence of 'online communities' and the friendships and warm relationships which develop between users, which attests to the socioemotional content and potential 'richness' of CMC (Hiltz and Turoff 1978, cited by Walther 1992). It has been found that over time, especially in the case of active users (Rice and Love 1987) individuals develop formats to express missing non-verbal cues in written form. This 'paralanguage' (Carey 1980, cited by Walther 1992) can express a range of affective and socioemotional information. It can include 'emotext' such as

- Intentional misspelling, as in, 'sssoooooo good!'

- Strategic capitalisation whereby for example, "communicators will INSULT EACH OTHER IN CAPITALS" (Allen 1980, quoted by Walther 1992, p. 80).

- Visual arrangements of text characters into 'emoticons' or 'smileys' which, if turned sideways resemble various facial expressions, for example, a smiley, :-), a winking smiley. ;-) and a turban wearing smiley @:-)

- Action Words (Argyle and Shields 1996). A selection of these 'action words' can be presented in an 'action list' on interactive Bulletin Board Service (BBS) chatlines to enable users to communicate more fully with each other. Words such as 'smile', 'grin', 'sigh' and 'groan' can be inserted into conversations. In the case of interactive action words such as 'hug', 'squeeze', 'tickle' and 'kiss', the computer will ask the user who the recipient of this action should be so that this particular interaction can be appropriately displayed on each of the users' computers.

Bracketing of action words may also occur to help to denote voice inflation or body movements in for example: <shrug>, <grin>, (LAUGH) (Argyle and Shields 1996, pp. 64-67).

Generic Actions in BBS's, allow a user (e.g. Joe) to type in an action such as 'handshake Ann'. The computer programme will then present this information in different formats. Ann will see, 'Joe is shaking hands with you.', other users will see, 'Joe is shaking hands with Ann.', while Joe will see, 'Shake, shake.' (Argyle and Shields 1996).

Lynn Cherny (1994) describes a wide range of emotive strategies that she found on a MOO. While these included the typical range of action words, they also include creatively invented 'affectionate' words such as high-5-ing, whuggling and nuzzling.

Overall therefore, Internet users have developed systems that attempt to turn this 'lean' medium into an effective interactive medium, which can allow individuals to communicate freely with each other. One example from many that demonstrates how interactive this medium may in fact be has been reported by *The Irish Independent, February 2nd, 1996*. They report on the case of John Goydan of Somerville, New Jersey, who filed for divorce because he accused his wife Diane, of carrying on a 'virtual' affair with a cybersex partner via the Internet and of committing on-line adultery.

5.3.3 How many people use the Internet?

Nobody knows exactly how many people use the Internet, as the number is increasing exponentially. Estimates have to be continually updated, but in general figures, less than 1% of Irish households are online (Kiberd 1997) while 1% of Europeans (Kavanagh 1997) and 10% of the US population are connected to the Internet (NBC 1997).

Network Wizard carry out a survey every six months of the number of hosts and domain names on the Internet. While originally a host meant just one machine connected to the Internet, over the years the definition has changed. Nowadays one machine can include a number of virtual hosts, even containing multiple domain names and Internet Protocol (IP) addresses. A Network Wizard survey (July 1996) shows that the Internet doubled in size from 6.6 million hosts in mid-1995 to 12.8 million hosts in mid-1996 (Kantor and Neubarth 1996). By January 1998 the number of domain names registered by the National Science Foundation in the United States had reached 30 million (Ward 1998). (See Appendix A) These figures provide us with a good estimate of the minimum size of the Net, but they cannot be taken as absolute measurements. Charles Arthur (1995) points out that there are a number of reasons why it is difficult to quantify the exact number of Internet users.

- As already discussed above, there is not a direct relationship between a host machine and the number of users. In offices, companies and academic institutions, many individual users may access the Internet through a host machine. As Donna Hoffman and Thomas Novak (1994) point out, it is as difficult to estimate the population of the Internet by counting the number of hosts as it would be to estimate "the number of people in the US by counting the buildings" (Hoffman and Novak 1994, p. 93).

- There is also no direct relationship between the number of unique IP addresses in use and the number of host machines.

- People can have more than one account through different Internet connections at home and at work for example.

- Companies are becoming more security conscious and often install 'firewall' software. This type of software protects the host machines by restricting data that can enter the host, while still allowing free access to the Internet. This prevents

hackers from breaking into their systems but it also makes the host 'invisible' to the Internet.

Faced with these difficulties in assessing the exact number of Internet users, some researchers look at present trends and make 'guesstimates' of the Internet population. This leads to varying estimates. Andrew Kantor and Michael Neubarth (1996) have examined US Internet user figures for 1996. According to their research, Morgan Stanley estimated that there were 9 million users, while Wirthin Worldwide suggested that the figure was 42 million. Two years later Nua (1998) suggest that there are 70 million users in Canada and the US. At the present rate of development Nicholas Negroponte predicts that the total number of Internet users will exceed the population of the world by 2003 (Negroponte 1995, p.6).

5.3.4 Who uses the Internet?

Results from Internet surveys tend to show that the typical user is white, male American, English-speaking, aged around 33, earns a high income, votes for moderate political parties, has sophisticated tastes and is interested in keeping fit. This differs from the image many people have of the Internet user who is often perceived as an anti-social 'techno-freak nerd'.

The Georgia Institute of Technology's Graphic, Visualization and Usability Center (GVU 1994a; 1994b; 1995a; 1995b; 1996a; 1996b; 1997a; 1997b) GVU has conducted a survey every six months since January 1994 up to the present, i.e. eight surveys. So far 105,154 participants from all around the world have participated in the surveys.

Here is a summary of their findings:

- **Location of user** The Internet is not as 'global' and 'world-wide' as we may like to believe, since North American users form the majority of users in all of the surveys. (See Figure 6.7)

- **Age of user** The average age of an Internet user is currently 35.7 years. (See Figure 6.8)

- **Gender of user** Women currently represent38.5% of internet users. (See Figure 6.9)

- **Income of user** Overall, in spite of a high percentage of low income students using the Internet, the average income of an Internet user is $53,000 which is high in comparison to world-wide averages. (See Figure 6.10)

- **Occupation of user** 20.63% of users have jobs related to computers, 23.14% are in jobs related to education or are students, 21.4% are professionals, 11.69% are in management while 23.14% work in 'other' occupations. (See Figure 6.11)

The VNU Internet Lifestyle Report (1996) surveyed 2,000 readers of Internet Business and Internet Advisor and 174 of these participants who were cross-matched against a Lifestyle database of 9 million households in the UK. This survey is of particular interest because it looks at the lifestyles and hobbies of Internet users.

- **Interests of users** The VNU survey found that Internet users surveyed were three times as likely as the public at large, to have American Express or Diners Club cards and almost twice as likely to hold other credit or store cards. The users also enjoyed a wide variety of interests and were far more likely than the population at large to spend their leisure time taking part in active sports and outdoor pursuits such as keeping fit, jogging, cycling and hiking. They also

enjoyed hobbies associated with affluence such as the theatre, fine wines, antiques, photography, gourmet cooking, foreign travel and skiing.

5.3.5 Why do males predominate on the Internet?

Various theories have been suggested to explain the male hegemony over the Internet involving psychological, social, educational and cultural factors. They can be divided into five main classifications:

1. Historical factors

2. Educational and computer training factors

3. Media factors

4. Financial and employment factors

5. Factors associated with linguistic and sexual intimidation of females.

5.3.5.1 Historical factors

5.3.5.1.1 Connection between militarism, computers and the Internet

Since World War 1, military leaders around the world, and especially in the United States of America have been very closely involved in the development of technology designed to assist in warfare and the detection and prevention of enemy attacks. They provided most of the early finances for this development, while working closely with various universities. As much as 40% of research and development which is carried out worldwide is funded by the military (Wajcman 1991). The development of the computer and the Internet evolved from this marriage of interests between scientific academic interests and military needs. A present-day example of this 'marriage of

interests' between the universities and the military, can be seen in the US Department of Energy's (DOE) weapons laboratories current project, which is called the 'Accelerated Strategic Computing Initiative' (ASCI). DOE has stockpiled a large number of bombs and since the Comprehensive Test Ban Treaty is in force, they are unable to test any of these bombs underground. With the ASCI project, they are offering $1 billion a year, and access to supercomputers to universities who will help to develop computer models that will test the capabilities of these nuclear warheads (Gibbs 1997).

As Paul Edwards points out, the development of computer science, "was conceptually driven by the strategic and technological puzzles the military provided" (Edwards 1990, p. 115). Evidence for this influence can be traced from Babbage's calculations of tides to the Colossus's deciphering of Lorenz codes and the ENIAC's ballistic calculations. The design of the Internet itself and the development of packet switching was influenced by Cold War military concerns, and the perceived need to avoid a single central information processing mechanism that could be damaged in any nuclear attack.

At present military powers around the world such as America, Britain, the USSR, France, China, India, Pakistan, Iran and Israel are actively involved in the development of computers for 'information warfare'. Computer programs are now available and viruses have been perfected, which can "turn off a country's electricity, steal its foreign exchange or open the sluice gates of its dams from thousands of miles away" (Adams 1997, p. 5.9). Computer engineers are now being recruited by the US CIA and DIA (the Pentagon's intelligence agency) as spies (Adams 1997). One Pentagon official is reported as saying, "In the future, victory will go to the force which has harnessed the information revolution and mastered control of cyberspace" (Adams 1997, p. 5.9).

Men have been traditionally associated with both the military and universities, particularly in scientific areas. Although women were employed by the military

during times of war when male personnel were in short supply, during peace times the proportion of males increased again. Present figures reported by Colin Lacey (1997) show that women represent 1.5% of soldiers in the Irish army, between 8%-9% of the armed forces in Britain and Canada, 15% of NATO's active duty forces, and following special recruitment drives by the US Pentagon (Dettmer 1997) 20% of new recruits in the armed forces are female compared to 12% a decade ago. In a similar way, although females are increasing in numbers at university undergraduate and post-graduate levels, staff in academic scientific departments have traditionally been, and continue to be, predominantly male. Women represent, for example, just 4% of professors in Ireland (*The Sunday Tribune, 22 June 1997, p. 9)* and 7% of tenured faculty in the sciences (Holloway 1993). Therefore the association between male-dominated university scientific departments and male-dominated military departments can help to explain the widespread perception that computers and the Internet are associated with masculinity (Edwards 1990).

In order to function efficiently armies must of necessity be well organised and for this reason the military has come to be associated with the single-minded achievement of objectives, precise, strict laws of conduct, and chains of command. Early computers were designed specifically to answer military related problems and therefore military ideology influenced the formats adopted. As a result, computers were designed to process commands sequentially, so that each step in the program's instructions is complete and exactly specified. A misspelling or misplaced punctuation mark can totally incapacitate a program. The type of precise, logical, abstract and mathematical thinking assumed to be solely required in computer science, has therefore come to be associated with males rather than females. This has arisen both through the early connection between the military and computers and because rational cognition has a long history of association with masculinity from Aristotle to Descartes to Locke (Edwards 1990).

Sherry Turkle (1984) argues that she found two types of approaches to programming among children using LOGO. There were the 'hard masters' who followed a rational,

precise linear style of programming by carrying out a set plan and imposing their "will[s] over the machine " (Turkle 1984, quoted by Edwards 1990, p. 103). "Hard mastery is comparable to having one's say: the clarity and control and mastery of the planner, the engineer, even the scientist " (Turkle 1996, quoted by McCorduck 1996, p. 161). However, there were also 'soft masters' who relied on a less structured system of working which used an interactive, more intuitive style of programming. Soft masters are more likely to "try this, wait for a response, try something else, let the overall shape emerge from an interaction with the medium" (Turkle 1984, quoted by Edwards 1990, pp. 103/104). Their less controlled work was "more like the give-and-take of a conversationalist, a negotiator, an artist" (Turkle 1996, cited by McCorduck 1996, p. 161). While girls and boys were found to adopt both styles of programming, Sherry Turkle (1984) found that girls tended to be soft masters and hard masters were overwhelmingly male.

Sherry Turkle (1984) suggests that when some girls reject the computer and computer programming, they are in actual fact "rejecting an intellectual style" the 'top-down' hard mastery style of thinking, which is generally recognised as a 'good programming style' (Turkle 1984, p. 49). She suggests that there is room for both types of approaches in computer programming, and that the development of more flexible approaches might encourage more females to engage in computing. She believes that the computer has a special role to play within the sciences by providing entry to women into the more 'formal' systems of science (Turkle 1984). Sherry Turkle feels that a computer "can be negotiated with, it can be responded to, it can be psychologized" (1984, p. 118).

As Pamela Kramer and Sheila Lehman (1990) point out, present day computers are more user-friendly than technical number-crunching machines. Modern computing is now a more interactive process, which "relies at least as much upon language, visual design, problem definition, and organisational skills as upon quantitative analysis" (Kramer and Lehman 1990, p. 171). Even stereotypical attitudes towards female skills would suggest that these are areas where females should be 'on home ground'.

Indeed, this may explain why girls are currently more successful than boys in GCSE computer studies (Woodhead 1996).

5.3.5.2 Historical denigration of female computer scientists

The perception that computer science is a subject that does not interest or suit females is widespread, in spite of the fact that women computer programmers have made significant contributions to computer science. For example, Ada Lovelace carried out very significant work on Babbage's Analytic Engine and Grace Hopper was instrumental in developing COBOL (Common Business Oriented Language). Women were the original 'computers' of ballistic tables and they were also the main programmers of the ENIAC. At that stage however, computer programming had low status and was regarded as "tedious clerical work" (Wajcman 1994, p. 224). During the 1950's and early 1960's women represented over half of all computer programmers and systems analysts (Buchanan 1994, cited by Larkin 1996) but by the 1980's this figure had dropped to one fifth (Chaika 1995). When the value of programming was more recognised and gained in status, this work came to be considered as "creative, intellectual and demanding 'men's work' " (Wajcman 1994, p. 224). Jennifer Larkin (1996) reports that now that the computer industry is established and pays high salaries with good working conditions, only 10% of the members of the British Computer Society are female. According to Frances Holberton, one of the original ENIAC programmers, and the person who created the world's first computer flow-chart, "It was a man's world and we were always overlooked" (Network Nuttall 1996).

Feminist theories would suggest that this type of situation is typical of our 'patriarchal' society that is organised in ways that benefit men rather than women. For example, Dale Spender (1982, cited by Kramarae and Kramer 1995) has shown that women's intellectual creativity has been trivialised through the years and their ideas only assume importance when they are attributed to men. As Ruth Perry and Lisa Greber say,

> *"One way of describing this phenomenon is that women's brain power often provides the intellectual venture capital for new fields but that the memory of this contribution drops away when the field becomes professionalized... ... once a field has stabilized and demonstrated its intellectual (and financial) potential, women are excluded." (1990, p. 87)*

Currently women presently represent only 30% of computer scientists, 8% of US computer science and engineering faculty members and 3% of tenured faculty members in these departments (Cottrell 1992). For this reason the achievements of those who do succeed in computer science should be acknowledged. This acknowledgement would help to provide encouragement and role models for other females to imitate. The lack of female role models obviously must have some attitudinal effect on females and research has shown that it can have a negative effect on the levels of career satisfaction experienced by female graduates (Cottrell 1992). The only available role model appears to be the stereotypical male computer 'nerd' and this seems to be a deterrent for many girls and women (Truong *et al.* 1993; DeBare, 1996).

5.3.5.3 Educational factors

5.3.5.3.1 Gender differentiation in access to computer training and experiences

5.3.5.3.1.1 Variation in computer access

As Alan Durndell *et al.* (1995) point out, girls are less likely to own computers, have access to them at home or make use of them at school. Dale Spender reports that in the UK, "six times as many boys as girls have a computer bought for them" (Spender 1995, p. 167). Compared with girls, boys are also more likely to use a friend's computer (Durndell and Thomson 1997).

5.3.5.3.1.2 Sex differences in attitudes and expectations

Betty Collis (1985) found in her survey of 2,899 students that following completion of a compulsory computer literacy course taught by an enthusiastic actively involved

male teaching staff, boys had more positive attitudes towards computers while girls had more negative attitudes. "Girls in these schools [ ] showed lower levels of self-confidence and interest in computers than did girls in the same schools who had not yet taken the course" (Collis 1985, pp. 209/210). She does not suggest here that the all-male staff are responsible for the negative attitudes in the girls. Indeed she found that girls in computer classes that were taught by female teachers were even less positive than those taught by male teachers. She sees the original attitudes of the girls playing a major role in their later attitudes to computers. "Grafting participation onto negative attitudes and self-concepts may serve to intensify the students' dislikes, rather than reduce them" (Collis 1985, p. 212).

The results from one study (Kolata 1984, cited by Wajcman 1994) indicates that girls and boys may not recognise the same type of benefits from computer use. In this study children were asked to describe how they would use computers when they were thirty years old.

> *"the boys said they would use them for finances, data processing, and games; the girls thought they would use them for housework. Wrote one sixth grade girl: 'When I am thirty, I'll have a computer that has long arms and that can clean the house and cook meals, and another to pay for groceries and stuff.' "* (Kolata 1984, quoted by Wajcman 1994, p. 220).

Females have been found to hold stereotypical attitudes towards computers and their users and for example, they are likely to believe that computer users are highly intelligent but not very social (Cardman 1990). Betty Collis (1985) also found that girls, in comparison to boys, were more likely to associate negative attitudes towards mathematics with negative attitudes towards computers and computer users. Melissa Koch (1994) believes that associating computers only with mathematics and science may be off-putting for some girls. She suggests that more girls could become interested in computers if teachers encouraged the use of computers in a variety of subject areas such as reading, history, and literature and used them for a variety of purposes, such as word processing, research, and design.

In general, research has shown that even when girls do use computers, they are less confident than boys about their abilities. They tend to stereotype themselves as "inadequate in the face of technology" (Collis 1985, p. 211). Betty Collis found that: "The typical girl felt that women in general were capable, but that she as an individual was not competent or likely to be a computer user" (Collis 1985, p.209). This is called the 'We can, but I can't' paradox. Even when females are reasonably confident of their computing skills, they are still not necessarily drawn to computing as a discipline (Durndell 1990, cited by Durndell *et al.* 1995). This phenomenon has been called the 'I can, but I don't want to' syndrome (Lightbody and Durndell 1993, cited by Durndell *et al.* 1995).

Eco-feminists such as Cat Cox (1992) have emphasised the 'special' relationship which women have with nature and their 'greater' awareness of the damaging effects of technology on our planet. From this point of view, the apparent reluctance of females to embrace a technology such as the computer, is understandable, and is seen in a positive, rather than a negative light. As Liesbet van Zoonen (1992) has pointed out, women's reluctant attitude can be seen as an active response. "Women use their rejection of computers [ ] to assert something about themselves as women: it is a way of saying that it is not appropriate to have a close relationship with a machine" (Turkle 1988, cited by van Zoonen 1992 p. 22).

5.3.5.3.1.3 A genderised 'hidden curriculum' in classrooms

While it is not clear which comes first, the chicken or the egg, research shows that computer teachers tend to give boys extended directions on how to accomplish tasks themselves, while often completing tasks for girls. Teachers in this way participate in a 'hidden curriculum' which differentiates between the potential abilities of female and male students and makes stereotyped judgements about their capabilities. For example, teachers will often direct their technical questions only to the boys in the class (Koch 1994; Spender1995). Teacher's attitudes tend to support the stereotyped belief that boys are better at computers than girls, no matter what the objective evidence provided. Dale Spender (1995) reports on two interesting experiments that

demonstrate this tendency. Initially, Sue Willis carried out research in 1991 on computer use among female and male students. Her results showed that, in computer classes, girls worked through the computer exercises, while boys preferred to play games. Sue Willis presented these findings at a teachers' conference. The teachers felt that these findings showed that "boys played games because they were confident with computers, while girls worked through the instructions because they lacked confidence and were reduced to just following the program set out for them" (Spender 1995, p. 180).

Dale Spender attended another teachers' conference a year later and discussed Sue Willis's results with the teachers, but this time she reversed the findings. This time the teachers concluded that the "boys worked through the programs, because they were confident and knew what they were doing, while girls played games because they didn't know about computers, lacked confidence and wouldn't tackle the serious stuff." (Spender 1995, p. 180).

In addition to a general stereotyped belief by some teachers and society in general, that 'girls are not good at computers', girls who do study computer science, especially within mixed sex classrooms, find that the atmosphere can be intimidating for the novice computer student. Melissa Koch (1994) reports, for example, that boys tend to jeer girls in class who demonstrate ignorance of technical terms. It is therefore not too surprising that many girls feel a lack of confidence in their computer science abilities, and they are likely to feel "that if something goes wrong while they are using high-tech equipment, it is their fault, whereas boys are more likely to blame the machine" (Koch 1994, p. 2).

5.3.5.3.1.4 Having fun with computers

One of the 'problems' for girls is that they do not seem to enjoy 'messing' around with computers like boys do. Alan Durndell *et al.* (1995) have found that girls and women adopt a very pragmatic approach to computers. If they have to use a computer either as part of their studies, or for work, they will learn how to use it and after some

initial hesitation, will become confident users of the technology (Siann *et al.* 1990, cited by DeBare 1996). This explains why females use computers just as much as males for word processing, since this computing skill has an obvious, practical, time-saving use. However, it is primarily males who will be found messing around with computers 'just for fun' in their spare-time, volunteering to set up computer networks, undertaking computer programming courses, or taking part in after-school computer clubs (DeBare 1996; Spender 1995).

5.3.5.3.1.5 The effects of male domination of computer classrooms

A wide range of research, for example, The Economic and Social Research Institute (ESRI) (1996, cited by Holmes 1996) has highlighted an academic advantage for girls in single sex, as opposed to coeducational schools. This advantage has been recognised for both girls and boys in England where single-sex classes have been experimentally introduced into co-educational schools for key subjects such as mathematics, science and English (O' Reilly and Norton 1997). It has been found that when allocated to single-sex classes, both sexes improved their GCSE grades, and as one head teacher states "They are more secure in their environment and they feel they have less need for stereotyped behaviour" (O' Reilly and Norton 1997, p. 9).

In mixed-sex computer classrooms, it has been found that boys tend to take over, answering all the questions and using the computer equipment first (Koch 1994). Sara Kiesler *et al.* (1985) found that even in pre-school, males dominated the school computers. Elizabeth Cardman (1990) suggests that the more aggressive tendencies of males enable them to be "the first to grab and then maintain control over computers available on a first-come, first-serve basis" (Cardman 1990, p. 118). Gerda Siann *et al.* (1988, cited by Durndell *et al.* 1995) reports that boys dominated the use of computer consoles in schools and that some teachers unconsciously reinforced this pattern of behaviour. In one pre-school, Kiesler *et al.* (1985) report that the boys took over the school computers, creating a computer club and refusing to let the girls either join the computer club or have access to the computers. When the teachers intervened and set up a time schedule for sharing computer access, the girls spent as much time

on the computer as the boys. Melissa Koch (1994) suggests that all-female computer science classrooms are better environments for girls to learn computer science in since they force girls to take on a variety of leadership roles and look to other female students for leadership. As already discussed above, Melissa Koch's conclusions are supported by results from experiments in sex segregation of classes within English coeducational schools in the areas of mathematics, English and science that have been proved to be beneficial for both girls and boys (O' Reilly and Norton 1997).

Research has highlighted the fact that classrooms are really made up of "little boys and little girls rather than little children" (Croll and Moses 1991, p.274) (See Section 3.6.2.4) and that girls and boys at school tend to associate with same-sex peers (Serbin *et al.* 1993). Students at school therefore tend to become socialised into separate male and female groups. Since computer clubs and classes tend to be male dominated (DeBare 1996) girls appear to be reluctant to 'break rank' with the other girls and join 'the boys' in the computer class or club.

Adolescence is a period when girls and boys become more aware of their 'image' and the need to appear attractive to the opposite sex. Compared to boys, girls are more likely to associate science and computers with anti-social unattractive stereotypes (Collis 1985). John Collings and Alan Smithers, for example, found that girls who chose physical science subjects "appeared to have doubts about their femininity and attractiveness" (Collings and Smithers 1983, p. 14). According to Betty Collis, this can lead females to experience conflict because:

> *"On one hand, they are bombarded by messages that "women are just as capable as men," but on the other they still retain the traditional cultural expectations that relate to what is appropriate and feasible for a woman to do, especially in anything seemingly connected with mathematics and science."* (Collis 1985, p. 212)

5.3.5.3.1.6 The effects of male bias in computer games

In a survey of English school children (Culley 1986; 1988, cited by Kirkup 1992d) males in families were found to use the computer almost exclusively for games-playing. While computer games can be seen simply as games to play 'just for fun', they also act indirectly as a means of teaching users basic computer skills. "Playfulness, foolishness, coping with challenge, and exploration are all part of learning to compute, of studying computers, and of working with them" (Kiesler *et al.* 1985, p. 457). Many computer games involve competing against each other or the machine, and trying to get the highest score. They also tend to be based on themes involving "wars, battles, crimes, destruction, and male-oriented sports" (Cottrell 1992, p. 3).

It has been suggested that the male culture which led to the masculinization of computer games, had its origin in the earlier pinball machines and arcade games played predominantly by young males (Haddon 1988, cited by Wajcman 1994; Kiesler *et al.* 1985). Since these games have more male than female appeal, it is not too surprising that boys play more video and computer games than girls. For example, Joseph Pereira (1994, cited by Spender 1995) shows that 75% of video games were bought for boys, 82% of users of the 16-bit Super Nintendo entertainment system were male, while 80% of players on the Sega Enterprises 16-bit system were male.

Even if girls overcome the male bias inherent in most computer games, they may not wish to become involved in a competitive situation with boys in a 'boys' area', which they may feel is a 'no win' situation. If they do better than boys at computing, they will be succeeding in a 'male' subject and therefore may appear 'unfeminine', while if they do badly at computing they may appear to be 'stupid' and therefore

'unattractive' to boys. Elizabeth Cardman (1990) suggests that the actual process of competition, in, for example, a computer game situation or in a 'girls versus boys' situation may not appeal to many girls. She believes, like Carol Gilligan (1982) that girls are more socially orientated than boys and prefer human rewards rather than impersonal rewards, such as those offered by a machine. For this reason they would also tend to avoid 'competing' against boys in computer science since, "To compete means to be inconsiderate of others, to consider only self" (Lewis 1987, cited by Cardman 1990, p.120).

A wide range of research has shown that females and males have sex differentiated tastes in game playing and competitive activities. Females tend to seek out activities that are consistent with "feminine values and goals" (Meece *et al.* 1982, cited by Kiesler *et al.* 1985, p. 460) and they are likely to feel intimidated by "a male-dominated achievement activity in a highly competitive and aggressive context" (Kiesler *et al.* 1985, p. 460). When Sara Kiesler *et al.* (1985) investigated women and men playing gambling games in Reno, Nevada, they found that men were more likely to play craps and poker which they describe as "confrontational, aggressive, 'put-yourself-on-the-line' games" which require the taking the psychological risks, as well as monetary risks, of "conning" others and being assertive (Kiesler *et al.* 1985, p. 460). The women in the gambling casino meanwhile, were more likely to play less competitive games that left more to chance, such as the slot machines. The researchers conclude that these differences in game playing preferences should be taken into account and computer games should be designed specifically to cater for the interests of females. Marguerite Holloway (1993) reports on the work of Ellen Spertus, who found that girls were more interested in computer games in which the objective was, for example, to prevent a meteor from hitting the planet, than they were in games in which players were supposed to slaughter invading aliens.

Therefore, while the design and formatting of computer software is frequently "motivating and exciting for boys" it often "discourages the girls who use it" (Lepper and Malone 1987, cited by Huff and Cooper 1987, p. 520). Charles Huff and Joel

Cooper (1987) believe that the designers of software have major effects on the type of interaction which a computer user experiences.

> *"The expectations of the software designer are central in determining the design of the program. And it is often the program, and the program's approach to the user, that determines the success or failure of the user in his or her interaction with the computer. The logical outcome of this line of reasoning is that it is not the computer, or even the software, that is at the root of the sex bias in software, but the expectations and stereotypes of the designers of the software."* (Huff and Cooper 1987, pp. 520/521)

In order to investigate these issues, Charles Huff and Joel Cooper carried out an experiment in which they asked subjects with educational and programming experience to design an educational program for (a) girls (b) boys or (c) students. They found that when designers were asked to write a program for boys or for students, they used a game oriented format, but when they were asked to design for girls, they designed programs that were 'learning tools'. It appears that the term 'student', within the context of computer science, was interpreted to refer to boys only. The researchers suggest that the designers were "using 'male' as the default value of 'student' " (Huff and Cooper 1987, p. 529). These findings are similar to the findings of another experiment (Phillips and Gilroy 1985, cited by Huff and Cooper 1987) in which subjects who were asked to think of a 'person' tended to assume that this person was male. Jennifer Larkin (1996) reports that many software companies feel that since their market is male, they may lose their male customers if they start advertising to females. While females remain outside the concerns of software designers they will probably continue to have difficulty interacting with computer software and will thus be limited in their computing experiences.

5.3.5.3.1.7 Female participation in computer science

If girls want to take up computer science they have to overcome the obstacle of limited prior experience of computer games, along with jeering and negative reactions from boys arising from their lack of computer and technology expertise (Koch 1994).

Research by Frances Grundy (1996, cited by Booth 1996) who investigated 151 coeducational schools with computer clubs, found that only 11 had female members. When girls did join these clubs, they found very little 'elbow room'. "Boys in school display the usual domineering behaviour and presumption of privileged access" (Grundy 1996, cited by Booth 1996, p.5).

Judy Wajcman (1994) reports that the number of girls studying computer science at British universities is decreasing and there are fewer girls applying for undergraduate level computer science courses now than nine years ago, although the number of courses has doubled in size. As Gill Kirkup (1992d) has shown, the numbers have dropped from 24% in 1979, to 15% in 1984 and 10% by 1989. At a more basic level, Gill Kirkup (1992d) reports that the number of girls studying computer science at O-level prior to 1985 was 30%, while in 1987/8 GCSE level the number was 9%. At A-level, the number also dropped from 22% in 1983 to 18% in 1985.

If, however, girls can overcome these obstacles and study computer science, girls can do better than boys, as shown by figures from the 1996 GSCE computer science examination results (Woodhead 1996; Charter 1996). Alan Durndell and Karen Thomson (1997) also report data from their study of computer study patterns from 1986-1995, shows that the 'gender' gap in computing is closing. However, as Laraine Zappert and Kendyll Stansbury (Zappert and Stansbury 1984) have shown in their survey of 628 Stanford University graduate students of science, engineering and medicine, greater female academic success does not automatically mean that females feel more confident than their male peers. In this study, the females who scored as well as or higher than their male peers still felt "less self-confident and assertive than their male counterparts, less sure of their ability, less trusting of their own judgement, and more fearful of making mistakes" (Zappert and Stansbury1984, p.18).

5.3.5.3.2 Is mathematical ability closely related to ability in computer science?

Betty Collis (1985) reports on research (Kolata 1984) which shows that females are often led to believe directly or indirectly that computer science is a masculine activity "appropriate for mathematically inclined men" (Kolata 1984, cited by Collis 1985, p. 207). However, although logical thinking is an important requirement for computer science, it cannot be assumed that mathematical ability, per se, is closely related to success in computer science. For example, one researcher (Wilson 1992, cited by Fallon 1997) found that linguistic abilities were more important than mathematical skills in achieving success in computer programming. This conclusion is also supported by another researcher Clarke (1992) who points out that:

> *"computers are not inherently mathematical. In fact, most work with computers involves manipulation of information and communication with people, which relies as much on verbal and interpersonal skills as on mathematical abilities"* (Clarke 1992, cited by Cottrell 1992, p. 2)

According to Sara Kiesler *et al.* (1985) computer literacy should really be looked upon as 'procedural thinking'(Papert 1980, cited by Kiesler *et al.* 1985, p. 459) and from this point of view, there is no evidence to show that girls are not good at procedural thinking or that their early training or interests are inconsistent with this skill.

Pamela Kramer and Sheila Lehman (1990) carried out research on women returning to college for undergraduate and post-graduate engineering and management degrees. Using the Math Anxiety Rating Scale (MARS) they found that all of the subjects exhibited very high levels of mathematics anxiety and needed remedial mathematics courses in algebra and trigonometry. Nonetheless, they all subsequently passed the required pre-calculus, calculus or statistics courses, 85% were awarded bachelor's degrees and 26% went on to earn M.S. degrees in areas such as computer science, information management and transportation management. The researchers found, however, that while grades in the preliminary mathematics course were predictive of

success in the later college mathematical course, they were not predictive of success in computer courses.

Mathematics however, often acts as a 'critical filter' that controls access to careers in engineering, science and computer science. As already discussed, the stereotype of femininity appears to be in conflict with the image presented by scientists, engineers and computer scientists and this may inhibit females from studying these subjects. In the US where a credit system of study operates, and students have wide choice in the subjects which they choose, girls study fewer mathematical courses than boys, and boys achieve on average higher marks in the SAT mathematics examination. The situation is different, however in the UK, where since 1993, girls have performed better than boys in mathematics at A-level and GCSE levels (Charter 1996; Woodhead 1996; Gold 1995).

5.3.5.4 The genderisation of science

5.3.5.4.1.1 The initial feminization of science

Scientific studies began just over 300 years ago. At first, as Susan Aldridge (1991) points out in her review of Patricia Phillips's 1991 book, *The Scientific Lady: A Social History of Women's Scientific Interests 1520-1918*, science was regarded as a 'trivial' pursuit and 'therefore' it was a suitable subject for women to study. Samuel Johnson, for example, recommended that women should study chemistry as an antidote to depression. At that time in the 17th century, 'real' learning was based on the study of the classics and this was the preserve of men. Some women felt that the study of science would help a young woman to gain "the skills she needed to run a household or make her own living" (Aldridge 1991, p. 52). Arising from these ideals Bathsua Makin in 1673 published her own school curriculum which was to continue to form the basis of science education in girls' schools from then until the end of the 19th century. This curriculum, for example, suggested that girls should study "the Names,

Natures, Values, and Use of Herbs, Shrubs, Trees, Minerals, Juices, Metals and Stones" (Phillips 1991, cited by Aldridge 1991, p. 52).

The Taunton Commission was set up between 1864 and 1868 to investigate the education of middle-class boys. Due to campaigning by Emily Davies, the founder of Girton, Cambridge's first college for women, the Commission included girls' schools in their investigation. The findings of the Taunton Commission were that "the girls' schools placed a high value on the study of science while the boys' institutions neglected it" (Aldridge 1991, p. 52). The campaigners for equal access to education for females at this stage, however, felt that if females were to be taken 'seriously' they had to compete on the 'same ground as men' and that meant they had to study Greek and Latin.

Towards the end of the 19th century, efforts were made to improve the health of the working classes by introducing classes in domestic skills including cookery, hygiene and housekeeping which replaced classes in botany and chemistry (Phillips 1991, cited by Aldridge 1991). Two other factors led at this time to the reduction of interest in science within girls' schools. First of all there was a growing recognition that science had a very low status, and so its value within education establishments for girls diminished. Secondly, female campaigners turned their attention from the educational field to the political one and concentrated on achieving the vote for women.

5.3.5.4.1.2 The current masculinization of science

In spite of this early 'feminization' of science, science is now stereotypically believed to be "inherently masculine" (Hein 1981, cited by Bleier 1984, p. 196). Some researchers such as Ruth Bleier (1984) and Evelyn Fox Keller (1992) argue that the very structures of our society and knowledge itself, form dichotomies in which 'feminine' values and traits are seen to be in direct opposition to 'masculine' values and traits. According to Evelyn Fox Keller, bodies of knowledge can be categorised as

either 'science' or 'not science'. Feelings, subjectivity and nature (often symbolised as a woman), are associated with 'femininity' and are regarded as 'not-science', while objective, dispassionate styles of thinking are seen as 'science'. Therefore, "to be a scientist is to learn the attributes of what our culture calls masculinity" (Fox Keller 1992, p. 47). Similarly, Ruth Bleier sees the 'female' mind as "untamed, emotional, subjective, personal", while the 'male' mind is "dispassionate, objective, impersonal, transcendent" (Bleier 1984, p. 196). These 'male' characteristics are believed to be essential requirements for the 'scientific' mind, which leads to the 'logical' conclusion that "women can apprehend [science] only by an extreme effort of overcoming their own nature which is inherently contradictory to science" (Hein 1981 cited by Bleier 1984, p. 196). Noretta Koertge (1997) disagrees with this point of view because she believes that by painting science as a strongly 'masculine' enterprise, inferring that there is something different about the way in which women understand the world, and that women are "intrinsically not suited to science" (Nemecek 1997, p. 84) feminists run the risk of turning more women away from science.

Many of these critics of science object to the 'masculine' view point that has influenced descriptive terminologies, issues and concerns within science and which has limited exploration of areas of knowledge outside 'legitimate' science. According to Ruth Bleier, the male dominance of scientific endeavours leads to a "male-created truth and reality, a male point of view, a male-defined objectivity" (Bleier 1984, p. 196). To illustrate this point, Emily Martin (Nemecek 1997) points out that for many years the sperm was seen as the only active party in fertilization, while the egg was incorrectly assumed to be passive. Similarly, until very recently, all research into the safety and efficacy of treatments for breast cancer was carried out on men, or on male rats and mice (Callanan 1997), since the male was regarded as the prototype individual and in addition, females were believed to be too weak physically to participate in these experiments.

The 'different' style of thinking (See Sections 4.3.5;4.7.4) which it is proposed females have, could, it is suggested lead to more flexible approaches to issues that

will "lead to a more thorough science and a better society" (Holloway 1993, p. 77). Evelyn Fox Keller's 1983 book on the geneticist Barbara McClintock who carried out research on 'jumping genes' is often cited as an example of this different type of scientific approach (Kirkup and Smith Keller 1992c). In this book she suggests that Barbara McClintock used a scientific style of thinking which included "creative empathy [ ] insight [and an intuitive] feeling for the organism [ ] an openness to 'let it come to you' [and to] 'hear what the material has to say to you' " which she suggests is not commonly found in the more rational 'masculine' styles of scientific thinking (Kirkup and Smith Keller 1992c, pp. 191-193). According to Evelyn Fox Keller, this intuitive style of scientific thinking "provides us with a glimpse of what a 'gender-free' science might look like" (Kirkup and Smith Keller 1992c, p. 195). One research study, however (Zuckerman 1993, cited by Holloway 1993) was unable to find solid evidence for the hypothesis that female scientists 'think' differently from male scientists.

5.3.5.4.1.3 Sex differentiation within scientific subject choice and employment

When statistical figures for science subjects at school and university level and employment rates for scientists are studied, sex differences do appear. For example, Marguerite Holloway (1993) reports that US 1993 figures showed that only 16% of employed scientists and engineers were female, with a closer inspection of these figures showing that females represented:

> *"like a warped version of "The Twelve Days of Christmas": 1 percent of working environmental scientists, 2 percent of mechanical engineers, 3 percent of electrical engineers, 4 percent of medical school department directors, 5 percent of physics Ph.D.'s,[and] 6 of close to 300 tenured professors in the country's top 10 mathematics departments"* (Holloway 1993, p. 70)

This underrepresentation of females in science occurs in spite of the fact that in the UK at GCSE and A-levels, females achieve higher marks than males (Motluk 1997). However, while, overall, males dominate within the general area of science, subject

areas within science tend to be genderised and so there are some subject areas where the sex balance is switched and females dominate or are well represented. Biology, the health sciences, psychology, food sciences, and chemistry are some of the main examples. According to Marguerite Holloway who reports on US 1993 figures (Holloway 1993) 41% of working biologists and life scientists were female, along with nearly 50% of all psychology and neuroscience graduates. Two years later, US figures for 1995, reported by Leonard Holdstock (1997) show that 75% of graduates in psychology were female. Although it is commonly assumed that all scientists are similar, varying characteristics have been found among students studying different branches of science. For example, John Collings and Alan Smithers (1983) found that there were differences in characteristics such as intelligence, styles of thinking, and attitudes among students studying physical sciences (where males dominate) and biological sciences (where females are well represented and sometimes dominate).

Proportionately, however, the number of women who hold senior positions within science laboratories at university or business level is low. Alison Motluk (1997) reports on the research of Christine Wennerås and Agnes Wold (1997) who examined Swedish postdoctoral peer reviews, and compared females and males who were cited a similar number of times by other scientists, within a calendar year. They found that the achievements of the men were over-valued, while achievements of the women were under-valued. In addition, regardless of the field of study, women scientists typically earn salaries that are 25% lower than those paid to men in the same position, they are rarely promoted to high positions, and are twice as likely to be unemployed (Holloway 1993).

The continuing current 'masculinization' of science may be facilitated by the manner in which science is introduced and taught at school. For example, the Girls into Science and Technology project (GIST), (Whyte *et al.* 1985, cited by Whitelegg 1992) found that the way in which science was presented increased the masculine image of the subject. In introductory science lessons, teachers often pointed out the dangers of equipment and chemicals in the laboratory. The boys seemed to be

particularly interested in this aspect of science and: "in later sessions displayed a great deal of bravado, for instance using a magnet to have a tug-of-war, trying to give each other electric shocks with a 6V battery" (Whyte *et al.* 1985, cited by Whitelegg 1992, p. 184). The girls however found this aspect off-putting. As Marguerite Holloway (1993) points out, most girls are directed away from science. "This subtle and overt deterrence can be seen in the educational system and is fortified by the perceptions of many male scientists that women simply should not be scientists" (Holloway 1993, p. 70). Off-putting stereotypes of scientists, as males first of all, and as 'nerds, or as 'mad scientists' (Holloway 1993, p. 70) and perceptions of scientific research as isolated and unrewarding (Anderson 1991) affect females' attitudes toward science and reduce their interest in scientific careers.

5.3.5.5 The genderisation of technology

5.3.5.5.1.1 What is technology?

According to Laurie Smith Keller (1992), technology comes from the word '*Tekhne* meaning art in the sense of 'way of doing' and *logike* which means reasoning. Therefore the word 'technology' means 'reasoning about the art of doing'. Technology differs from science because science is primarily concerned with discovering, while technology is primarily concerned with designing, making and doing. Technology is concerned with basic concerns for food, shelter, health, and communication and in designing and making practical tools, objects and new materials to meet those needs.

5.3.5.5.1.2 Development of technology

Laurie Smith Keller (1992) describes Long and Dowell's (1989) three models of technology.

5.3.5.5.1.2.1 The craft model

This is a model of technology that typifies crafts such as pottery, hand-weaving, wood-turning, and cookery. These crafts develop through experience and the 'master-apprentice' method of passing on skills. The craft model characterises the technology of early periods of civilization and technology in many Third World countries. Participation in these crafts by females and males varies from culture to culture.

5.3.5.5.1.2.2 The engineering model

The engineering model of technology began to emerge in the late Middle Ages and involved the developing and testing of engineering and structural hypotheses. Military requirements often spurred on developments in this area. These areas of technology eventually developed into civil and mechanical engineering and architecture, and have tended to be male dominated. For example, in 1990, UK figures (Kirkup 1992b) show that 13% of students in university undergraduate engineering courses were female, while only 5% of professional engineers and 3% of technician engineers were female.

5.3.5.5.1.2.3 The applied science model

This model uses scientific knowledge in order to solve technological problems, often by using natural products and harnessing their properties through scientific methods. Nuclear power is an example of this type of model. Overall, males dominate in this area of technology, although females are often well represented in low-status, low-paid areas of this technology. Especially in the USA, the military has been important sponsors of this type of technology, which have led directly to many 'spin-off' products used by society at large, such as computers, teflon pots and pans, 'space pens', the microwave oven and lightweight bicycles.

In common usage, the term 'technology' usually refers to 19th and 20th century developments such as cars, aeroplanes, trains, television, computer systems and

communication networks, rather than, for example, the pots and cooking utensils of the craft model.

5.3.5.5.1.3 Gender differentiation of technology

Technology has tended to be 'gendered' and so, for example, saws, trucks, wrenches, guns and forklifts are seen as 'suitable for men', while vacuum cleaners, typewriters and food processors are regarded as 'suitable for women' (Lowe Benston 1992). Even when women and men are employed within a technological area such as a factory, the tasks are sex differentiated. Women usually assemble electronic components or hold clerical positions, while men handle large or powerful pieces of equipment and occupy almost all managerial positions, with the result that "men order women about" (Wickham and Murray 1987, p. 4). "In electronics factories all over the world, the best paid jobs are filled almost entirely by men and the worst paid jobs almost entirely by women" (Wickham and Murray 1987, p. 4). Women tend to be employed in semi-skilled, lower paid, and more insecure jobs that are often in relative or absolute decline (Wickham and Murray 1987).

Within the subject area of technology a gendering process takes place, so that when girls do study technological subjects they tend to study perceived 'feminine' areas of technology. Leonard Holdstock and John Radford (1997) using data from the British Colleges Admissions Service, have examined the proportion of females studying speciality areas of technology and found large variations in the female uptake of these subjects. Within the area of engineering, polymers and textiles have a high female uptake, with females representing 81% of the students, radiology has 79% female students, nutrition 88%, food science 69%, and biotechnology 32%. Metallurgy, which is usually regarded as a 'masculine' technology has 25% female participation, computer science 20%, civil engineering 14%, chemical engineering, 24%, while electrical, electronic, mechanical and aeronautical engineering each recruited less than 9%.

Research indicates that there are sex differences in the way in which females and males approach technology. Margaret Lowe Benston (1992) discusses some of the 'gender' socialisation practices which lead to this differentiation. Boys and men, for example, are expected to learn about machines, tools and how things work, and are supposed to adopt a 'technological world view' that emphasizes "objectivity, rationality, control over nature and distance from human emotions." (Lowe Benston 1992, p. 33). Technological competence has basically become an essential part of the male identity (Hellman 1996). In general, males have a more adventurous attitude towards technology, and they tend to be 'early adopters' of new technologies (Rogers 1962, cited by Hellman 1996, p. 6). Research which supports this view comes from the Motorola Report which found that males were more likely to see themselves as a 'risk-taker', 'innovator', 'leader', 'ideas person', and a person who is 'familiar with IT' (Information Technology). Females on the other hand were more likely to see themselves as a 'follower', as a 'cautious person' and a person who is 'scared of new technology' (1995, p. 12).

Girls and women are "not expected to know much about technical matters" but are expected to be good at interpersonal relationships, to focus on people and on emotion and be "less rational, less capable of abstract, 'objective' thought" (Lowe Benston 1992, p.33). Their identity is therefore not enhanced by their use of technology (Hellman 1996). They often do not have the same access to technological training and experience that males frequently encounter. This factor appears to affect female confidence levels around technology. Evidence for this lack of confidence is reported by Betty Collis (1985) who carried out a survey of 3000 adolescents and found that females "stereotype themselves as inadequate in the face of technology" (Collis 1985, p. 211). In one experiment at primary school level, Katherine Clarricoates (1980) found that girls appeared to believe that boys naturally possessed extra technological skills that they lacked. "Girls actually believed that boys were naturally ordained with a profusion of masculine esoteric skills such as being able to drive a car, tractor or helicopter" (Clarricoates 1980, p. 39). One girl called Jennifer, for example, told

Katherine Clarricoates that her father was a helicopter pilot. The following conversation than took place:

> " *'Would you like to be one?' I asked.*
>
> *'Oh no. women would fall out of a helicopter whereas men*
>
> *wouldn't – they're stronger.'*
>
> *But don't men fall out?'*
>
> *'No, they hang on better than women.'* " (Clarricoates 1980, p. 39)

Sherry Turkle believes that girls are socialised to avoid technical objects, and "for many of them [it is] best summed up by the admonishment, 'Don't touch it, you'll get a shock' "(1988, cited by Spender 1995, pp.172/173). Teachers do not appear to believe that it is very important for girls to be good at technology. Dale Spender (1995) presents research findings which show that 49% of teachers sampled (across all subjects) believed that technology subjects were very important for boys but only 24% felt that they were important for girls. When the teachers were asked if these subjects were important for the student's future, 60% felt this applied to boys and 25.7% felt this applied to girls (Cole *et al.* 1994, cited by Spender 1995). It is not too long however, since girls were not even given the opportunity to study science and technology in schools. Gill Kirkup (1992b) points out that in the United Kingdom between 1920 and 1975 when the Sex Discrimination Act was published, it was both acceptable and legal to offer separate curricula for girls and boys, with boys studying science and technology while girls studied 'domestic' subjects.

According to Margaret Lowe Benston (1992) the exclusion of females (in general) from technological areas results in a deficit in their knowledge of 'technique' which includes "not only [the] knowledge of how to construct equipment but the knowledge of how to use it"(Lowe Benston 1992, p. 34). Cynthia Cockburn (1992) traces this

lack of 'technique' back to the early development of metallurgy when men took control of tool-making skills and technology and guarded these transferable skills to the exclusion of females. Throughout history, Cynthia Cockburn suggests, men have moved from industry to industry carrying this 'transferable knowledge' "across the boundaries of firm and sector" (Cockburn 1992, p. 200). Because females (in general) often lack a basic knowledge of technological 'technique', they are more dependent on male 'experts' when machines break down and are also less likely to experiment and transfer techniques from one machine or situation to another.

Some researchers suggest that the development of technology should be understood in the context of the male domination of females. Margaret Lowe Benston, for example, refers to "male-created and male-dominated technology" (1992, p. 34) which places women in a subordinate position in relation both to men and technology. From her perspective, "male power over technology is both a product of and a reinforcement for their other power in society" (Lowe Benston 1992, p. 37).

> *"Even at the household level, every time a man repairs the plumbing or a sewing machine while a woman watches, a communication about her helplessness and inferiority is made"* (Lowe Benston 1992, p. 37)

5.3.5.5.2 The gendering of technological products

Researchers such as Cynthia Cockburn (1992; Cockburn and Ormrod 1993) and Judy Wajcman (1992; 1994) have examined the 'social construction' and gendering of technology (Cockburn and Ormrod 1993). This approach examines not just the technological artifact, but the social processes that give the technology meaning. From this point of view the technology in question is shaped by a wide range of 'actors' ranging from the designers, engineers and sales personnel to the domestic users.

5.3.5.5.2.1 Brown goods, white goods

Cynthia Cockburn and Susan Ormrod (1993) in their study of the microwave oven and the production of technological products, have examined the manner in which products become gendered. They found, for example, that products were divided into 'brown goods' which were marketed by males, with the male customer in mind, and 'white goods' which were marketed by females, with the family and female customer in mind. Once an image and potential buyer for the new product were established, the actors involved in the manufacturing and marketing of the product developed its 'image'. This image was projected onto the artifact through various factors such as "its positioning in the store [ ] advertising, point-of sale material, instruction booklets, the way it is spoken about, the sales pitch" (Cockburn and Ormrod 1993, p. 156).

'Brown goods' were manufactured with a black colour, while 'white goods' were produced in white or off-white colours, although they were sometimes manufactured in brown or grey. Brown goods were used for leisure and entertainment and included products such as televisions, video recorders, music systems and cameras. 'White goods' were used for domestic work and included products such as washing machines, dishwashers, fridges, freezers, vacuum cleaners and so on. They also included products that can be used for personal hygiene or grooming, as in the case of the hair drier.

Cynthia Cockburn and Susan Ormrod found that people involved in the production and marketing of these technological products viewed 'brown' and 'white' goods in different ways. Brown goods, for example, were associated with concepts such as being: "complex/clever/obscure/challenging/contentful" while white goods were seen to imply concepts such as being: "clean/simple/transparent/functional/vacuous" (Cockburn and Ormrod 1993, p. 101). These differences in approach towards products is demonstrated by one of the managers whom they interviewed.

> *"Brown goods are looked upon as more high technology than white goods, because the white goods are workhorses, they're functional things. Brown goods, to me, perhaps you could say are more entertaining. The washing machines, the refrigerators, they've got to work for a living, they're there to do a job."* (Cockburn and Ormrod 1993, p. 104).

5.3.5.5.2.2 Tracing the gendering process in specific technological products

At this stage it is interesting to look at some studies that have examined the gendering of specific technologies.

The television

David Morley (1986, cited by Wajcman 1992) in his study of television viewing patterns among white, working-class nuclear families in London found that women and men watched television in different ways. The men preferred to watch television attentively in silence without any interruption, while the women watched television, "distractedly and guiltily, because of their continuing sense of their domestic responsibilities" (Wajcman 1992, p. 242). Males, including both fathers and sons (in the father's absence), tended to take control of the remote control and David Morley suggests that in some way, the remote control appeared to symbolise the father's 'domestic power'.

The video

Video recorders have been found to be predominantly a masculine home entertainment technology (Gray 1987, cited by Wajcman 1992). Heikki Hellman (1996) found that the male partner of the family was often the person who decided to buy the machine and who operated it on a regular basis. Fathers and sons were found to control the timer and remote control and they decided what to view.

The telephone

Until the 1920's, the telephone was promoted as a male technology suitable for businessmen. The people who originally developed, built and marketed the telephone were predominantly men who had worked in the telegraph system, and so their previous experiences led them to place great value on the transfer of short, important and urgent messages. The telephone was seen as an "efficient, 'rational' medium" (van Zoonen 1992, p. 23). Women, with their 'trivial gossip' were therefore condemned and extra tariffs were proposed for social calls in Oregon and Indiana in order to discourage them (van Zoonen 1992). "Talkative women and their frivolous electrical conversations about inconsequential personal subjects were contrasted with the efficient task-oriented worldly talk of business and professional men" (Marvin 1988, cited in (van Zoonen 1992, p. 23). However, as Ann Moyal has shown, a "feminine culture of the telephone" developed (1992, cited by Hellman 1996, p. 8) and so the genderisation process changed the telephone from a male to a female technology. Indeed, many studies have shown that women now are "much heavier users of the residential telephone than are men" (Fisher 1992, cited by Regan Shade 1995, p. 4).

The microwave oven

This technology originally developed from military radar technology research and was initially used in US Navy submarines. From this masculine base, the microwave oven was eventually marketed for the female consumer. Cynthia Cockburn and Susan Ormrod (1993) in their study of the development of a range of microwave ovens, found that at the production level, the oven began 'life' as an 'almost-brown' category of goods which had "interesting technological features" Cockburn and Ormrod 1993, p. 15) but it eventually slipped 'down' into the 'white goods' category. Studies have shown that the microwave oven is used overwhelmingly by females (Johansson 1988, cited by Cockburn and Ormrod 1993). "Microwave cooker ownership does not encourage men to cook more often "(Burnett 1990, cited by Cockburn and Ormrod 1993, p. 133).

The car

At first the car was regarded as a masculine technology. In 1955, only 5% of car licence holders were female (*Channel 4, The Cutting Edge, November 4,* 1997). The percentage of female drivers has however increased steadily over the years. In Ireland, for example, the figures show that in 1993, 41.3% of new licence holders were female (Department of the Environment and Local Government 1994) and the latest figures for 1996 (Department of the Environment and Local Government 1997) show that females represent 44.3% of licence holders. It is estimated that by the year 2010, 50% of drivers will be female (*Channel 4, The Cutting Edge, 4 November, 1997*).

5.3.5.6 Media influences

5.3.5.6.1 Association of the Internet with masculinity by advertisers and the media

Within the advertising industry the Internet is regarded as a male interest technology. The author (Connolly 1997) carried out an analysis of the percentage of pictures of females, males and children displayed in sample Internet magazines, female interest and male interest magazines. (See Chapter 6, Study C) The gender bias of magazines was determined from the relative percentage of male, female and child models used in the magazines. It was found that the Internet magazines used similar proportions of models to those adopted by male magazines. It was also observed that Internet magazines were frequently positioned in newsagents' shops within the 'male interest' area. Therefore it was concluded that Internet magazines are male oriented in marketing and design and as a result are more likely to have reduced appeal for females.

An analysis of advertisements by Ware and Stuck (1985, cited by Cardman 1990) found that even when women were pictured with computers, they were not shown actively enjoying them. They found that males were featured over-whelmingly in

active, computer expert roles while females were portrayed in "passive or actively anti-computer roles" (Ware and Stuck 1985, cited by Cardman, 1990, p.121). Although some films such as, *The Net* and *Jumping Jack Flash* and *Jurassic Park* have portrayed female stars as computer experts, males tend to be shown in active 'expert' computing roles in the majority of newspaper and magazine articles, books, films, radio and television programs. It is therefore suggested that the perception is prevalent within advertising and the media in general that computing and the Internet is a male preserve and as a result females are being indirectly discouraged from accessing information concerning these technologies.

5.3.5.7 Employment and financial factors

5.3.5.7.1 Sex-differences in employment within computer science and technology

The computer industry is one of the most important and fastest growing industries of our western societies and will predictably play a major role in all worldwide economies in the future. However, presently, there are major imbalances in the employment rates for females and males. Females are mainly employed in low-tech manufacturing, telesales and customer services, while males predominate in high-tech manufacturing, management and computer programming. For example, Ilana DeBare (1996) reports that according to US 1996 figures, 89% of computer scientists and 89.4% of top-tier executives at computer companies are male. Dale Spender (1995) provides figures that show that the numbers of females studying computer science is dropping. In the UK, for example, in 1978, there were 28% female participation levels, but by 1985-6 this had dropped to 13%. As far as the figures from the US are concerned, she quotes Barbara Kantrowitz (1994) who says:

> *"In the United States in recent years, women have earned about half of all associate degrees in computer science, more than one-third of the bachelor's degrees and 37% and 13% masters and PhDs respectively according to* The Chronicle of Higher Education. *Yet, only 7% of American universities' computer science and engineering faculty are women. Of that a meagre 3% are tenured."* (Kantrowitz 1994 cited by Spender 1995, p. 166)

5.3.5.7.2 Confusing data from computer sales and workplace affiliation to the Internet

Males buy the majority of computers, computer games, and software, and form 60%-90% of Internet users (GVU 1994a; 1994b; 1995a; 1995b; 1996a; 1996b; 1997a;1997b; VNU Newmedia 1996). However, it must be assumed that these males are living in social groups that also include females. While it is true that some brother/sister, husband/wife, father/daughter relationships are troubled and the male may intentionally or unintentionally restrict the female's access to computers and the Internet, this cannot be the case in all social groupings. It is not really clear therefore, why more females do not access the Internet in situations where males are able to access it, and where the female/male relationship is democratic and caring.

This trend however is also seen in computer use in general. While Chris Woodhead (Woodhead 1996) has shown that females who study computer science are more successful than males, they tend to avoid or hold back from using computers even when they have computer access at home. For example, one study found that while 50% of boys and just 22% of girls questioned had access to computers at home, the girls who did have access to a computer were less likely to utilise that opportunity (Lookheed 1985, cited by Chaika 1995). Betty Collis (1985) also found that in a sample of 2,899 students, both males and females agreed that 'mother' was "the least likely person in their households to be seen using a computer" (Collis 1985, p. 209). Since accessing the Internet involves extra telephone or other charges which increases the household's debts, it is obvious that many female partners, wives, sisters and mothers are contributing directly or indirectly to the upkeep of a facility which they are entitled to avail of, and could benefit from, but choose to avoid.

Within the workplace, it is not clear why more women do not access the Internet especially in industries and academic institutions where the organisation is affiliated with the Internet. The majority of secretaries are females. For example, they represent 98.9% of secretaries in the United States (DeBare 1996). Where formerly secretaries were trained only in clerical, shorthand and typing skills, due to the rapid computerisation of offices, the modern secretary must also be proficient in a range of computer word processing packages. As Pamela Kramer and Sheila Lehman (1990) point out, girls in school who attend computer science classes, are likely to be taught word processing and clerical skills, while the boys are more likely to be taught computer programming. While this educational bias may help to explain why there are very few female computer programmers, it does not explain why more females are not using the Internet. Secretaries who are familiar with any of the word processing packages such as 'WORD' and who have used printers and FAX machines should have no difficulty in accessing the Internet. Yet, while most large businesses are now connected to the 'Net', the author has personally spoken to many secretaries who are aware of their company's access to the 'Net' but have not used it themselves. Access seems to be restricted 'psychologically' to 'the boss' or to usually male 'experts' in the office. Recent research findings reported by Libby Brooks (1997) supports this observation, since it was found that "many companies still treated Internet access as a privilege accorded only to top executives" (Brooks 1997 p.5).

5.3.5.8 Factors associated with linguistic intimidation of females on the Internet

5.3.5.8.1 Subculture theories of genderised discourse online

Following in Lakoff's steps, a number of researchers have investigated discourse on the Internet. In general, they have found recognisable differences between the discourse styles of females and males. Like Jennifer Coates (1986) some researchers have used subculture theories to explain these differences in discourse styles online (Herring 1994; Jaffe *et al.* 1995; Mulvany 1994).

5.3.5.8.1.1 Feminine and Masculine communication styles

Susan Herring (1994), for example, takes a subcultural approach. She identifies a 'male style' of online communication that is characterised by "adversariality: put-downs, strong often contentious assertions, lengthy and/or frequent postings, self-promotion, and sarcasm" (Herring 1994, p. 2). According to Susan Herring, female styles show (a) supportiveness, which include "expressions of appreciation, thanking and community-building activities that make other participants feel accepted and welcome" (Herring 1994, p. 2) (b) attenuation, which includes: "hedging, apologizing, asking questions rather than making assertions [and (c)] a personal orientation, revealing thoughts and feelings and interacting with and supporting others" (Herring 1994, p. 2). These 'genderlects' (Herring 1993, p.9) are according to Susan Herring so recognisable that even when users post anonymously their communication styles give "subtle indications of participants' gender" (Herring 1993, p.10). She concludes that since our on-line communications therefore reveal our gender, CMC is not so anonymous and 'gender-blind' as previously suggested, "gender differences, along with their social consequences, are likely to persist on computer-mediated networks" (Herring 1993, p. 4). Nancy Kaplan following her examination of MOO's and MUD's similarly agrees: "even when personae try to construct genderless avatars, there is no social, communicative space without gendered speakers" (Kaplan and Farrell 1994, cited by Spender 1995, p. 244). Reflecting the findings of researchers in this area, Leslie Regan Shade concludes that: "cyberspace is not a gender-free space" (Regan Shade 1993, p. 6).

5.3.5.8.1.2 Gender differences in communicative ethics

5.3.5.8.1.2.1 Intimidation

Susan Herring (1994) further suggests that females and males had different 'communicative ethics' in that they appear to differ in the value they place on different types of online interactions, and they differ in how they interpret these interactions. In her investigations on the mailing list LINGUIST (devoted to the discussion of

linguistics related issues) she asked members of the list who had not contributed to recent debates that had become very heated, why they had remained silent. They reported that they felt intimidated by the nature of the debate. However, the reactions of the females and males surveyed differed. The males tended to accept this behaviour "as a normal feature of academic life" (Herring 1994, p. 2) and as one male wrote: "Actually, the barbs and arrows were entertaining, because of course they weren't aimed at me" (Herring 1994, p. 2). Many females were upset and felt "profound aversion" towards these types of interactions.

> *"That is precisely the kind of human interaction I committedly avoid. [ ] I am dismayed that human beings treat each other this way. It makes the world a dangerous place to be. I dislike such people and I want to give them WIDE berth."* (Herring 1994, p. 2)

5.3.5.8.1.2.2 Flaming

Flaming involves the sending of vicious, insulting or intimidating messages to another Internet user usually in response to a particular email or newsgroup message which the flamer dislikes. Sometimes these 'flames' can involve 'letter-bombing' in which the 'offender's' e-mail address is inundated with these offensive messages. In an examination of attitudes towards 'flaming', Susan Herring (1994) found that women seemed to place a high value on consideration for the wants and needs of others, taking into account the addressee's 'face' and demonstrating supportiveness. In this context, women viewed flaming as an unacceptable behaviour that was off-putting and intimidating.

Meanwhile, while men expressed a dislike for flaming, they also placed high value on "freedom from censorship, forthright and open expression, and agonistic debate as a means to advance the pursuit of knowledge" (Herring 1994, p. 6). Flaming in this context is an important tool which men choose to use in order to stamp out perceived unsuitable behaviour. It is therefore, "a rough and ready form of justice on the virtual frontier" (Herring 1994, p. 7). In her examination of 'netiquette' guidelines, she found

that flaming was tolerated, justified and implicitly authorised. Susan Herring describes how the typical netiquette rules are presented:

> *"To simplify, net rules tend to look like the opening scenes of an old-fashioned boxing sequence on a late night movie: 'No hitting below the belt, no fighting dirty; may the best man win. Ding. Ding.' Most netiquette statements acknowledge that the going can get rough, but the answer is invariably that if you can't take the heat, stay out of the kitchen."* (quoted by Spender 1995, p. 196)

Rather than prohibiting flaming, subscribers to POLITICS, for example, were advised on the correct way to flame. "Do not insult or criticise third parties without giving them a chance to respond" (Herring 1994, p. 7). Susan Herring (1994) found, however, that on women's issues moderated newsgroups there was "little or no flaming and co-operative, polite exchanges" (Herring 1994, p. 2).

Therefore she concludes that men and women constitute different discourse communities and cultures in 'cyberspace', a term coined by science fiction author William Gibson (1984, cited by Lajoie 1996). She believes that there is a real conflict between the male and female culture in cyberspace which makes, "cyberspace [ ] or at least many 'neighbourhoods' in cyberspace [ ] inhospitable to women." (Herring 1994, p. 8).

5.3.5.8.1.2.3 Frequency and length of postings

In a 1993 study Susan Herring analysed postings on two academic bulletin boards, LINGUIST and Megabyte University (MBU) (devoted to the discussion of computing and writing), and she found that a few males tended to dominate the discourse by posting long messages and using "self-promotional and adversarial strategies" (1993, p. 9). When females did raise topics they tended to be "ignored, trivialized, or criticized by men for their tone or the inappropriateness of their topic" (Herring 1994, p. 2) and she found that women also tended to ignore female postings (Herring, 1993). Margie Wylie (1995, cited by Spender 1995) similarly found that:

> *"women's ideas are simply met by silence from men and women alike. A female-initiated subject gets roughly less than a third of the replies that a male-initiated thread does [ ] And even women-initiated threads that survive are taken over by men [ ] so the eventual fate of the conversation isn't guided by women."* (Spender 1995, p. 197)

It is estimated that 95% of contributions on the Usenet (newsgroup) system are male (Herring 1994). Within 'feminist interest' groups, males represent 50% of the contributors on moderated groups and 80% of the contributors on unmoderated groups (Regan Shade 1993). Susan Herring, Deborah Johnson and Tamra DiBenedetto (1992, cited by Spender 1995) carried out research on the MBU mailing list. They chose this list because it was seen as a "non-adversarial environment [ ] where feminism enjoyed some influence" (Herring *et al.* 1992 quoted by Spender 1995, p. 194). They monitored all the postings over a five week period. During this period, men made 70% of the postings. Over a two day period, a feminist subject was initially raised by a male, and subsequently, actively discussed by females, so that female postings out-numbered male postings. As a result, many accusations came from men who believed that they were being silenced, including one from the man who originally started the debate and wrote a protest that ran to 1098 words. These intimidatory practices tend to silence females or lead to their transfer to women-only internet groups, which as Susan Herring points out carries the "risk of ghettoization" (Herring 1994, p. 8).

5.3.5.9 Problems associated with the 'lawless frontier'

There are a number of problems and issues associated with the Internet that have yet to be satisfactorily resolved and which are a cause of concern for users. Some of these issues affect all users, and concern areas such as censorship and freedom of speech, communication and data privacy, copyright practices, computer fraud and harmful

computer devices such as viruses[7], worms, trojan horses, salami techniques and logic bombs. Because: (a) 'cyberspace' does not have a geographical location, and exists 'outside of the law' (b) the Internet is a new entity without a long history and tradition on which legal precedents can be based, and (c) the ethos of the Internet is based on "individual freedom rather than collective civility" (Kramarae and Kramer 1995, p. 16) it is presently legal to publish data on the Internet that would be a criminal offence on 'terra firma'. This enables users who so wish to have access to unsavoury data on necrophilia, paedophile material, bomb-making instructions, suicide guidance and incitement to racial hatred, to name but a few (Hammond 1996).

Some researchers have, however, identified problems with the Internet which affect females in particular, arising from their minority representational level and status on the Internet, and some would argue, their low status within society in general. These problems include: pornography, sexual harassment and stalking (Regan Shade 1993; Spender 1995; Kramarae and Kramer 1995; Brail 1996). Some Internet users, for example, indulge in 'Net.sleazing and 'trolling for babes' (Regan Shade 1993, p. 6). Cheris Kramarae and Jana Kramer (1995) report on cases in which women have been the victims of stalking, hate speech and even non-voluntary 'compu-sex' or 'netrape'. Dale Spender (1995) has also written extensively about the sexual harassment which females have experienced on-line and has provided many disturbing examples from

---

[7] Computer viruses are programs that "modify other programs and reproduce endless, infecting other programs (Martin 1995, p. 107). A computer worm is a program that "replicates itself and spreads from one computer to another" (Martin 1995, p. 107). A trojan horse is "a set of program procedures that will sometimes perform unauthorized functions but will usually allow the program to perform its intended purpose" (Martin,1995, p. 108). A defrauder can devise a computer program using salami techniques which instruct for example, bank accounts to be rounded out to the nearest penny. This surplus of money would then be transferred to the defrauder's account, and these small 'slices of salami' can add up to a large 'salami' (Martin 1995, p. 108). A logic bomb is a program written by an employee, which is "designed to perform destructive or fraudulent actions" (Martin 1995, p. 108).

her research. Harassment can be upsetting whether it takes subtle forms such as personal questions, or blatant forms, such as sexual propositions. As Stephanie Brail points out: "It is the threat of the physical behind the virtual that makes online harassment a very scary thing" (Brail 1996, p. 152). In order to avoid drawing attention to their sex and attracting unwanted harassment, women are more likely to adopt male or neutral pseudonyms which 'mask' their gender, while males are more likely to choose male pseudonyms (Jaffe *et al.* 1995, p. 12). There has also been an increasing tendency for women to post on moderated women-only mailing lists (Truong *et al.* 1993).

There is widespread public concern about the number of pornography sites online and the possibility that young children could access these sites at vulnerable stages in their (i.e. the children's) development. To investigate the level of pornography online Carnegie Mellon University recently carried out a survey of 68 American Internet servers and found that these servers provided access to 450,620 pornographic images, animation and text files (Hammond 1996). An analysis of Usenet, carried out by Benjamin Franz (1995, cited by Arthur 1995) found that newsgroups dealing with pornography were the most popular newsgroups with the largest number of readers worldwide. Looking only at commercial Web sites, as opposed to academic or personal Web sites, David Brake (1997) reports that up to 6,000 are sex-related. In addition, Usenet at present has over 43,000 discussion groups where pornographic pictures and messages can be posted anonymously. Cheris Kramarae and Jana Kramer report that many alt. newsgroups circulate data among users that include, "high-resolution, anti-female, racist pictures of women and children" who have been sexually mutilated (1995, p. 16).

There have been movements by many governments to censor 'indecent' speech and obscenity on the Internet. Seventeen governments around the world including the US, and Sweden which is renowned for its liberal attitudes, are currently attempting to censor 'indecent' speech on the Net, in spite of the strong opposition of Internet activists. Government bodies in China and Singapore have even gone so far as to filter

and censor all connections to the Internet by using government servers that are not connected to sites deemed to be 'unsuitable'. These 'unsuitable' sites can include information of a political, religious or 'so called ' obscene nature (O'Marcaigh 1997). The Beijing government has recently introduced new regulations (30 December 1997) which impose fines and jail sentences on individuals who are found to be leaking 'state secrets', or promoting 'violence, political subversion or pornography' (Newswire, 1998, p. 5). According to these new regulations, Chinese Internet service providers are now obligated to help to track down these 'offending' users.

However, all efforts to control or prevent access to 'objectionable' sites have so far met with a strong opposition, and in many cases have been 'side-stepped' by users. When, for example, the German government tried to block access to a site holding 'Radika', which is a banned left-wing magazine, the data were copied and posted to more than 50 Web sites around the world (Brake 1997). Opponents of the US government's 'Communications Decency Act' which had attempted to make it illegal to publish 'indecent' material on the Web were successful in having the Act ruled unconstitutional in June 1997. Realistically, many governments have now reached the conclusion that outright bans are unlikely to succeed, and are instead in favour of the adoption of filtering mechanisms and rating systems (Brake 1997). This was the approach adopted by ministers from 29 European countries who met in Bonn in July 1997, at the Global Information Networks conference (Brake, 1997). The Californian state government is also presently considering a law that would require every school in the state to buy and use some sort of filtering software (Kleiner 1997).

Internet server companies and standards bodies have recently established the Platform for Internet Content Selection (PICS) which provide a rating system for sites on the Internet. The rating system which PICS uses is the system produced by the Recreational Software Advisory Council on the Internet (RSACi) which is a non-profit censorship group based in the US (Brake 1997). Four main aspects of data are rated and they include – nudity, sexual content, violence and language including racist 'hate speech' (Brake 1997).

In addition, the number of filters or blocking programs on the market is increasing. At the moment these include blocking software such as : Net Nanny, Surf Watch, Cybersitter, ImageCensor, and Cyber Patrol, that disable access to particular Internet sites that are believed to contain indecent or offensive material. However, this is a controversial area, because some of this software can also block access to any site that includes discussions on, for example, branches of politics, feminism, homosexuality, or sites run by critics of blocking software. It is not too surprising that in the climate of individual freedom, free speech and non-censorship that has permeated the Internet from its inception, these restrictive measures are being actively opposed by a large number of Internet users.

5.4 CONCLUSIONS

A genderisation process affects scientific and technological developments and changes the apparent 'neutrality' of new inventions, making them initially more attractive to either females or males.

- Over time the gender identification of a technology can shift allowing either a monopolisation of the technology by members of the opposite sex or more equal representation between the two sexes.

- In the case of the Internet, historical, educational, linguistic and socialisational factors appear to have contributed to the present identification of masculinity with the Internet.

6. RESEARCH FINDINGS OF SIX STUDIES WHICH EXPLORE ISSUES RELATING TO GENDER DIFFERENCES ON THE INTERNET

6.1 STUDY (A): AN EXPERIMENT TO TEST THE ABILITY OF SUBJECTS TO IDENTIFY THE GENDER OF AUTHORS OF ON-SCREEN TEXTS

6.1.1 Methodology

6.1.1.1 Formation of data base

The first part of the experiment was concerned with the formation of a data base, and involved four female and four male third level students. While the sex of each 'author' subject was recorded, no further details concerning these subjects were collected thus ensuring their complete anonymity. The 'author' subjects were each provided with access to a computer. They were then presented with a series of five questions and asked to comment freely on each of these questions, recording their opinions on the computer using a word processing program. The questions were chosen by the experimenter specifically because they concerned issues that were topical at the time and were assumed to be of general interest to both female and male third level students. The questions were as follows:

1. Is it safe to eat beef?

2. Is the university points system fair?

3. What should be done about Sellafield nuclear station?

4. Is marriage necessary?

5. Can we trust Irish politicians?

The responses of the subjects were stored on computer to provide a data base of 40 text samples, i.e. the responses of the eight subjects to each of the five questions. (See Appendix (B) for transcript of these forty texts)

6.1.1.2 Data base analysis

The texts in the data base were then analysed to determine if there were in fact textual gender differences in the styles of communication. Statistical analysis of the texts show that there were gender differences. For example, word counts of the texts showed that males used 62% more words than the females. (See Figure 6.1)

6.1.1.3 Gender identification of authors of texts

Altogether 126 volunteer subjects, 80 females and 46 males took part in the gender identification part of this experiment. These 'identifier' subjects were students and staff members of the National College of Industrial Relations. Their ages were recorded on computer in five year age-bands and ranged from 15-19 years up to 45-49 years.

A computer program was devised which led the subject through the experiment step by step. (See Disk) Each 'identifier' subject participated in the experiment by reading on-screen instructions and responding by clicking a mouse as directed. Initially subjects were required to indicate their sex and age.

In the next stage of this experiment every subject was presented with a sample of five texts that included one text from each topic question. These texts were randomly chosen for each subject by the computer from the data base of forty texts. The subjects were directed to read each text as it appeared on the screen and indicate if they believed that the text had been written by a male or a female by clicking the mouse on either the 'Male' or 'Female' icon. When a subject had clicked on the chosen icon, the next text appeared on the screen awaiting gender identification. This process was repeated five times until each of the five randomly chosen texts had been gender assigned. As each new subject began the experiment, another random sample of five texts was chosen by the computer and presented to the next participant.

No feedback was provided to the subjects to indicate whether they were correct or incorrect in their assessments of textual gender.

6.1.1.4 Analysis of data

The results of the gender assignments of the 126 subjects were analysed to see how accurately each subject scored and to determine if there were any statistical age or gender differences in the success rates of the subjects.

6.1.2 Aims

The aims of this experiment were to investigate whether subjects could correctly identify the gender of the authors of texts, and whether there were any age or gender differences in success and failure rates of identification.

6.1.3 Results

6.1.4 Analysis of texts

Figure 6.1 presents the results of an analysis of the word counts for each of the texts which shows that the males wrote 62% more words than the females. An ANOVA analysis of the word counts (See Table 6.1) shows that these results are significant to the 99.5% level.

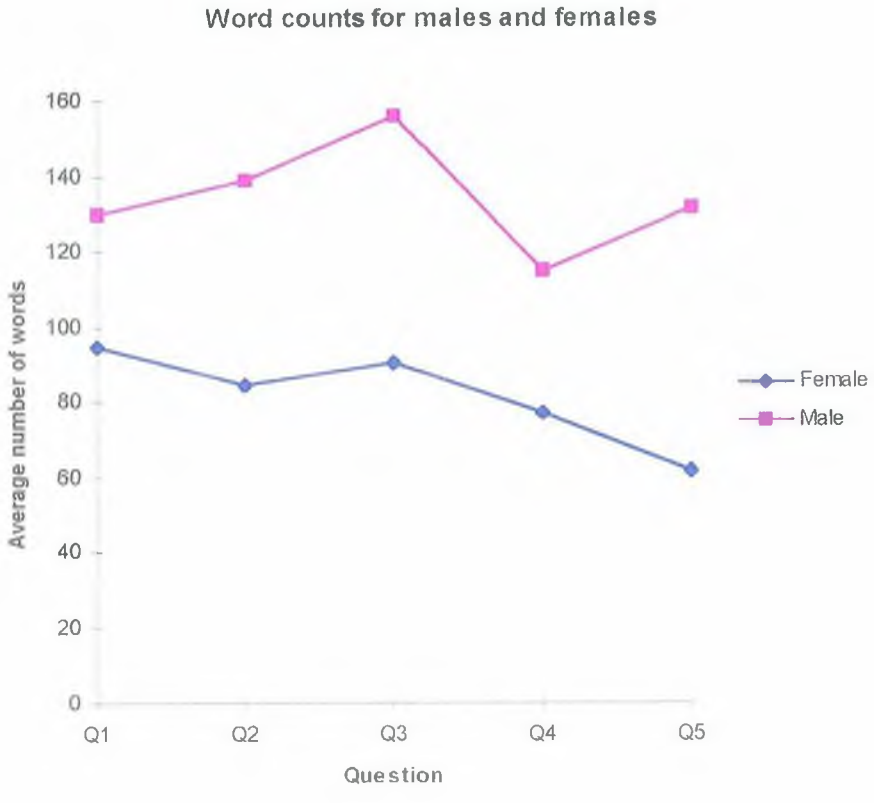

Word counts for males and females
160
140
120
100
80
60
40
20
0
Average number of words
Q1
Q2
Q3
Q4
Q5
Question
Female
Male

Figure 6.1

Table 6.1

Anova: Two-Factor With Replication

SUMMARY	Female1	Male1	Total
Q1			
Count	4	4	8
Sum	378	519	897
Average	94.5	129.75	112.125
Variance	289.6667	3017.583	1772.411
Q2			
Count	4	4	8
Sum	337	555	892
Average	84.25	138.75	111.5
Variance	1726.917	8644.917	5293.714
Q3			
Count	4	4	8
Sum	360	622	982
Average	90	155.5	122.75
Variance	944.6667	4753.667	3667.929
Q4			
Count	4	4	8
Sum	308	458	766
Average	77	114.5	95.75
Variance	784.6667	1788.333	1504.5
Q5			
Count	4	4	8
Sum	246	525	771
Average	61.5	131.25	96.375
Variance	1516.333	7142.25	5100.839
Total			
Count	20	20	
Sum	1629	2679	
Average	81.45	133.95	
Variance	971.7342	4189.629	

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Sample (Question)	4252.65	4	1063.163	0.347337	0.84376	2.689632
Columns (Gender)	27562.5	1	27562.5	9.004704	0.005379	4.170886
Interaction	1986.25	4	496.5625	0.162228	0.955811	2.689632
Within	91827	30	3060.9			
Total	125628.4	39				

6.1.5 Analysis of results of gender identification experiment

Although in general the majority of the 126 subjects were confident that they could correctly identify the true gender of the authors, their actual results were no better than the results which you would expect from random guessing. The average successful score rate for random guessing of texts is 2.5 and the success rate for the females was 2.55 and for the males was 2.42. From a statistical point of view, there is no difference between these results. (See Table 6.2) This is a surprising result. As already discussed above (Section 6.3.1) there were statistically significant gender differences in the actual textual style but analysis of the responses of the 126 under every heading, i.e. gender, age, and success rate show that regardless of age or gender, the success rate was identical to that which could be expected from random guessing.

Table 6.2

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Males	47	22.8	0.485106	0.043034
Females	80	40.8	0.51	0.054582

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.018347	1	0.018347	0.364511	0.547106	3.916938
Within Groups	6.291574	125	0.050333			
Total	6.309921	126				

6.1.6 Discussion and conclusions

It has been reported in the literature, e.g. (Herring 1993; 1994; Kaplan and Farrell 1994, cited by Spender 1995; Regan Shade 1993) that the sex of Internet users can be determined from the style of their communications, even when messages are posted anonymously. It has therefore been suggested that the easily recognised more 'hesitant' style of many female communications and the more 'aggressive' style of many male communications may lead to stereotyped on-line gender interactions. This

in turn could contribute to female underrepresentation on the Internet both by isolating and intimidating female contributors.

The texts used in the data base for this experiment have shown that there were statistically significant differences in textual styles confirming what many linguists suspect. However, the results of this experiment show clearly that the general population are unaware of these differences and are unable to determine the gender of the author of a piece of text from a reading of the text alone.

6.2 STUDY (B): AN EXPERIMENT TO INVESTIGATE AGE AND GENDER DIFFERENCES IN RISK-TAKING STRATEGIES ADOPTED BY SUBJECTS WHILE PARTICIPATING IN A COMPUTERISED CARD GAME

6.2.1 Methodology

6.2.2 Experimental design and procedure

This computer based experiment was carried out in order to investigate whether there were any age or gender differences in the type of 'perceived' risk-taking strategies adopted by 354 subjects while participating in a computerised card game.

In total 354 subjects, 152 females and 186 males participated in this experiment. The subjects ranged in age from 5 to 60+ years in age. (a) 67 subjects were tourists and members of the public who volunteered to take part in the experiment while visiting a tourist attraction in County Wicklow (b) 73 subjects were students and staff members of University College Dublin (c) There were 214 subjects who were either: (i) students and staff members of Dublin City University or (ii) parents, students and staff members of a Children's Summer School at the Center for Talented Youth , Dublin City University

A computer program was developed which presented the game on-screen to each subject, randomised the location of a 'joker' card which if chosen by the subject negated all scores for that round of the game, and recorded the sex, age band, risk taking responses and scores for all subjects. (See Disk)

At the start of the game the subject was presented with ten cards. A 'joker' card was placed under one of these cards in a randomised location. The object of the game was to 'turn' as many cards as possible without picking the joker. If the subject turned the card which covered the joker, they received a zero score for that round. Otherwise they received one point for each card turned.

The lowest risk strategy was to turn only one card in each round. That way the subject had only a 1 in 10 chance of locating the joker. However, the subject's score for that round would be only 1 point. If the subject turned more that one card, the chances of locating the joker would be higher, but the subject had the possibility of a higher score. The subject had to chose between a high score/high risk strategy or a low score/low risk strategy.

6.2.3 Experimental game procedure

To start the experiment each subject is invited to provide information on their sex and age band, by clicking on the appropriate icons.

They are then presented on-screen with a set of instructions as follows:

> *In this game there are 10 rounds.*
>
> *The aim of the game is to gain as many points as you can.*
>
> *At the start of each round one of the cards is chosen randomly by the computer as a 'joker' card. If you happen to choose to turn this card you will score 0 points for that round. Otherwise you score 1 point for each card which you successfully turn. In other words, you get 1 point for turning 1 card successfully, 4 points for turning 4 cards successfully, 6 points for turning 6 cards successfully, etc. but 0 points for turning over the joker card.*
>
> *To start each round click on the card or cards which you wish to select in that round and click on the Go button when you are finished.*

Subjects were also presented on-screen with a display of ten identical cards numbered consecutively from one to ten. (See Disk)

To play the game the subject is required to click with the mouse on the card or cards that she/he wishes to 'turn over' or choose in that particular round. At this stage the subject is unaware if her/his choice of card includes the 'joker' card. The subject can

deselect any card by clicking twice on the card and making a new choice. When the subject is satisfied with all choices made, she/he clicks on the 'GO' icon.

The computer then proceeds to 'turn over' each of the chosen cards and provide the subject with feedback on whether or not she/he has picked the 'joker' card. The subject's final score for that round appears on-screen and the next round of the game begins. There are ten rounds of the game and when the final round is played a 'Finished' icon appears which indicates the completion of the game.

6.2.4 Analysis of data

The computer program stored all data on the sex, age, scores in each round, total scores, and risk-taking strategies of each subject. These data were subsequently analysed under the following headings:

1. Average scores versus average guesses (Figure 6.2)

2. Age versus perceived risk taking strategies, i.e. number of guesses (Figure 6.3)

3. Gender versus perceived risk-taking strategies, i.e. number of guesses (Figure 6.4)

4. Analysis of variance (ANOVA) for 15-19 year olds, 20-24 year olds and 15 to 24 year olds (Table 6.3)

6.2.5 Aims

The aims of the experiment were to investigate age and gender differences in the perceived risk taking strategies adopted by a broad age profile of subjects in a computer related environment.

6.2.6 Results

It was found that males take more 'perceived' risks than females and that older subjects take more optimal risks than younger subjects.

Figure 6.2 shows that the optimum guess rate is to turn 4.5 cards on average, i.e. to choose to turn over 4 cards for half the number of turns (i.e. five turns) and 5 cards for the remaining five turns.

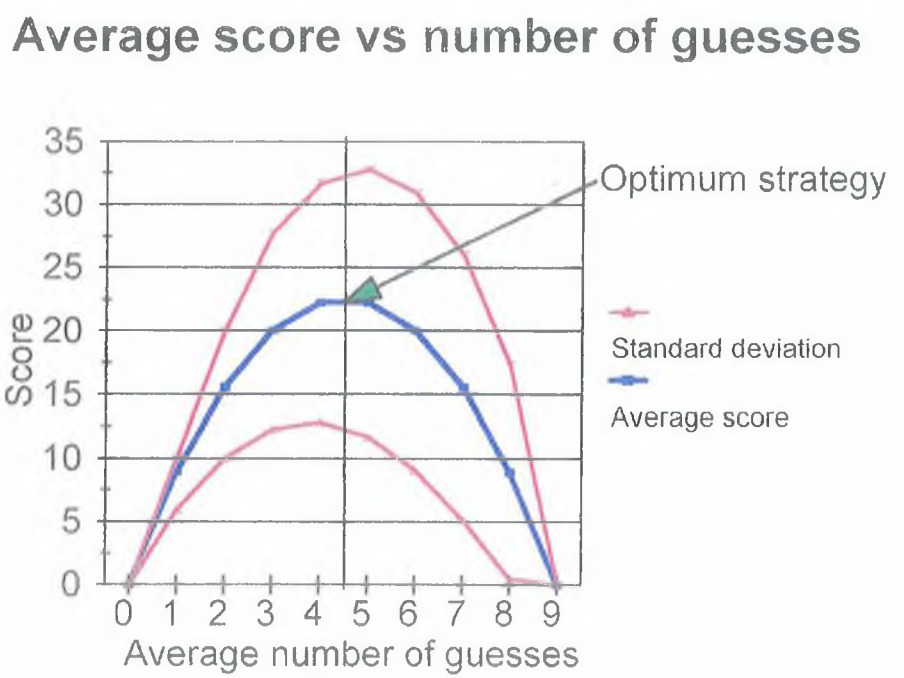


Figure 6.2

Figure 6.3 shows the results of the subjects, analysed with respect to age. All age groups on average are conservative and score below the optimum guess rate. In other words they choose less than 4.5 cards. The graph also highlights a distinct age difference. Younger subjects on average take fewer risks than the older age groups. These are of course average results and within each age group there were individuals who took higher or lower risks. Some individuals consistently turned over 8 or 9 cards and others consistently turned only 1 or 2 cards.

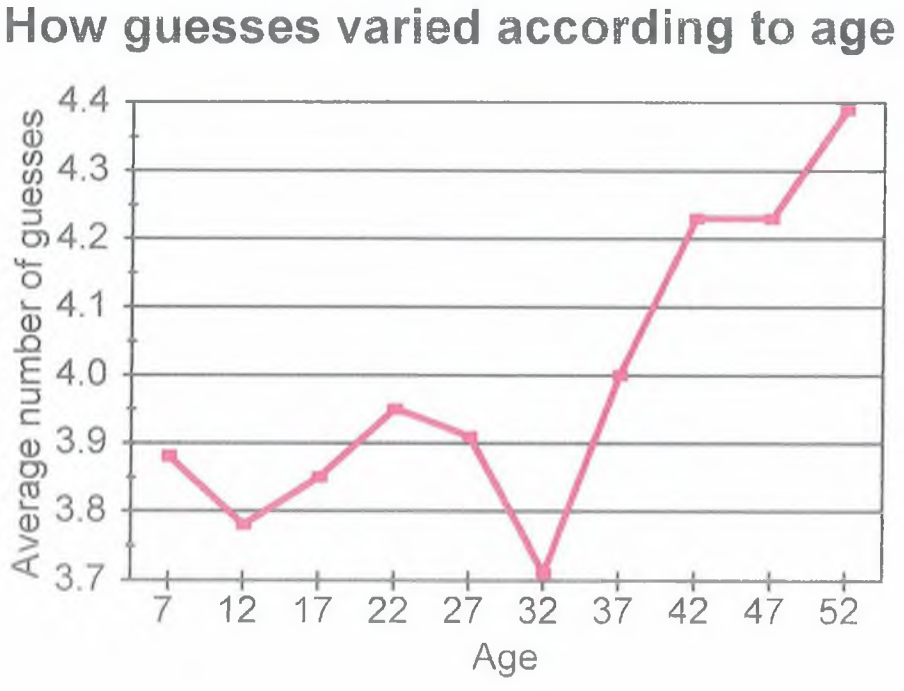

How guesses varied according to age
Average number of guesses
4.4
4.3
4.2
4.1
4.0
3.9
3.8
3.7
7
12
17
22
27
32
37
42
47
52
Age

Figure 6.3

Figure 6.4 shows the average scores of the males and females. It can be seen from this graph that on average, males take more risks than females. Another interesting result from this graph is that both male and female children have almost identical scores until they reach 12 years of age. It is only from adolescence onwards that the scores differ.

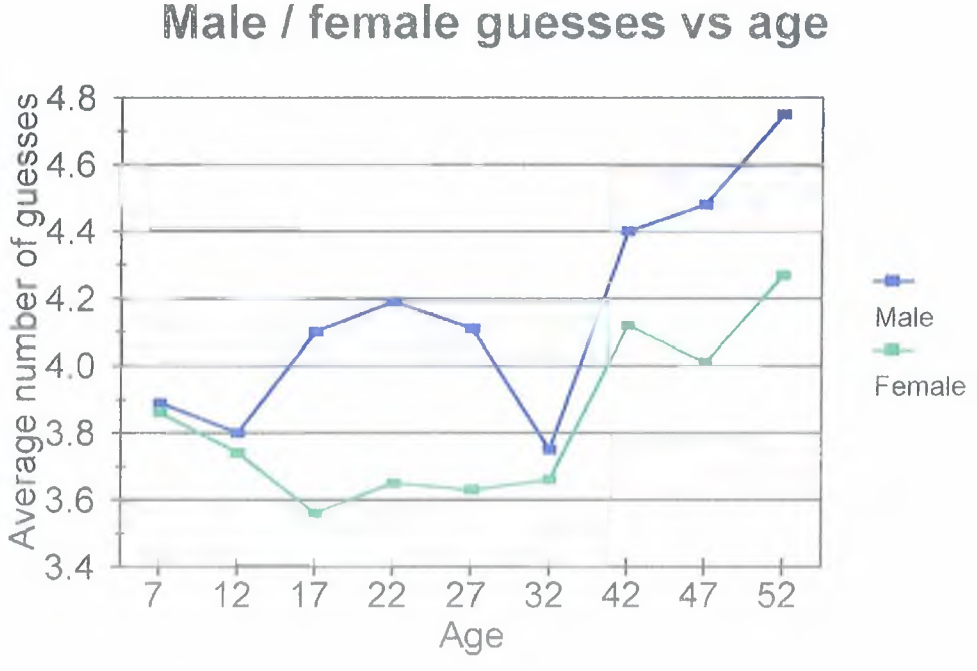


Figure 6.4

Table 6.3 shows an ANOVA analysis of the data

(a) Shows there is a significant difference between male and female results for the 15-19 year olds. These results are significant at the 95% level.

(b) Shows there is a significant difference between male and female results for the 20-24 year olds. These results are significant at the 98% level.

(c) Shows there is a significant difference between male and female results for the combined results of the 15-24 year olds. These results are significant at the 99.5% level.

Table 6.3

Analysis of variance (ANOVA)

(a) 15 to 19 year olds

Summary

Groups	Count	Sum	Average	Variance
f	22	78.40	3.56	0.87
m	25	102.40	4.10	0.74

Analysis of Variance

Source of Variation	*SS*	*df*	*MS*	*F*	*Significance level*
Between Groups	3.41	1	3.41	4.26	**95.00%**
Error	36.03	45	0.80		
Total	39.44	46			

(b) 20 to 24 year olds

Summary

Groups	Count	Sum	Average	Variance
f	39	142.50	3.65	0.79
m	46	192.90	4.19	0.61
x	2	8.00	4.00	0.72

Analysis of Variance

Source of Variation	*SS*	*df*	*MS*	*F*	*Significance level*
Between Groups	6.16	2	3.08	4.45	**98.00%**
Error	58.19	84	0.69		
Total	64.35	86			

(c) 15 to 24 year olds

Summary

Groups	Count	Sum	Average	Variance
f	61	220.90	3.62	0.81
m	71	295.30	4.16	0.65
x	2	8.00	4.00	0.72

Analysis of Variance

Source of Variation	*SS*	*df*	*MS*	*F*	*Significance level*
Between Groups	9.58	2	4.79	6.62	**99.50%**
Error	94.82	131	0.72		
Total	104.40	133			

The three significant findings of this experiment were as follows:

- males take more 'perceived' risks than females
- older subjects take more optimal risks than younger subjects
- both females and males took significantly less than the optimal level of risk

6.2.7 Discussion and conclusions

The results of this experiment quite clearly show that there is a significant gender difference between the perceived risk taking strategies adopted by subjects in a computer related environment. In line with the findings of research in other areas, the results show that in general males take greater perceived risks than females. The results also show that there is a significant learning effect in the adoption of the appropriate level of risk taking strategies. In general, younger participants adopted more cautious, 'safe' strategies in the computer game, while older subjects, i.e. those over 30 years, adopted risk taking strategies closer to the optimal level.

If we look at Figure 6.9 (See Study E) we can see that the average Internet user is male and over 30 years of age. When we look at the results of this perceived risk taking experiment we can see that the subjects that adopt the most optimal risk taking strategies are male and over 30 years of age. The author finds these parallels to be suggestive if not revealing.

6.3 STUDY (C): A RE-EXAMINATION OF DATA ON RECIPROCITY IN REVENGE PRESENTED BY JEAN PIAGET (1932) THAT WAS CARRIED OUT TO ESTABLISH WHETHER THE DATA CONFIRMS GENDER DIFFERENCES IN PERCEIVED RISK-TAKING STRATEGIES

6.3.1 Methodology

6.3.2 Background

In *The Moral Development Of The Child* (1932) Jean Piaget discusses reciprocity in revenge among young children and its role in the overall development of a concept of justice. (See Section 4.7.2.2) He presents data on an experiment that Mlle. Rambert who was one of his collaborators undertook. She asked 167 male and female school children a series of questions, one of which concerned the following moral questions:

"If anyone punches you, what do you do?" (Piaget 1932, p. 297).

The children's responses to this moral question were coded under four main headings: (a) It is naughty (b) Give back the same (c) Give back more (d) Give back less.

Jean Piaget presented the experimental findings in the following way:

	"It is naughty" %	"Give back the same" %	"Give back more" %	"Give back less" %
Age 6 Girls	82	18	-	-
Boys	50	37.5	12.5	-
7 G	45	45	10	-
B	27	27	46	-
8 G	25	42	8	25
B	45	22	33	-
9 G	14	29	-	57
B	29	57	14	-
10 G	-	20	-	80
B	6	54	31	7
11 G	-	33	-	67
B	-	31	31	38
12 G	-	22	-	78
B	-	67	10	23

When the basic responses of the subjects are examined it is clear that they relate closely to risk-taking strategies. For example, if a child responds that "It is naughty" to hit back then they are in effect adopting the lowest perceived risk strategy possible and are proposing that they would completely avoid the conflict situation. If a child suggests that the individual should "Give back less" this could be seen as a low risk strategy. Giving back "the same" would involve a higher level of risk-taking while giving back "more" could be seen as the riskiest of options.

6.3.3 Weighting system

In order to clarify the trends shown in Mlle. Rambert's findings a weighting system was attached to each response as follows: The 'it is naughty' response got a weighting of 0, 'give back less' received 1, 'give back the same' received 2, while 'give back more' was assigned a score of 3. The results are shown in Figure 6.5.

Using this weighting system the data presented by Jean Piaget was recalculated and recorded on computer to enable more extensive analysis. (See Figure 6.5)

6.3.4 Aims

The aims of this analysis were:

- To develop an appropriate weighting system which could be used to analyse the data presented by Jean Piaget.

- To carry out analysis of this enhanced data in order to assess its risk-taking properties.

6.3.5 Results

Figure 6.5

6.3.6 Discussion and conclusions

These results show quite clearly that at every age, girls opted for a less confrontational and therefore less risky approach in their responses. These findings (within the age limits of Jean Piaget's results), confirm the results of study (B) which showed that males took greater perceived risks than females. It should be clear from these results that differences in perceived risk taking strategies between the sexes may have been present in experimental data all along without being clearly recognised as such. The fact that both the computerised risk taking game and the reciprocity in revenge research give the same results in two entirely different experimental situations indicates that these behaviours are not just specific to the risk taking computerised game but are of a more general nature.

6.4 STUDY (D): AN EXPERIMENT TO TEST THE EFFECTS OF LABELLING ON PARTICIPATION RATES IN TWO OPTIONAL TESTS

6.4.1 Methodology

In this experiment, a computer program was devised which invited subjects to undertake a short, four question test and allowed them to choose to answer these questions in a linguistic or a computer test. (See Disk) The subjects indicated their preference by clicking on an icon marked either 'linguistic test' or 'computer test'. Records of their choice of either a linguistic or computer test, their sex and age band were stored in the computer program. These data were subsequently analysed with respect to sex, age and test choice.

126 volunteer subjects, 46 males and 80 females took part in this experiment. The subjects were students and staff members of the National College of Industrial Relations.

6.4.2 Aims

The aims of this experiment were to find out whether any sex differences could be found among subjects who are offered the choice of either participating in a linguistic test or a computer test.

6.4.3 Results

The responses of the females and males in this experiment are shown in Figure 6.6 The results clearly shows that there were no gender differences in the choice of test.

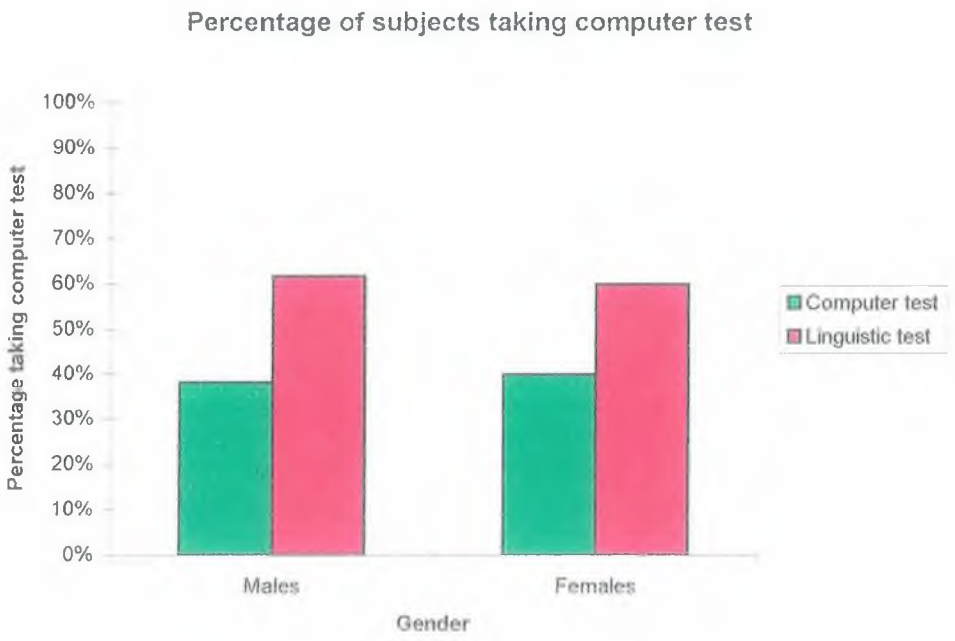


Figure 6.6

6.4.4 Discussion and conclusions

The author (Connolly 1997) has carried out research that appears to indicate that the gender proportions of student enrolment in two Dublin City University computer courses are affected by labelling. (See Table 6.4) Both of the courses in question require a similar level of computation skills from the student. However, one course that is entitled 'Computer Applications' has a majority of male students, while the second course entitled 'Computational Linguistics' is female dominated. One possible explanation for this phenomenon could be that the word 'linguistics' which is stereotypically associated with females influences both male and female students applying for these two courses. This experiment was carried out to investigate whether giving subjects a choice between undertaking a short 'linguistic' test or a short 'computer' test would result in gender differences in test choice.

Table 6.4

Computational Linguistics	*Males*	*Females*	*Computer Applications*	*Male*	*Female*
1991/1992	6	12	1991/1992	62	23
1992/1993	4	17	1992/1993	93	37
1993/1994	7	16	1993/1994	101	29
1994/1995	6	19	1994/1995	108	22
1995/1996	7	19	1995/1996	106	24
1996/1997	9	16	1996/1997	102	27
1997/1998	27	57	1997/1998	370	100

The results of this experiment indicate that there was no gender bias in the percentage of subjects who chose the linguistic test as opposed to the computer test. The experiment initially seemed straightforward, but on reflection, it is hard to see what exactly it says. A two to three minute experiment in which subjects are asked to choose between a linguistic and computer test may not be a true reflection on how people would choose a course which would have major implications for their future life plans. So the results of this experiment, though interesting, do not help to shed much light on the gender imbalances in the DCU courses. Obviously factors other than just the course title contribute to the gender imbalances in these courses.

The author therefore concludes that this is an area that needs further research and investigation.

6.5 STUDY (E): AN INVESTIGATIVE ANALYSIS OF SELECTIVE DATA DRAWN FROM EIGHT GEORGIA INSTITUTE OF TECHNOLOGY'S GRAPHIC, VISUALIZATION AND USABILITY CENTER WORLD WIDE WEB (GVU) USER SURVEYS

6.5.1 Methodology

6.5.2 Experimental design and procedure

A selective collection of data was carried out on seven World Wide Web (WWW) user surveys carried out by Georgia Institute of Technology's Graphic, Visualization and Usability Center (GVU) between January 1994 and November 1997. Altogether 105,154 subjects participated in the seven surveys. Although these surveys were carried out over a short period of time, it is fortunate that this interval corresponds with a period of rapid growth in Internet use. (See Appendix A)

The GVU surveys are self-selected surveys in which participants chose to respond to questionnaires that are posted on the Internet. The problems associated with self-selective sampling have been outlined in the GVU Eighth WWW survey (GVU 1997b). In total between January 1994 when the First survey was posted and November 1997 when the most recent Eighth survey was posted, 105,154 subjects have participated in the surveys. The breakdown of subject numbers is as follows:

Survey	*Number of participants*
First Survey (January 1994)	4,853 participants
Second Survey (October 1994)	3,522 participants
Third Survey (April 1995)	13,000 participants
Fourth Survey (October 1995)	23,000 participants
Fifth Survey (April 1996)	11,700 participants
Sixth Survey (October/November 1996)	15,000 participants
Seventh Survey (April/May 1997)	19,970 participants
Eighth Survey (October/November 1997)	10,109 participants

6.5.3 Aims

While surveys have been carried out since the Internet began, they have tended to be (a) one-off surveys (b) have been limited or inconsistent in the data presented or (c) have focused on aspects of Internet use such as usage patterns, media research, commercial market shares that are not of direct interest to this research project. The GVU surveys were chosen by the author for selective analysis because:

- They have been carried out every six months since January 1994 which corresponds to a period of exponential growth in Internet use.

- They have attracted a large number of respondents, i.e. 105,154 respondents up to the most recent Eighth Survey in November 1997.

- With the exception of the First and Second Surveys which have more limited information than later surveys, the data provided by the GVU surveys is both comprehensive and of relevance to this research project.

The aims of this investigative analysis were therefore:

1. To 'tailor-make' a data base of information that was relevant to this research project by collecting statistical information from seven GVU surveys concerning:

    - Geographical location of user
    - Age of user
    - Gender of user
    - Income of user
    - Occupation of user

2. To analyse this data base of relevant information in order to see worldwide trends in Internet user profiles, which may shed light on current sex differences in Internet usage and predict future trends.

6.5.4 Results

- **Nationality of Users.** The results of the GVU Surveys (1994a; 1994b; 1995a; 1995b; 1996a; 1996b; 1997a; 1997b) show that the Internet is not as 'global' and 'world-wide' as we may like to believe, since North American users form the majority of users in all of the surveys. (See Figure 6.7, Location of users)

The percentage of European and Canadian/Mexican users is dropping relative to the number of American users. This is as you would expect from two exponential growth rates in which the American growth rate is two to three years ahead of that of Europe and Canada/Mexico.

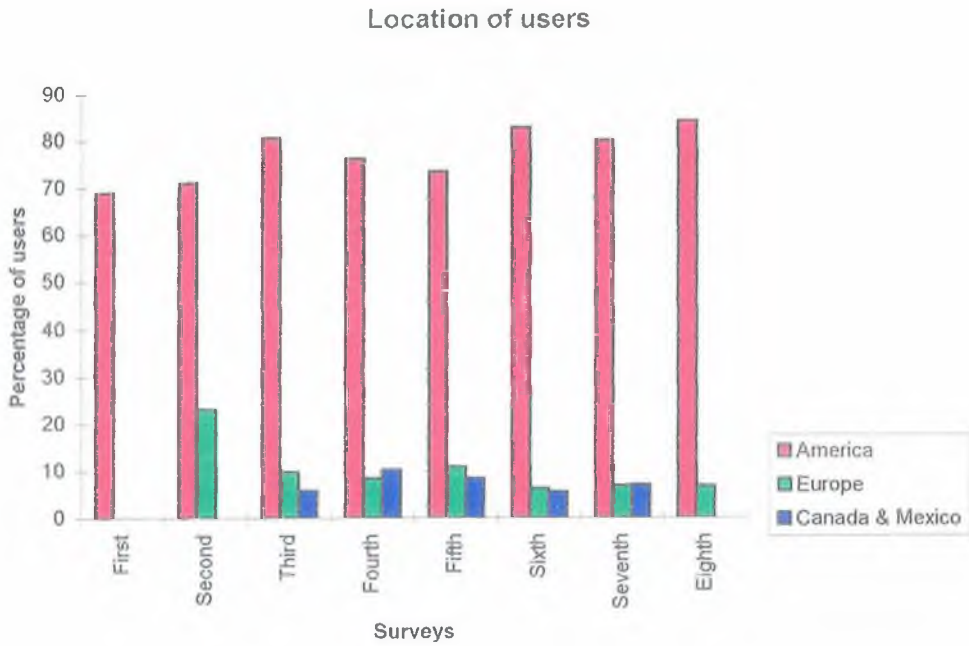


Figure 6.7

- **Age of Users.** According to the GVU 8th Survey (GVU 1997b) the average age of an Internet user is 35.7 years. (See Figure 6.8, Age of users)

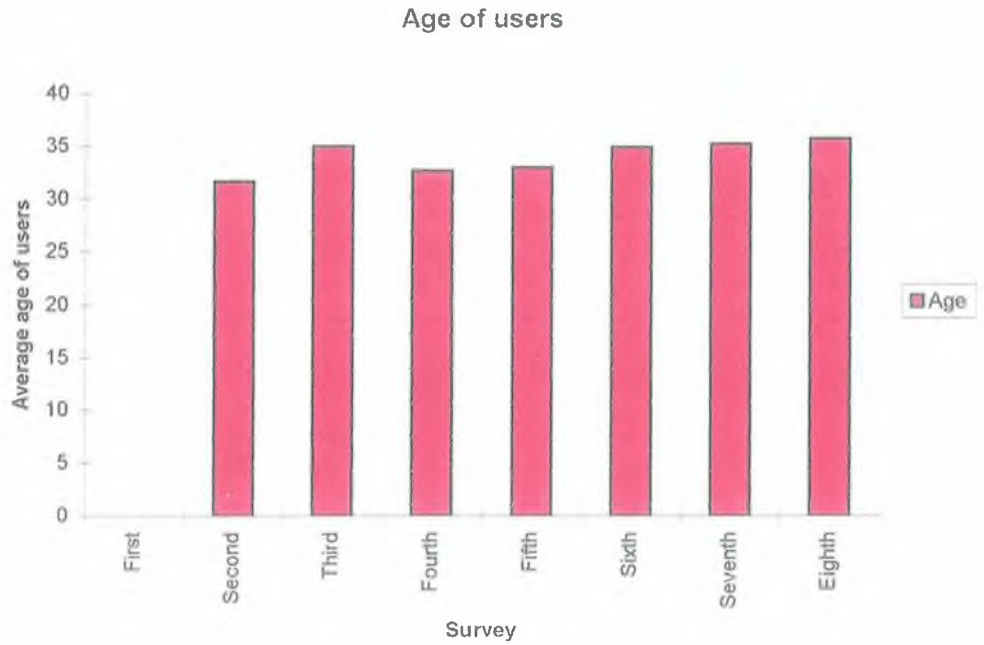


Figure 6.8

- **Gender**. Women represented 38.5% of internet users in the GVU 8th Survey (GVU,1997b). (See Figure 6.9) In general other surveys and researchers have found that females are in a minority on the Internet although figures vary. Early researchers reported a 10-15% participation rate (Regan Shade 1993; Truong *et al.* 1993; Herring 1994) while (DeBare 1996), a more recent researcher, reports a figure of 35% that is in line with the GVU 5th Survey (GVU 1996).

This graph clearly shows that the relative percentage of females using the Internet is increasing with time. The present representation of females in Europe reflects the situation that pertained in America two to three years ago, when the overall percentage of the American population of Internet users was similar to today's European levels.

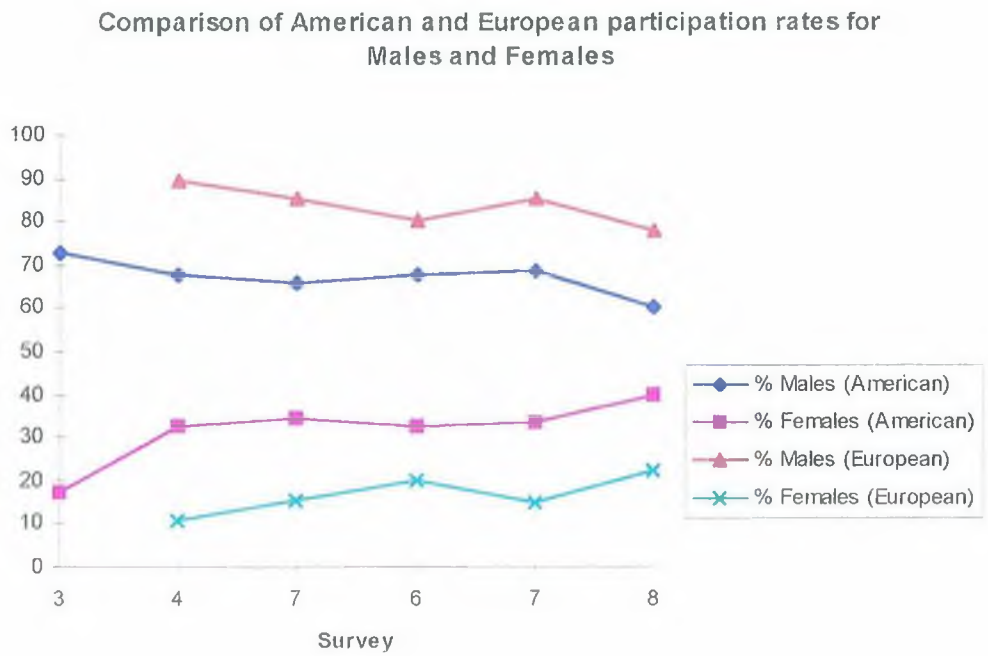


Figure 6.9

- **Income:** Overall, in spite of a high percentage of low income students using the Internet, the average income of an Internet user is high in comparison to world-wide averages. According to GVU's 8th Survey, the average Internet user has an income of US$53,000. (See Figure 6.10)

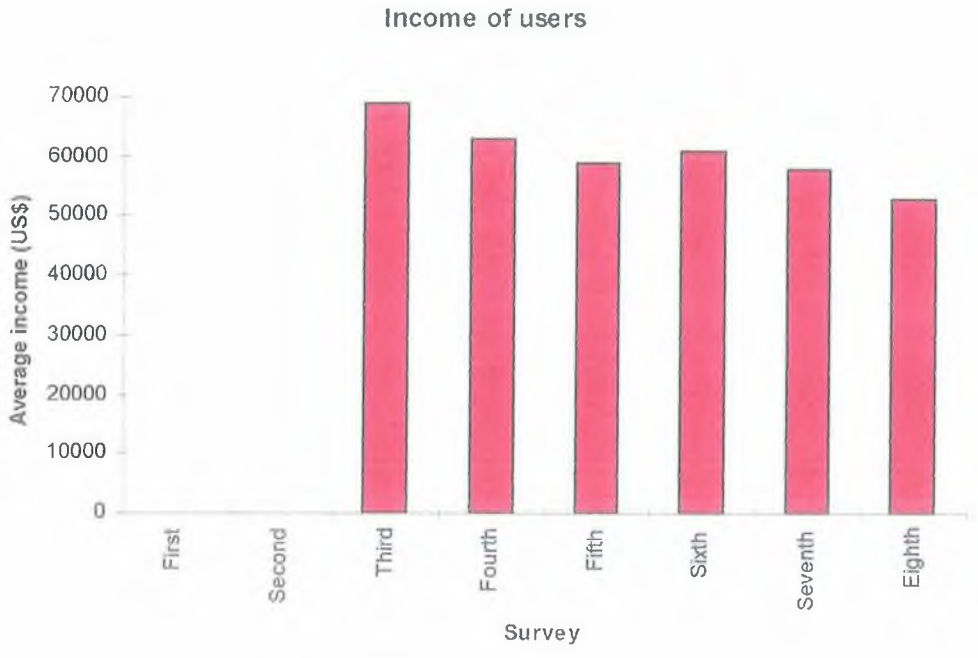


Figure 6.10

- **Occupation:** The GVU 8th Survey (GVU 1997b) reports that more than a third of the users, i.e. 38.5%, were employed in computer related jobs, 23.14% were in educationally related jobs or were students, 21.4% were professionals and 11.69% were in management or fell into the 'others' category. (See Figure 6.11, Occupation of users)

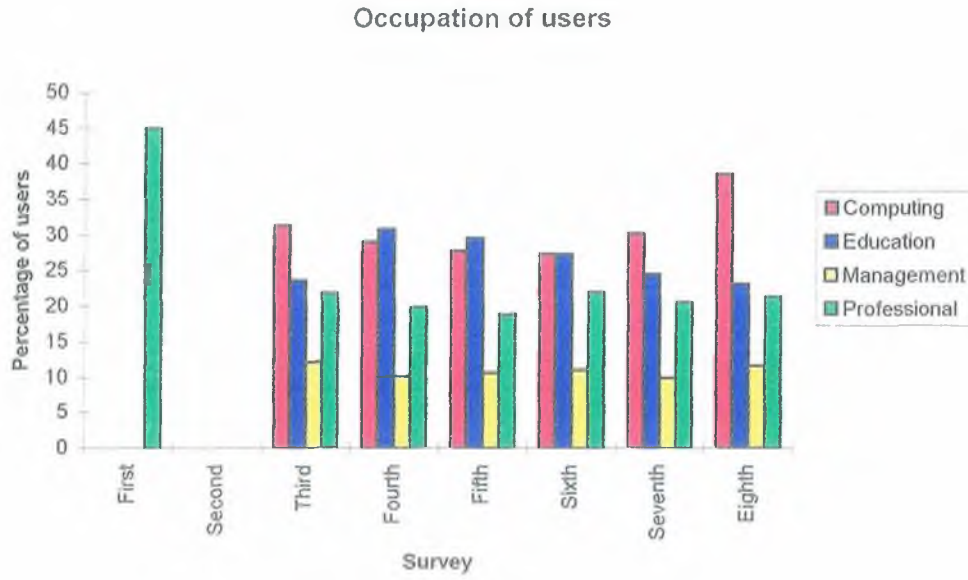


Figure 6.11

6.5.5 Discussion and conclusions

With the growth in use of the Internet among the general population, the relative percentage of females using the Internet has increased. Similar trends were seen in older technologies such as the car and telephone. What is remarkable about the Internet is the speed at which these developments have taken place. The author predicts that although the current level of female participation in Europe is low, it should within the next two to three years rise to the levels currently seen in America.

6.6 STUDY (F): A COMPARATIVE ANALYSIS OF GENDER BIAS FOUND IN SAMPLES OF INTERNET AND MALE AND FEMALE ORIENTED MAGAZINES

6.6.1 Methodology

6.6.2 Experimental design and procedure

An assumption was made that the gender bias of magazines can be determined from the relative percentages of male, female and child models used in a magazine. In order to establish whether a gender bias existed in two sample Internet magazines Wired and .net, the number of pictures of females, males and child models were counted and compared with the numbers found in two 'male interest' magazines – Esquire and GQ and two 'female interest' magazines – She and Cosmopolitan. These data were subsequently analysed. (See Table 6.5)

6.6.3 Aims

A survey of the literature shows that the Internet originated within a climate of male-dominated military and academic interests. This developmental origin would therefore help to explain the current domination of males in Internet use. Media commentators on the Internet and advertisements presented by Internet servers however, tend to portray the 'Net' as a friendly interesting technology that has equal appeal to both females and males. The aims of this investigation were to establish whether the photographic content of Internet magazines, which are obviously designed to appeal to those interested in the Internet, has any gender bias.

6.6.4 Results

When the photographic profiles of Wired and .net magazines were compared with the other magazines, it was found that the Internet magazines had a male gender bias that was similar to that found in 'male' magazines.

Table 6.5

	Males	Females	Children
Wired (averaged over 6 issues)	77%	19%	4%
.net (one issue)	74%	22%	4%
GQ (averaged over 6 issues)	80%	16%	4%
Esquire (one issue)	89%	9%	2%
SHE (averaged over 6 issues)	23%	56%	21%
Cosmopolitan (one issue)	25%	69%	6%

6.6.5 Discussion

Internet magazines are specifically marketed to appeal to would-be and current Internet users and to increase the level of interest in the Internet. This analysis of photographic content indicates that there are significant differences in the proportions of female, male and child models used within popular 'female' and 'male' magazines. The popularity of these particular 'male' and 'female' magazines indicates that they are targeted correctly and hold an appeal for their gender targeted audience. The findings of this investigation show that Internet magazines are either consciously or

unconsciously designed to appeal to males. This indicates that females are unlikely to find them appealing or interesting. Since Internet magazines provide up-to-date information on the latest Internet developments and help to maintain and increase interest in the Internet, the exclusion of females from the potential target audience of Internet magazines such as Wired and .net, help to explain the overall underrepresentation of females on the Internet.

6.6.6 Conclusions

In the light of the three step theoretical framework mechanism presented in Chapter 7, the results of this study show that popular Internet magazines contribute to the maintenance of the masculinisation of the Internet.

7. THEORETICAL FRAMEWORK TO EXPLAIN THE DEVELOPMENT OF GENDERISATION IN ACTIVITIES, OCCUPATIONS AND TECHNOLOGIES

All societies in the world perpetuate social differences between the genders with customs, clothes, work-roles and pastimes that differentiate and define what constitutes a 'woman's world' and a 'man's world'. These customs and differentiated sex roles vary from place to place and so, for example, 88% of medical graduates in Denmark are female while females represent only 44% of medical graduates in Italy (Eurostat 1995) (See Appendix A); bricklayers are predominantly women in the former Soviet Union yet in Ireland you will only find male bricklayers. Sex roles also change over time so that for instance, in the early 1900's most teachers were male and now women dominate in the teaching profession.

When we look at stereotypical sex roles it is relatively easy to understand the development of some persistent and traditional gender differences in areas such as child care and warfare. Females are biologically equipped to undertake the care and nursing of their young babies and children and 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, Eleanor Maccoby and Carol Jacklin (1974) have established 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.

Gender equality agendas have helped to raise public awareness of previously unconscious levels of acceptance for patriarchal values, powers and status within our society. Sexual discrimination legislation has been introduced to correct gender discriminating policies within the legal, political, and employment areas, while efforts continue to introduce more 'politically correct' language in publications and the media generally, so that an ethos of gender equality is established. These developments leave us with the impression that eventually by a slow process of

elimination, all areas of sexual discrimination will disappear from our society and men and women will be equal academically, socially, legally, financially and politically. But we have to ask the question, will this happen?

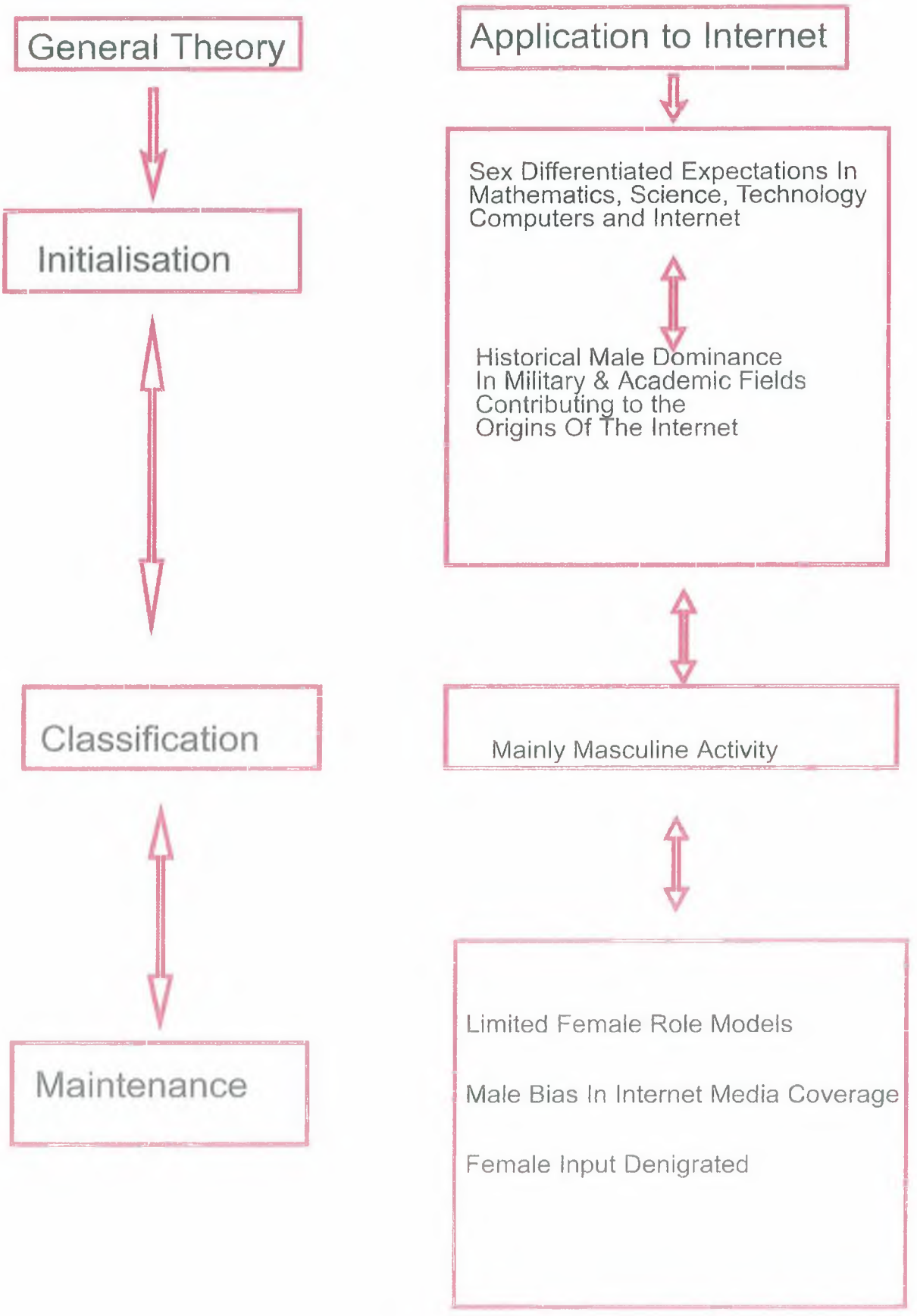
7.1 A THEORY FOR THE GENDERISATION OF ACTIVITIES

In order to understand more fully the genderising processes that may occur within an activity or occupation, it is necessary to examine the processes that lead to an occupation being dominated by one gender. To date, explanations that attempt to account for the different gender ratios within occupations, activities and new technologies, have lacked a theoretical framework. While researchers on the Internet have, for instance, examined the ratios and contents of male and female postings to newsgroups and mailing lists, these facts of themselves do not explain fully why females are underrepresented on newsgroups or why they fail to access the Internet in the first place. I am proposing a three-step mechanism that I believe helps to explain the processes by which some activities, occupations and new technologies in particular, become gendered. (See Schematic Diagram 7.1 which highlights the main factors that appear to contribute to the genderisation of the Internet)

7.1.1 Step 1 Initialisation.

For an activity to become gendered there must be some mechanism or mechanisms that initially cause one gender or the other to predominate. This initial step could be purely random. For example, if a new activity initially involved a small number of people, say perhaps, five people, four of one gender and one of the other, then this accidental ratio may cause the activity to be associated with one gender rather than the other. Alternatively, the initialisation step may be complex and arise from a long socialization process. For instance, the new activity may arise in an area that is already dominated by one gender. This is illustrated in Nigeria where females are the main agricultural workers and food producers and this has led to female domination of the sale of goods in the Nigerian market-place. Another example can be seen in the fact that although men predominate in the computer field, women's association with

Schematic Diagram 7.1



typing has led to their cross-over to the field of word-processing, which is currently dominated by women.

7.1.2 Step 2 Classification.

Once an activity attracts more members of one gender than the other, the activity may become classified as being a 'feminine' or a 'masculine' activity. Alternatively the activity may be labelled masculine or feminine for stereotypical socialisation reasons. For example, technologies such as food processors, microwave cookers, knitting machines and washing machines are labelled 'feminine' due to their association with domestic work, which is stereotyped as 'female work'.

7.1.3 Step 3. Maintenance.

Once an activity has become labelled, a mechanism or mechanisms are required to maintain or enforce the stereotyping.

For example, the attractiveness of an occupation varies according to the proportion of males and females employed. Males are attracted to already male dominated occupations and as Madeline Heilman (1979) found out, they 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.

The status of an occupation varies according to the proportion of males and females employed. When the majority of workers in a field are female, the apparent 'professionalism' and image of that occupation changes. Secretaries, bank clerks, teachers, pharmacists, English professors and psychiatrists provide examples of occupations that have lost status as they have become more female dominated (Borsook 1996). When the gender balance has tipped so far that the occupation is

dominated by females, males are often actively recruited to redress the balance and improve the 'status image' of the job. However, as John Touhey (1974a; 1974b) has shown, female dominated occupations are less attractive to both males and females.

When members of one gender attempt to enter a field dominated by the other gender, impeding or promoting mechanisms may operate. An impeding mechanism appears to operate when females move into a 'male designated' occupation such as engineering, business, or computer science. They tend to hit what Hymowitz and Schellhardt (cited by Roth Walsh, 1997) termed the 'glass ceiling', an invisible barrier that blocks them from obtaining the top positions. On the other hand, a promoting mechanism seems to operate when males enter a 'female designated' occupation such as nursing, primary level teaching or librarianship. They tend to experience what Christine Williams (1995) describes as the 'glass escalator effect'. They are moved along an invisible 'up' escalator to higher pay and status than their female colleagues. This balancing act between male or female domination of an occupation and the subsequent shifting of status within occupations, acts as a filter controlling access to these occupations.

If the mechanism is not too rigid, it is possible for the gender identification to drift with time. If we look at a technology such as the telephone, we find that originally the telephone was marketed as a 'male' technology to be used for business purposes. At first; 'private calls' were charged at a higher rate than 'business calls' (Spender 1995). Over time however, women increased their social use of the phone and so extended the intended use of this technology. As many studies have shown, females now use the residential phone more than men (Martin 1991).

7.2 NEW TECHNOLOGIES AS A TEST OF THIS THEORY

What patterns of gender differentiation occur when a new activity is invented which is a novel experience for everyone in that society? In our present-day society this is occurring on a daily basis. More inventions have been made within the last two decades than in all the years since the beginning of civilisation. New technologies are developing and 'mutating' exponentially, and these technologies result in rapidly

changing work patterns and life styles. It is estimated that the future jobs of 90% of the children currently in pre-school have not been invented yet (Women and Work 1996).

New technologies may appear to arrive in our society 'baggageless' and unencumbered by traditional attitudes and societal gender prohibitions. These technologies develop within our modern-day society, which, as previously mentioned, gives great lip-service to the principle of equal rights for males and females, thereby leading us to expect non-gender differentiated patterns within new technology usage. It is very surprising then when we discover that this is not the case.

Let us consider, for example, the Internet. This new technology that was invented in the late 1960's has become readily available to the public within the last 5 years. The best 'guesstimates' indicate that there are approximately 112 million Internet users, although these participation rates are still low in relation to overall populations, with for example, only 10% of the US population and 1% of the Irish population on-line (Kiberd 1997). Research indicates that males presently dominate the Internet and females represent between 10-38% of the Internet population. Gender differentiation has therefore occurred within this area of technology and established that the Internet is part of 'a man's world'.

Nevertheless, over time the proportion of female Internet users has increased. Early surveys of Internet users indicated female participation at 10%, while the most recent surveys show that particularly in the United States where college access to the Internet is standard, females represent about 40% of users. Within Europe however, where Internet usage is still in its early stages, females represent just 22% of users. So we can see that gradually the percentage of female participation on the Internet can be expected to rise, although only time will tell how gendered the activity will remain.

7.3 APPLYING THIS THEORY OF GENDERISATION MECHANISMS TO THE INTERNET

7.3.1 Step 1 Initialisation

Technologies "bear the imprint of the people and social context in which they developed" (Wajcman 1991, p. 22) and this can be seen in the development of the computer and the Internet. These technologies arose from a marriage between military needs and scientific academic interests. Early computers were designed to carry out military calculations during World War Two, while the Internet was designed during the Cold War to carry information successfully from one computer to another in the event of a nuclear attack. Military personnel and scientific and engineering departments of universities are male dominated and so their associated connection with both computers and the Internet appears to have contributed to a male dominance of these technologies.

Other factors that may be responsible for male dominance of the Internet are indicated in the results of the Motorola Report (1995). This Report claims that males are more likely to see themselves as 'a risk-taker', 'innovator', 'leader', 'ideas person', and a person who is 'familiar with IT' (Information Technology). Females on the other hand were more likely to see themselves as a 'follower', as a 'cautious person' and a person who is 'scared of new technology'. Similarly Rogers (1962, cited by Hellman 1996, p. 6) found that males were 'early adopters' of new technologies, while Betty Collis (1985) found that female adolescents saw themselves as "inadequate in the face of technology" (p. 211). The results of Study (B) confirm the Motorola findings and show that males took more perceived risks than females. (See Section 6.2) These results might be explained in the following way:

Society appears to adopt a protective attitude towards females which leads to a restrictive style of child-rearing, education, life-style and employment opportunities for females. The 'hidden curriculum' of gender stereotyping and segregation that permeates the educational system often leads to gender differentiated subjects, career

choices and expectations for success. Femininity as a stereotypical ideal is not portrayed as compatible with technological competence, or with doing dangerous or risky things. As a result of these trends, it appears that females, in general, are less adventurous and less likely to take risks than males in our society and are consequently cautious in approaching new technologies. When technologies have become more established within a society, as in the case of the car, women are then more likely to participate.

Males on the other hand are reared in a less restrictive manner than females, they are allowed more personal freedom even from a very early age, and are expected to be out-going, adventurous and risk-takers. While this approach to life results in greater levels of deaths and accidents among males, it also contributes to the situation where males are early adopters of new and unproven machines and technologies. The process of socialisation which males and females in our society experience therefore affects the initialisation process of a new technology. Females are more likely to withdraw from 'scary' new technologies such as the Internet until they are well established, which therefore appears to have facilitated a male domination of this new Internet technology.

7.3.2 Step 2 Classification

Survey after survey confirms that males dominate the Internet (VNU Newmedia 1996; GVU 1994a; 1994b; 1995a; 1995b; 1996a; 1996b; 1997a; 1997b). However, within the Internet and IT industry, many believe that this fact is accidental and that the Internet is not a gendered technology. In fact many go so far as to believe that the Internet is a totally democratic technology and communication tool, without any 'social context information' that could indicate status, power or gender Kiesler *et al.* (1984).

The apparent 'democratic neutrality' of the Internet is however largely a myth since the VNU survey (VNU Newmedia 1996) and GVU surveys (1994a; 1994b; 1995a; 1995b; 1996a; 1996b; 1997a; 1997b) confirm that the Internet is monopolised by

upwardly mobile educated white males, and is not being significantly accessed by females or lower socio-economic groups.

There are a number of factors that lead me to conclude that the Internet has been gendered and has been classified as a 'male-interest' technology.

(1) Advertisements for all aspects of computing and the Internet predominantly tend to feature males using computers and accessing the Internet and they generally present males as experts within these fields.

(2) Internet magazines are generally displayed on newsagent shelves beside specifically labelled 'male-interest' magazines such as 'Esquire', and 'GQ'.

(3) The media, in general, assume that the Internet user is male. Newspaper articles, radio and television programmes, films tend to portray males as Internet and computer users.

(4) The results from Study (G) (See Chapter 6.6) confirm that Internet magazines are marketed and therefore labelled as a 'male interest', which subsequently limits the attractiveness of the Internet for potential female Internet users.

7.3.3 Step 3 Maintenance

On the surface, the Internet appears to be a 'depersonalised ' technology that lacks 'social context information' Kiesler *et al.* (1984). While audio and visual means of communication on the Internet are becoming more widespread, at the moment, on-line communication primarily takes place through text only and users can 'hide behind' gender and status – neutral 'handles'. What mechanisms are therefore operating which can account for the underrepresentation of females on the Internet?

Research shows that many women feel uncomfortable with aspects of the on-line community (Herring 1993; 1994; Regan Shade 1993; Spender 1995). Susan Herring, for example, found that many women felt intimidated by the type of discourse and flaming which can occur on-line and which Susan Herring describes as "a rough and ready form of justice on the virtual frontier" (Herring 1994, p. 7). As a result, many females leave the Internet, while others resort to confining themselves to the use of email among their friends and to the use of moderated women-only mailing lists instead of the more public newsgroups.

Susan Herring further suggests that the communication styles of many users are so gendered that other users regularly infer the gender of a user just from the communication style used. However, the results of Study A, Section 6.1 show that the average person cannot determine the gender of the author from the text alone. Therefore the main factors affecting the maintenance of the Internet as a male hegemony are external to the text.

The well documented male presence on Newsgroups, Mailing Lists and Bulletin Boards guarantees that the main topics under discussion are of male interest. The tendency for males to write more than females (confirmed by Study A, Section 6.1) means that the bulk of texts are of male authorship. In addition, the general media presentation of the Internet as a male technology (as confirmed by Study G, Section 6.6 and discussed in Section 5.3.5.6) helps to ensure the Internet's greater appeal for males. These factors and not so much the actual texts themselves contribute to the current maintenance of the Internet as 'male'.

8. GENERAL DISCUSSION

There are many theories that offer explanations to account for the development of a gender role identity which results in the display and adoption of 'feminine' or 'masculine' behaviours, attitudes, approaches and sex roles. The process of developing a gender role identity is a complex one which can go 'wrong' genetically, physically, psychologically and socially. There are, for example, individuals who genetically are assigned to a particular sex but develop a gender role identity which is associated with the opposite sex.

The very fact that individuals develop a gender role identity implies that there are differences between the genders. These gender differences are often of cultural and historical origin and are not necessarily part of the genetic makeup. For example, females in western societies are stereotypically associated with wearing bright clothes, makeup and jewellery. Males who adopt dress, jewellery and makeup styles 'normally' associated with females are likely to be labelled 'effeminate' in a derogatory way. However, in the late 17th century aristocratic men wore wigs, makeup, bright clothes and beautiful fabrics and yet were considered to be fully 'masculine' (O'Driscoll 1998). Another example can be seen in the fact that while 88% of medical graduates in Denmark are female, in Italy females only represent only 44% of graduates (Eurostat 1995). (See Appendix A)

It is argued by evolutionary psychologists that psychological structures such as gender role identity must have had some beneficial effects in the past for human society. Perhaps the demarcation of labour allowed for a smoother functioning of society by allowing for specialisation without friction within family units. In earlier educational systems it might have been handier for mothers to pass on skills to daughters and fathers to pass on skills to sons since they represented obvious role models. It is debatable however, whether it is still necessary to have these sex differentiated roles in today's modern society where trade and production have become globalised and education has become more standardised. On the other hand, it may be that genderisation processes may still be of psychological or sociological benefit to society. This is an area that requires further investigation.

The literature review and research carried out by the author highlights the fact that technologies can become gendered and that the Internet, for example, is presently genderised as a 'male' technology. A number of historical, biological, sociocultural, and psychological factors appear to have interacted with each other and led to the current male hegemony of the Internet. Using the theoretical framework proposed by the author, we can recognise that these interacting factors have contributed to the male initialisation and classification of the Internet, which have in turn resulted in the maintenance of the Internet as a male interest. The process of genderisation can however, change with time and this is occurring on the Internet with the growing participation of females. From a study of other technologies that have fluctuated back and forth in their genderisation patterns, it is obvious that gender imbalances in activities and technological use can be rectified. The theoretical framework provides a tool for analysing and interpreting these processes and could assist in pin pointing problem areas in existing or new technologies.

8.1 GENERAL CONCLUSIONS

1. It can be concluded that new technologies are capable of being gendered during their introductory phase. The Internet in particular for the last few years has been genderised as a male technology and it looks likely to remain so for the next few years. The current trends in the US indicate that eventually it should become gender balanced. In the meantime however, females are being disadvantaged in their access to and use of the Internet.

2. It seems clear that new technologies should be examined for genderisation at their introductory stages and efforts should be made to make sure that they are presented to the public in a non genderised way.

3. The three-step mechanism proposed in the theoretical framework provides a tool which can facilitate the analysis of potential genderisation processes associated with a technology .

9. GENERAL RECOMMENDATIONS

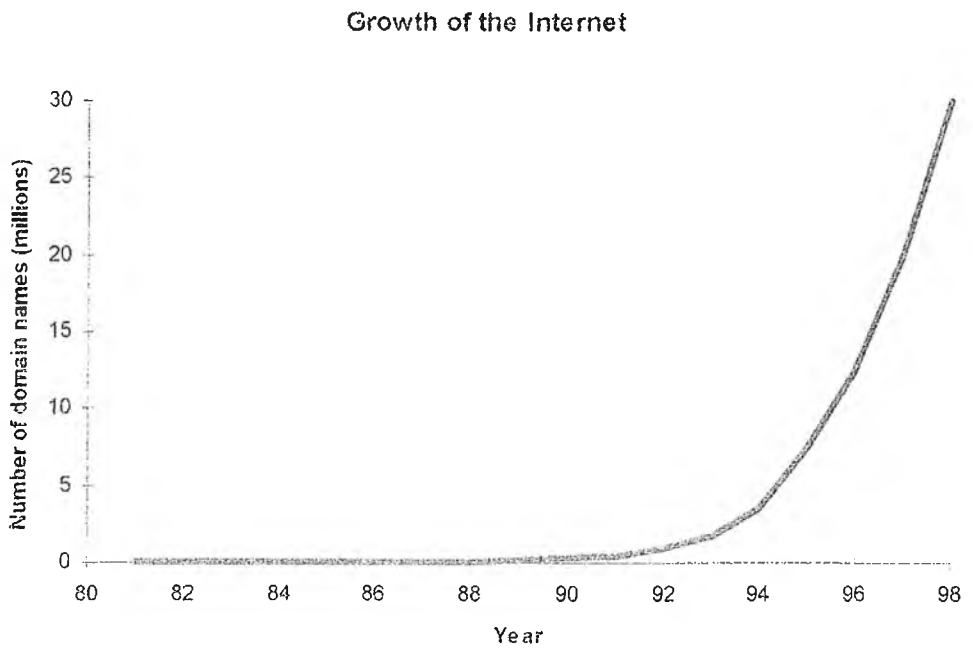
1. When introducing new technologies to the market place it is necessary to take account of initialisation and classification processes that may operate to unnecessarily exclude members of one sex. This is important from a commercial and financial point of view in order to optimise the full potential of technologies and ensure that the market is not restricted to members of just one sex.

2. The design of educational syllabi should be gender balanced. In those situations where genderised initialisation has already taken place, it may be necessary to discriminate positively towards one sex for a short period. However, care must be taken to ensure that this 'positive discrimination' does not tip the balance 'too far' in the opposite direction. An example of this can be seen in the case of mathematical education in the United Kingdom, where girls who were originally underachieving are now out-performing boys. Karen Gold (1995) also reports on a school where in the name of 'gender equality' and 'political correctness' all 'macho' books were removed from the school library. In reading tests administered to the pupils, the boys performed badly. To try to improve reading standards among the male pupils who lagged behind the female students, the school purchased a range of books that were full of adventures and violence. When the next reading tests were administered, the reading scores of the boys had caught up with those of the girls. These examples illustrate the necessity of having proper checks and balances within schools and educational institutions.

3. If genderisation of a technology or activity has occurred it may be necessary when attempting to redress these gender imbalances to provide subsidies that could ensure the market survival of publications of magazines, games and other information designed specifically for members of the underrepresented sex.

10. APPENDICES

APPENDIX A:
GROWTH OF DOMAINS 1981 TO 1998



Source: Ward, M. (1998) Name Games. *New Scientist,* **157**, 2124, 20-21

APPENDIX B: TRANSCRIPTS OF FORTY TEXTS USED IN STUDY (A) ARRANGED UNDER EACH OF THE FIVE TOPIC HEADINGS

The following texts are presented unedited, exactly as presented by the students and including all spelling and grammar errors.

Question (1) Is it safe to eat beef?

(a)

Given the current uncertainties regarding the beef processing industry, it is probably wise to think about whether beef is, in fact, safe for human consumption. While it would certainly seem logical not to eat beef until such time as the uncertainties have been resolved, this logic has certainly not been applied in my case. I suppose I have, to a certain extent, been persuaded by the blurb issued by the Departments of Agriculture both here and in other countries which have been found to have cases of BSE, while the fears of such countries as Russia and Egypt in banning Irish beef seem to me a over-reaction to the situation. I feel, given that agriculture is such an important industry in this country has led to many people feeling that an attack on an element of this industry is almost an attack on the nation itself. Thus my persistence in consuming its products may be more to do with a defence of the country and its interests than anything else.

Is it safe to eat beef? To be honest, I simply don't know. Nonetheless, I am willing to take the risk.

(b)

Survey : 27/01/1997

Is Beef Safe To eat ?

All though in this day and age we all have to watch what we are eating, as regards red meat, cholesterol levels etc. in relation to the BSE scare in the Republic of Ireland and the British Isles recently, I think people are being a little over cautious. Although personally I prefer to eat fish or chicken to red meat, if you are sure about the origin of the beef then I feel it is alright to eat beef. My mother shops in a major supermarket chain that guarantee that all their beef is organically and naturally fed with none of the feeds, held responsible for the BSE scare used in feeding their cattle. I think if people look at the situation in perspective they'll realise they can be over doing the whole beef scare.

(c)

(1) Is beef safe to eat?

Yes, I believe beef is safe to eat. I personally have no worries about eating beef and eat it about once a week. I do think though that there should be more research into the topic. The public don't know how much contaminated beef they have to eat before they develop CJD

(d)

1)Is it safe to eat beef?

At first when I heard about mad cow disease and CJD, I thought it was all exaggerated, people were making a big fuss about nothing but now I would have second thoughts about eating processed beef in Britain. I think Irish beef is safer than British beef because we have stricter health and safety rules. When I'm going to buy a burger I don't really think oh no beef isn't safe, I usually don't even think of it.

(e)

1-In my opinion it is safe to eat beef in Ireland because most of the problems have been in England , however I would be cautious when eating minced beef or hamburgers . I think that there was a lot of hype around the time that it came out first although some people did die I think that the fuss will die down eventually but I do hope that they sort it out soon as it affects farmers badly.

(f)

(1) Is it safe to eat beef. I personally am a vegetarian but as with many vegies I am like this for many reasons . My reasons stem from religion i.e. Buddhism . The safety of beef never entered into the decision its popularity in the press was not even great

at the time . If forced into an answer I would say no beef is not safe to eat . My reasons are not CJD based but based on the facts that at the age of 40 the average man has 5lbs of undigested red meat in there bowels , fat form red meat causes clogging in arteries and you can get all the vitamins you need from more easily digestible vegetables and particularly wonderful fish .

(g)

(1)

I don't think it is safe to eat beef because there have been too many cases where people have died from it. People don't really know whether the cow had mad cow disease or not. I probably would eat chicken more than I'd eat beef as I think it would be more safe. I would like to become a vegetarian but feel that I need the vitamins and iron beef provides for you. I would be less inclined to eat beef rather than lamb or pork and I try to eat the minimum amount of beef as possible.

(h)

(1) Where Irish beef is concerned I would like to believe that it is safe to eat, otherwise there is going to be an epidemic of 'mad cow disease' in a few years time, given the amount of people still consuming beef in this country. It appeared to me that initially, the beef scare caused sales of beef to drop dramatically, but once the hype died down people began eating beef again. Being a vegetarian myself it is not a personal concern of mine whether beef is safe to consume or not – though in terms of success in our economy it would be far more advantageous to us as a nation if our beef was safe.

Question (2) Is the university points system fair?

(a)

Is the university points system fair ?

In my opinion the university points system is responsible for most of the pressure placed on school leavers today. I think there is too much emphasis on university being the "be all and end all" of a persons career. It ends up placing a lot of needless pressure on students. In saying that I think the points race is responsible for the high standard of education in Ireland, with a higher calibre of student entering college these days.

(b)

2-No, definitely not!!! I believe that the whole education system needs revising in Ireland because it doesn't prepare you for the outside world. I did my Leaving Cert. two years ago and I remember it being a very stressful time. I think that it is a shame that there is so much emphasis on points. I hope a time will come when people will be able to do the courses they want without worrying about points.

In America , there are so many colleges that you have the option of choosing which one you would prefer, I don't know if that will ever happen in Ireland.

(c)

2) Given the fact that I repeated my leaving certificate in order to gain access to college, I suppose I am likely to be somewhat biased on this particular issue. Whether that will colour my opinion against the points system or subconsciously in favour of it, I couldn't say.

On the whole, I do feel that the points system most certainly represents an accurate reflection of a persons knowledge and ability to present a particular topic on a given day, safe in the knowledge that it has not been interfered with by anyone for the benefit or detriment of the student involved. It allows for a quick and relatively cheap selection procedure in determining the allocation of college places. It is used as an alternative to costly interviews or continuous assessments which might give a fairer overall picture but would be considered impractical by many and would almost certainly be difficult to introduce in an environment where teachers are trying to cut back their workload and introduce early retirement schemes.

Nonetheless, other countries such as the United States do use a combination of each of these three methods in their selection procedures and while it causes the student to have to work more consistently hard throughout their educational career, it avoids the panic which sets in every June in this country. Given this potential for the reduction of stress, I don't believe the system to be fair to students. Perhaps if all Leaving Cert. students were to be given the vote prior to the exam, there would be more of a political impetus towards change. Certainly Niamh Bhreathnach might experience some electoral difficulties in Dun Laoghaire-Rathdown.

(d)

(2) The university points system is not fair . Its the first step towards Huxley's Brave new world . It ignores continual year long effort , personal preference or ability i.e. the subjects I do in the leaving cert. have no association with the course I do in college if I want to do languages I must be good at maths and science , when I don't get the points the college doesn't care I got an A in French and English but cares that I didn't get enough points from the other subjects . The system is a rat race in which everyone is a number , other countries avoid this why can't we .

(e)

(2)

Yes it is fairly fair as people are judged by their abilities to cope under stress and under exam pressure and when you're in college these are the things that you have to deal with on a continuous basis. The Leaving Cert. exam is really the best indicator as to a students academic capabilities. However there should be more emphasis put on students being continually assessed during 5th and 6th year instead of just 1 exam being taken into account, as the student might just be having a bad day or be too nervous. Also a person might be put under pressure by their parents which gives the student added worries onto what they already have to cope with. After this being said , if a student can't cope with exam pressure they won't have a chance of surviving through college either.

(f)

(2) I believe that the points system is a fair system of determining who should be allocated places in third level. It is however, a very competitive system with the points getting higher and higher each year. This should be a good sign that the standard of our education system is improving.

(g)

(2) Is the university points system fair?

Yes, I believe it is fair. It rewards the people who have studied hard for their results. But the problem with it is that people with high points just choose a course because of its points even though they have no aptitude for it. Students with lower points but have a high aptitude and interest in the course can't do it because they aren't very good at Irish, English, or Maths.

(h)

2) Is the university points system fair?

I don't think it is fair at all. I think it would be better if the points were graded going by how difficult the course is and by interviews with each applicant rather than depending totally on supply and demand.

Question (3) What should be done about Sellafield nuclear station?

(a)

3)What should be done about Sellafield nuclear station?

I think this is a very difficult question. Ecologically thinking I would say it should be closed down, all nuclear stations should be closed down but then you have to think of all the people that work at the stations. There are whole communities depending on the stations for a living. In countries like France where nuclear power is their only source of energy I kind of think less harshly of them but Britain has all the oil rigs, do they really need power from nuclear stations as well. As Sellafield is only a nuclear dump I think they should make it the upmost importance to make sure it is totally safe.

(b)

What should be done about the Sellafield nuclear station ?

I think that the Sellafield problem is case of being proactive as opposed to being reactive. In the case of Sellafield I think Greenpeace should be given free reign over that area in order to do what they do so well and try to return the area to its original form as much as possible. I also think that the govt. in question should seriously consider what this is doing to the natural habitat of not only their country but to surrounding countries and environment. In any case I would whole heartedly believe that Greenpeace should take the govt. in question to the European Court of Human Rights. As it is a case against human rights and their natural habitat.

(c)

(3) What should be done about the Sellafield nuclear station?

I think that it should be better regulated. Enough isn't being done to ensure its run properly. When safety has been breached in the past not enough was done to make sure it didn't happen again. Also, the fumes given off by the station drift towards the east coast or Ireland and have quite obviously caused an increase the cancer and leukaemia levels. It isn't fair that people who have nothing to do with the station should suffer like this. I know there is no way British Nuclear Fuels are going to shut down the plant, so all I can hope for is for it to be better regulated by the British government. Also, the Irish government should do its part and put pressure on the British government for regulation and for compensation for the station's victims.

(d)

3-I don't actually know much about Sellafield but I do know that what happened in Tchernobel should never happen again. Here we may not realise how much Sellafield does affect Ireland but the winds carry over poisonous gases so we are affected .

If people don't want Sellafield to extend their factory , we need to protest and let them know we care.

(e)

(3) The Sellafield plant should be closed down . Ireland has one of the most nuclear polluted seas in Europe with out even owning one nuclear plant . If I through my rubbish into my neighbours garden it would not be allowed in fact the police might arrest me for dumping but because it is on an international scale it's some how expectable to England and Europe . Nuclear power has been proven to be too dangerous yet some how it continuos , the logic and reasoning is totally beyond me.

(f)

(6) Given the dangers posed by a nuclear reprocessing/power plant, as evidenced by the devastating aftermath of 1986 Chernobyl disaster, the effects of which, it is estimated, will remain in the area for 22,000 years and may result in the destruction of the Belorussian people by the year 2020, it is surprising that more people in Ireland are not involved in campaigning against the continued presence of Sellafield lying not 70 miles from our coastline.

Of course, the reality is that, regardless of what the people of Ireland might do, it is highly unlikely that the station will ever be closed down. No international pressure will be exerted on the British government because all of the major, relevant powers

(Russia, France and the US.) have their own nuclear plants. Additionally, in the current anti-European climate which exists in Britain, any judgement on the matter would, most likely, be ignored by the British government. As the nuclear industry is so important to the provision of sufficient power in the UK, let alone being a huge source of employment (3,000 are employed at Sellafield alone), the British electorate are hardly likely to campaign against it not least of all because it is so far away from any major population base.

What should be done? It, and all nuclear plants, should be closed down in favour of more environmentally friendly and renewable power sources. What should the Irish people do? Frankly it's not really worth doing much. What will be done? Absolutely nothing until the accident.

(g)

(3)

I think that there should be more protective actions being taken to minimise the effects that the Sellafield nuclear station has on the environment . We do need the station but the environment has to pay for it in the meantime. I think overall people in general should be more cautious as regards to the products they use and the effects the products have on the environment , Sellafield isn't the only area from which dangerous chemicals come from. If we are able to cope without Sellafield altogether

it should be gotten rid of , but I don't think this is a likely occurrence so preventative measures should be taken.

(h)

(3) Ideally I would like to see it being decommissioned, though this is a romantic ideal, since the vast cost of decommissioning such a dangerous station makes it unfeasible.

Question (4) Is marriage necessary?

(a)

(4) Is marriage necessary?

I do not believe that it should be necessary, but with Irish laws the way they are people are discriminated against because they are living together. So because of this it is necessary. For example with tax, if you are living together you are classed as two single people with regards to your tax-free allowance, but if you were married your tax-free allowance would be increased greatly. This is the same with social welfare where you get less benefits if you are living together. Also, if a person dies intestate, their partner of say 10 or 20 years will not automatically get the house they shared

together or anything else. They would have to go through loads of legal wrangle and still might come out with nothing.

Another point is that if a couple living together have a child. The child would be seen as illegitimate under the law and a lot of society as well.

(b)

(4) Yes marriage is necessary , but I still voted for divorcee in the last referendum . I see marriage being necessary because people need rules and laws to conform to and to rebel against to evolve . I think the paradox is that with out law and order man has now freedom . I not sure how much sense it makes but with out it I would just see chaos in an emotional and legal sense .

(c)

4-I wouldn't say that marriage is completely necessary but I think that it is a good thing . Different people have different ideas – some like their independence , some like the security of having someone to turn to. I believe that marriage seals the fact that two people want to be together ., however it doesn't always work out for the best.

(d)

4)Is marriage necessary?

I don't think marriage is necessary unless the couple was going to have a baby.

In some circumstances the couple would be better off financially if they were married, I think that is a shame because its like they are being forced to get married. When children are involved I think couples should get married if they love each other and are already 100% committed to each other.

(e)

(5) I really don't believe marriage is necessary in today's society, a society which has changed so much in the last generation. Couples living out of wedlock is almost an expected element of every neighbourhood, while children born to these relationships no longer have any stigma attached to them and benefit from the full recognition of the state.

As far as the sanctity of marriage is concerned, given the large number of separations which occur here every year and now the availability of divorce and remarriage, marriage itself has become somewhat less relevant. Certainly the idea of 'till death us do part' is gone. Will this have a detrimental effect on society as a whole? Only time will tell but I would have a certain degree of hope in the ability of the Irish people to maintain a healthy society regardless.

(f)

(4) Of course marriage is necessary if the population is to continue growing!! Ha, ha – this of course is the view instilled in us as a nation of good Catholics, where sex outside marriage is forbidden. I believe that marriage should be something two people decide to undertake when they love each other and want to share the rest of their lives together.

(g)

Is marriage necessary ?

I think that is up to individuals in question. As for myself I would feel that marriage is necessary in a relationship that seeks a long term committal as it is the greatest show of love one human being can express to another. By committing themselves permanently for life (all arguments on divorce aside) I think it is the ultimate statement of love. It also gives children a more stable environment to grow up in.

(h)

(4)

No, I don't think marriage is necessary. A lot of people get married because they feel they have to. They may feel they're getting old, they may worry about what other people think i.e. their parents or friends, and in the past they may have gotten married because they were pregnant , which I think is stupid . It has been shown time after time that men will cheat on their wives , whether they're married or not , so I

don't see what the point is in getting married if you're husband will cheat on you anyway. It is socially expected to get married and if you don't people will think there's something wrong with you.

Question (5) Can we trust Irish politicians?

(a)

(5)

No , I don't think that we can trust Irish politicians as they always say one thing and do another. All their interested in is getting their votes and they'll do whatever it takes to achieve this, even if it means lying to the public. Most politicians are richer than the average worker and can't really understand what the average person has to go through . Personally I would not trust any politician at all.

(b)

(5) Can we trust Irish politicians?

In my opinion it depends on the individual politicians and parties. It wouldn't be fair to throw them all together under one generalisation. I personally will never vote for Fianna Fail or any of its politicians. Over the years they have shown themselves to be so devious and two-faced and not to be trusted. For a gun runner like Charlie Haughey to have become Taoiseach was a disgrace. Also, during the peace-process with Albert Reynolds as Taoiseach he said one thing and did another. The picture of him shaking hands with John Hume and Gerry Adams was a disgrace. As soon as he was out of government he was stabbing the British government in the back and showing his real staunch republican views. Also, the Minister for Justice, Maire Geoghan Quinn, releasing all those IRA prisoners as a sign of "peace" was despicable. These were people who had bombed and killed innocent people and had years left on their sentence.

Personally, I trust the majority of the other politicians in the Dail but there is no way I will trust Fianna Fail.

(c)

5-It all depends on the politician. You have to admit that it is hard to trust them especially after all the scandals recently . – that business with Ben Dunne , and the

politicians who use taxpayers money to go on holidays. Things like that can be really annoying – not so much for me (a student) but moreso for hardworking taxpayers. On the other hand , being a politician does mean that you are always being watched by the public and that cant be easy for them. Its probably easier for us, the public , to complain.

I would hope that they would try not to abuse their power.

(d)

5)Can we trust Irish politicians? I don't think we can trust Irish politicians at all. Going from their track records I don't think even one of them is trustable .

(e)

Can we trust Irish politicians ?

I think on the whole we can trust Irish politicians. Of course there are always going to be a few who will stray and get up to questionable actions, but on the whole I feel that most politicians have the good of the country at heart. I think by not showing any belief in our politicians shows a disbelief in our whole way of thinking as a nation and can be detrimental to the health of Ireland.

(f)

(5) The only thing we can thrust about Irish and in fact most politicians is that they are guaranteed to abandon all pre-election promises and follow there own agenda and goals . The idea of elected officials lost all meaning a long time ago . You see the system is that we elect people to run our civil services for us and to help them we give them a share of our earnings and they do the best the can to make things better for as little as possible . What a joke , we still have a huge national debt ,

' needle ' muggings at ten a day , one of the highest unemployment rates in Europe and now an increase on certain products . There's taxes when you buy a home when you sell a home even taxes when you buy a Mars bar . And as a result has our lives been improved greatly , no I CAN'T walk around the streets of my own town because it's not safe and my sister can't go to college because she's not smart enough . Comedian Eddie Murphy made a movie about a comedy about a corrupt member of the American congress , I think it's the most realistic film about politics ever .

(g)

(5) Definitely not, I would be reluctant to trust anyone in politics simply by the nature of their profession. I realise that this is a very cynical attitude but the amount of

empty promises that politicians spout off – especially around election times – makes me wonder if they can differentiate between reality and imagination.

(h)

Given the widespread refusal to answer questions regarding the availing of Irish politicians of the recent tax amnesty, I would have some doubts. I don't however, believe that the isolated issue of Michael Lowry should colour all politicians.

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