HACKERS
An Anomalous Global Community

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INTRODUCTION

This book is about the people known as 'computer hackers'. The concept of the 'hacker' has changed since its inception, and it is now widely applied to a group of people very different from those who first called themselves hackers. It is hackers in their original incarnation who are my subjects. (See glossary for explanations of jargon and technical terms).

My analysis of the hacker community is informed largely by the work of A.P.Cohen (1985), in which a community is defined by the symbolic boundaries built around it. I consider that Cohen's method is the most suitable for the bounding and analysis of a community which is difficult to define in any other way.

However, the hacker community is unlike most which have been studied by ethnographers, is not confined to one locality. Thus consideration must be given to methods which have been applied to other groups which are not so confined. The problem is that those methods do not apply satisfactorily to the hacker community.

I argue that hackers are members of a world-wide community different from any other and, therefore, that an examination of them is not only useful ethnographically, but can also raise questions about the methods of analysing such groups.

The first chapter following this introduction is a prolegomenon to the main discussion of the rest of the thesis. In it I discuss a number of factors which determine

and define the field and the people under analysis. I look at the differences in the two meanings of the term 'hacker', how it took on its later meaning, and the differences between the two groups. Some important doubts are raised in relation to many of the sources of information about hackers which not only tend to further confuse the differences but also to reinforce stereotypes. I argue that much of this material must be discarded since it is either wrong or misleading.

In the next chapter I discuss the method I use in arguing that the hackers are members of a community. I follow A.P.Cohen's (1985) approach to the definition of the boundaries of a community by their symbolic nature. This chapter lays down the ground rules which I use in later chapters.

In the third chapter I argue that hackers should be seen as members of a community by discussing the Hacker Ethic; the ethos or ideology on which the community is built. I discuss the Hacker Ethic as the basis of the hacker community and how it objectifies the hacker world-view.

I continue the argument in the following chapter where I consider the hacker community as it is symbolically constructed and defined. The community has a number of boundary defining mechanisms which separate it from the outer world and from the rest of the computer culture. I also argue that, over time, the hacker community changed from being confined to a number of separate localities, into a single community which is international in its scope.

Finally, I contrast the hacker community with other communities which are not confined to one locality. I suggest that the methods applied to those other communities are inapplicable to the hacker community. I argue that it differs from them both in its basis and in its structure.

In conclusion, I argue that my analysis of the hacker community challenges questions which we normally ask when we approach communities which are not localised. As I demonstrate, hackers are members of a global community different from others which have been studied. Therefore those differences must be taken into account when devising definitions which can be applied to all global communities.

PROLEGOMENON: ON DEFINING THE FIELD

The purpose of this chapter is to set out what ideas and stereotypes should be put aside when first looking at those people who call themselves hackers. I argue that much that has been written about them is misleading or wrong, and that common stereotypes have led to an image of them which needs revising.

The term 'hacker' as most people understand it today -- as referring to those who break into other people's computer systems and either steal data or cause malicious damage -- is largely a result of media attention. The original 'hackers' were very different. Attempts have been made to replace 'hacker' in its current incarnation with other terms such as 'cracker'. They have been largely unsuccessful, partly because those who break into computer systems call themselves 'hackers', and, perhaps more importantly, most people are not aware that the term had an original, very different meaning.

To avoid the confusion which occurs in many books, and which follows from using the same term (hacker) to refer to two different groups, I use 'cracker' or 'system cracker' to refer to those who 'crack' or break into other people's computer systems, and reserve 'hacker' to refer to the original group known by that term.

Even those writers who are aware that there are two types of hackers often confuse the issue and apply the same criticisms to both groups. The purpose of this chapter is to show that, despite what might be said of crackers, hackers

are not all "computer addicts unable to control their irresponsible, compulsive behavior" (Sterling 1994:58), nor any of a number of other derogatory descriptions which have been applied to them.

The reader will notice that, when referring to hackers, I use the designation 'he'. I am not being sexist nor ignoring the contributions which women have made in the field of computing. The reason is that I have been unable to find any reference to a female hacker. There have been many women who were excellent professional programmers -- indeed it is claimed that the first programmer was a woman: Countess Ada Lovelace wrote the instructions for Charles Babbage's mechanical computer, the 'differencing engine', in the 1830s. It seems that women simply do not become hackers. Why this should be so is an interesting question which I discuss later.

The beginning of hacking is usually traced back to the group of young men who gathered around the computer at the Massachusetts Institute of Technology (MIT) in the late 1950s, "that pure hacker paradise, the Tech Square monastery where one lived to hack, and hacked to live" (Levy 1984:421). Tech (or Technology) Square is the building at MIT where, on the ninth floor, the computers are housed. Groups at other American universities, such as Stanford, also formed around the same time.

From the beginning the boundary between the hackers and professional computer people was drawn. To the professionals, 'hacker' was a derisive term (Levy 1984:ix); to the hackers, the professionals were staid and restricted access to the computer. The fact that some of the

hackers were not students at the Institute, and some of those who were students were neglecting their studies, did not make for a smooth relationship. Whilst some of the staff, such as Marvin Minsky, (himself something of a hacker) encouraged the hackers, others, such as Joseph Weizenbaum, saw them only as "computer bums, compulsive programmers" (Weizenbaum 1976:116).

During the 1970s the hackers at MIT played a great part in developing the 'Incompatible' Time-Sharing (ITS) system. The ITS system became something of a world standard in operating systems, noted for its ease of use and comprehensive facilities. But shortly after, a move began which gradually excluded hackers from the main computers to a great extent. Some of them moved into the Artificial Intelligence Laboratory where they found a more congenial atmosphere. But many resented the change because they lost much of their freedom: they now worked mainly on projects suggested or directed by other people; the freedom to choose and follow their own interests was limited. However, at about the same time, a new revolution began, which would bring hacking within the compass of more people, would open computers up to anyone who wanted one, and was to produce a new generation of hackers. The home computer was born.

In 1975 Model Instrumentation Telemetry Systems (MITS), of Albuquerque, New Mexico, introduced the first home computer kit, the Altair. It was small, had little memory, and there was no software available, but it made computing available to anyone who could put the kit

together. MITS expected to sell a few hundred kits; they sold thousands. No longer was access to a mainframe computer necessary, now anyone could be a hacker in his or her own home. Soon other home computers appeared on the market, either in kit form -- to be put together at home -- or ready to use. Computer clubs proliferated across America, and soon across the world.

An important aspect of both these periods, which I discuss in greater detail when I examine the hacker community, was that information gained by individual hackers was made available to anyone who wanted it. The sharing, and free availability, of such information was one of the basic tenets of what has been called 'The Hacker Ethic'. 'The Hacker Ethic' is, more correctly speaking, an ethos rather than an ethic, since it is not a system of morals, but rather an embodiment of the 'spirit' of hackerdom.

The third phase was a complex one and so I deal only briefly with it, to bring out the contrasts with the previous periods. A number of new avenues of interest were opened to computer users. Communications between computers via the telephone system became practical and more and more business computers were accessible through telephone links; computer games became more realistic; and very importantly the cost of ready-to-run computers and modems dropped in price. Thus, more and more people had access to computers and could communicate with others using their computers. An important influx of people into the computer-hobbyist sub-culture at this stage were the so-called 'phone phreaks' (sic) who had long before found

ways of using the public telephone system as their 'playground'.

It was during this phase that the conflicting meanings of hacker developed. The most important development being that 'hacking' became synonymous with 'system hacking' (or cracking) -- breaking into other (usually business or other large organisations') computer systems and either causing trouble or stealing information. This use of the term 'hacker' was adopted by the media, and became the one known to the general public, much to the disgust of the 'old-time' hackers. Since many of the new crackers considered access to information as a public right, they condoned the breaking into of computer systems and the theft of data. Also many of the new home-computer users were politically active and saw the computer, and in particular, bulletin boards, as a useful tool in breaking down bureaucratic control of information.

Simons points out that crackers do not break into computer systems for the challenge. They acquire passwords and information from other crackers which permits them to easily bypass any security procedures. Their aim is access to the data on the computer in the simplest way. Discovered or stolen passwords, telephone numbers and access codes are often posted on bulletin boards for anyone to read (Simons 1989:91).

On the other hand, the cracker problem may itself have been a media creation. Bonnett shows that, statistically speaking, crackers are only responsible for one-tenth of one percent (0.1%) of computer crime; most of it is

committed by people who have legitimate access to the computer (Bonnett 1987:7).

During this period, the original hackers did not disappear. However, some of the criticism of crackers spread to hackers, and hence the popularity of admitting to being a hacker declined. I argue later that although the number of hackers apparently declined, many people became hackers in all but name. Although there was some fragmentation, the hacker community did not completely disappear, and the Hacker Ethic continued to be an ideal of many computer hobbyists.

Most people who write on the subject are either not aware of the difference between hackers and crackers, or are aware but only add to the confusion of the issue. It is difficult at times for one to identify those at whom comments are aimed, since the term 'hacker' is used for both groups. It appears that, of all the sources, only Levy and Turkle went out and actually spoke to hackers about themselves.

Sterling (1994: 55) notes the difference, and that:

> there are hackers today who fiercely and publicly resist any besmirching of the noble title of hacker. Naturally and understandably, they deeply resent the attack on their values implicit in using the word 'hacker' as a synonym for computer criminal (Sterling 1994:55).

He rather spoils it when he adds:

> This book, sadly, but in my opinion unavoidably, rather adds to the degradation of the term.... [because] 'hacker' is what computer intruders choose to call t*hemselves* (Stirling 1994:55. Emphasis in original).

Whatever the justification for using the same term for both groups, there appears to be a need to show that there is a difference. To not do so misleads the general reader into believing the stereotype of all hackers being criminals (Simons 1989; Forester and Morrison 1990; *et al.*) or psychopathologically disturbed (Weizenbaum 1976:121).

Weizenbaum, a professor in the Computer Science Department at MIT, contributed considerably towards the stereotypical view of the hacker in his rather pessimistic book *Computer Power and Human Reason* (1976). He describes, with approval, the manner and appearance of professional programmers and contrasts it with hackers and hacking, to the detriment of hackers (Weizenbaum 1976:116 ff). But he takes the dictionary definition of 'to hack', not realising that to hackers it means something very different, indeed it is something of a self-parody.

Weizenbaum goes on to describe hackers as "bright young men of dishevelled appearance, often with sunken glowing eyes", "[t]heir rumpled clothes, their unwashed and unshaven faces, and their uncombed hair all testify that they are oblivious to their bodies and to the world in which they move"; "These are computer bums, compulsive

programmers" (1976:116). He compares hackers with compulsive gamblers: both, he says, suffer from "megalomania and fantasies of omnipotence" (Weizenbaum 1976:122). The diatribe quickly becomes wearying.

Many later writers quote Weizenbaum -- often without credit -- or paraphrase his description of hackers. It is surprising that they do not, apparently, bother to explore the reasons for his statements, perhaps because the stereotype suits their purposes.

Levy calls the passage in Weizenbaum from which I have taken the above, 'notorious' (Levy 1984:124), and says that he "found them [hackers] quite different. Beneath their often unimposing exteriors, they were adventurers, visionaries, risk-takers, artists..." (Levy 1984:ix).

Levy describes Weizenbaum as "a thin, moustachioed man" who rarely associated with the hackers. Perhaps his (Weizenbaum's) greatest claim to fame was a program called ELIZA. An adaptation called DOCTOR performed the role of an analyst in encouraging the user to talk about his or her problems (Weizenbaum 1976:4ff). That Weizenbaum was a high-ranking academic, and that ELIZA was written in BASIC would not have impressed the hackers, for reasons which I discuss later. Indeed, he would have been beyond the pale unless he could demonstrate his ability to hack, and was probably ignored for all intents and purposes. Since Weizenbaum comes over as rather pompous in his book, it is possible that he disliked the hackers simply because they did not show him the respect that he felt his position deserved. And perhaps the hackers were doing things with the computer, and achieving results,

such as Weizenbaum had never thought possible. Thus Weizenbaum's description appears to be, in some respects, the result of a personality clash. Levy points out that Weizenbaum later modified his description, saying that it was not derived from the hackers at MIT. But they still took it personally (Levy 1984:125), even though Weizeman did qualify his statement by saying that it did not apply to all hackers and that some had contributed greatly to the improvement of computers (Weizenbaum 1976:118-9).

Sherry Turkle sees the computer as a medium onto which the individual can project her or his personality, like the Rorschach ink-blot test of psychology (Turkle 1984:15-6). To the hacker, the computer is always referred to as a 'machine'. It reflects the hacker personality in that it is a device to be investigated, improved, and used to develop ideas. Also, a program often contains algorithms and tricks which reflect the way a hacker thinks. If this is what Turkle means as a projection of the hacker's personality, then she is correct. However, hackers rarely visualise their computers as anything but machines. That fetishisation of computers appears far more common amongst non-hackers, can be illustrated by an observation.

Some time ago I saw a hacker demonstrating his new computer to a group of fellow hackers. He had set it up so that when it required a response from the user it printed the message "Yes Master, what are your orders?" on the screen. This appears at first sight to be a prime case of fetishisation. However his purpose was two-fold: firstly it was a joke, almost a self-parody; and, secondly, it was done

to show off the way in which he had hacked the operating system. A week later the message had disappeared from the screen, never to return. The joke had staled, the hack was history.

On the other hand, I later observed a friend (definitely a non-hacker) who had bought a new computer by which she felt threatened. She had had the command line prompt set up to use her name, so that she could feel that the computer was talking to her, personally. She now refuses to have it changed, since she feels comfortable with it, and has given the computer a name. The name (Kit) is interesting since as well as being a diminutive form of her own name it also refers to a small, furry, baby animal. She also has a pair of knitted baby's booties hanging from one of the knobs, and photographs of her children sitting on top of the computer. It appears that she has removed the threat that she felt when she first acquired the computer by making it, symbolically, part of her family, in particular, one of her 'children'. A hacker would never feel threatened in this way.

Thus, much of what has been said or written about hackers is misleading as the basis for an understanding of them and their community. Of necessity, some sources I have had to use, but always with caution. Wherever possible, I have used informants from within the hacker community as foils against whom to test sources and ideas. Unfortunately, hackers have rarely written about themselves, so first-hand accounts are difficult to find.

Having now defined what hackers are not, I continue, in the next chapter, by declaring the method by

which I shall discuss hackers as they are. It is the first step towards defining hackers as members of a global community.

A.P.COHEN AND THE SYMBOLIC CONSTRUCTION OF COMMUNITY

In this chapter I consider A.P.Cohen's approach to the definition of community. I suggest that his approach to the community as a symbolic construct is suitable for defining the hacker community.

Cohen (1985) argues that the meaning of community is displayed in the form of symbols which the community constructs for itself; that it is a system of ideals, values and moral codes which provide its members with cohesion and identity within the defined boundaries of the group; and that the symbols define both the community and its boundaries. He argues that those symbols are constructed from the way the people think about their community, and are in turn used to express how the members see their community in their interaction with the wider world. But the symbols need not, and probably will not, have rigid meanings; the same symbol may mean different things to different people.

Cohen rejects past attempts to define 'community', since there seems to no one satisfactory definition which fits all cases. Rather he says that he will interpret the word by the manner in which it is used (Cohen 1985:12). He suggests two related factors in the concept of community. Firstly, that there are some common factors among the people of the community, and secondly, that they are distinguished from other similar groups by those factors, which might include a way of life, a ritual or whatever. So the meaning of 'community' depends on a relationship. To

Cohen, this relationship is most apparent at the boundary between communities. It is at the boundary that one community distinguishes itself from another, both by the similarities within and the differences without (Cohen 1985:12).

Next he discusses the boundary, which he says "marks the beginning and the end of a community" (Cohen 1985:12), and proceeds to answer the question of why it is necessary to mark those limits. His answer is that it "encapsulates the identity of the community and...is called into being by the exigencies of social interaction." (Cohen 1985:12). That is, the boundaries set the limits of those who belong and those who do not, and are necessary so that both the members of the community and those outside will know the limits of social interaction. The community, in effect, says that the wider world stops here.

There are a number of ways in which the boundary can be defined, depending on the community. They may be national borders, legal proscriptions, or physical features of the landscape. They may also be based on ideology, religion, language or race. But, and Cohen stresses this point (Cohen 1985:12), they may not be so objective, they may only exist in the minds of the community members. Thus, the boundary might have different meanings for different people, both inside and out, and even for some of those on the same side of the boundary. Again Cohen stresses the importance of the boundary in understanding community as an experience. He argues that the vital point is the meaning that people give to a boundary, that is, its

symbolic function (Cohen 1985:12-3). Unfortunately, perhaps, this means that the boundaries may not only mean different things to different people, but also that they may see the boundaries in different places, or not see them at all.

Cohen is critical of earlier approaches to the study of community, particularly those modelled on Durkheim's methods (Cohen 1985:20). In his view, those methods tended towards finding integrative structures which held the social group together in spite of its tendency to fragment. Culture was seen as part of that integrative force.

Cohen's approach is to see a community as individuals, who have adopted a collection of common symbols. The symbols are imprecise and may not have the same meaning to all. But, providing that they share the symbol, the differences in meaning are not important (Cohen 1985:21). The individuals may not even be aware that they have differences of meaning. Thus, Cohen argues that the community coheres because the symbols can accommodate different meanings, allowing individuality without splitting the community (Cohen 1985:21). This process he calls 'aggregation'.

Cohen argues that symbols are used to rebuild boundaries when the normal structures of the community begin to break down due to changes in itself or the outside society. His main point is "that symbolism does not so much carry meaning as allow people to impute meaning to it" (Cohen 1985:70-1).

A community presents its boundary in two very different ways: the view for the outsider, or for the insider.

According to Cohen, the view presented to the outside is simple and rather stereotyped, whereas that seen inside is complex, because it is a montage of the different values of different people. These he calls the 'public' and the 'private' faces of the community (Cohen 1985:74-5)

The public face is the image which the community shows the outsider. It may be a stereotype of the community as the outsider sees it, accepted by the people to be used as a mask to hide their real identity. That is, it might only reflect what the outsider thinks, consciously adopted so that it does not reveal anything of the insiders' values. Alternatively, it might be deliberately built by the community, by, for instance, exaggerating some characteristic of the group. Again, it will hide the inner variety of the community.

The private face is more complex, in that it reflects how the people in the community see themselves and their community. It is at this level that Cohen defines 'community', where he finds the meanings of the symbols and how they give value to the meaning of community.

Cohen also points out that similar appearances may be deceptive, because the people of a community might adopt a symbol from outside, but give it their own meaning. He argues that they may adopt the structure but not the meaning. This may or may not be done to mislead the outsiders, by hiding the substance behind the symbol (Cohen 1985:86).

To Cohen, community is a mental construct. It is more than the structure of the community or the behaviour

of its members. It is, rather, how those members think about the community. The extent and boundaries of the community are products of the minds of the people who belong to the community: it means what they want it to mean.

This meaning, and its symbols, often come from the past; either real or mythical. But it is not a simple slavish following of tradition. The past is used to provide meaning to current practices which are threatened by the encroachment of the outside world. The community is made to, or rather makes itself, feel different because its past is different (Cohen 1985::99).

Cohen argues that because the community is so highly symbolized that each person can interpret it in a way that suits his or her own values. Furthermore, the symbolism is sufficiently flexible that it can encompass a variety of individuals without any of them feeling that they have lost any individuality. By belonging to such a community, the people have something to which they can refer their individuality. They also have a means of distinguishing their own community from those outside (Cohen 1985:108-9).

A community may also adopt a particular symbol because it draws attention to some important value, either by exaggeration or contrast. In doing so it brings the value to the forefront of attention and helps in its preservation. The same, or similar, effect can be achieved by contrasting a symbol with some value which belongs to the outsiders, but against which the community wishes to protect itself (Cohen 1985::115). Thus, by contrast or comparison, the

community is defined in the minds of its people. The symbols remind the people that they belong to a community which is different from that outside.

Perhaps the main advantage of approaching a community through its symbols is that it attempts to see the community as it sees itself, that is, from the inside looking out, rather than from outside looking in. Further, it shows how a community is able to adjust its view of itself and its boundaries when required by the changing conditions of contact with the wider world.

Thus, to summarise, the people who comprise a community adopt certain symbols which have a meaning to them. Those symbols then define the boundary between the community and the rest of the world, by their different interpretations from within and without.

I suggest, then, that by examining the symbols of the hacker community I can establish its boundaries and, therefore, the extent of the community. My task in the next two chapters is to argue, from the presence of the symbols and the consequent boundaries, that hackers are members of a global community.

THE HACKER ETHIC

This chapter begins my argument that hackers should be understood as a community, based on the work of A.P.Cohen described in the last chapter. I discuss an important facet in the construction of the community; its ethos or ideology. The 'Hacker Ethic' is an ethos rather than an ethic. Whereas an ethic relates to the moral actions of a group, an ethos is the formulation of the fundamental, 'spiritual' characteristics of a culture or community. The 'Hacker Ethic' is an unwritten statement of the way hackers would like the world to be.

The contrast between the Ethic and what are seen as the normal values of western capitalist society supports the contention by Zimbardo (1980b) that hacking is the rejection of society and its values. I discuss this issue further when I analyse the hacker community and its boundary defining mechanisms in the next chapter

Levy states the Ethic thus: "Access to computers -- and anything which might teach you something about the way the world works -- should be unlimited and total. Always yield to the Hands-On Imperative!" (Levy 1984:27). Thus hackers have a drive to get to the bare bones of anything, whether it be hardware or software, or even something not related to computers. They see no reason why anyone should stop them from exploring interesting things. Levy continues with some of the implications of the Ethic.

First, he says, "All information should be free" (Levy 1984:27). Creativity depends on knowing how a thing is put together, and how it works. Sharing information allows anyone to take part in improving the world.

Next: "Mistrust Authority -- Promote Decentralization" (Levy 1984:28). Bureaucracies limit the flow of information, and hence the amount anyone can learn about the world and the way it works. They hide behind a flawed set of arbitrary rules, instead of acting in a neat, logical fashion. They are the anti-thesis of the Hacker Ethic.

"Hackers should be judged by their hacking, not bogus criteria such as degrees, age, race, or position" (Levy 1984:30). Hackers do not care what credentials someone has, only how he can perform at the keyboard. Contributing to the pool of programs, thinking up new algorithms, moving knowledge of computers forward: these are the aims, and only someone who can contribute to them will be awarded the title 'hacker'.

Levy continues, with the implication that: "You can create art and beauty on a computer" (Levy 1984:30). Computers can be programmed to play music or draw patterns. But, even more, hackers believe that there is an inherent beauty in a well constructed program, an elegant algorithm, or a clever hack.

Finally: "Computers can change your life for the better" (Levy 1984:33). Hackers do not try to convert other people to their view about computers, but they believe, the intellectual benefits of using the computer should be

appreciated and experienced by everyone: not from just using the computer to do some job, but the act of getting it to do something new, or in an unexpected or improved way.

These implications of the Ethic shaped the way in which the hacker community grew. Sterling (1994:59) argues that such unwritten rules are open to abuse, and can only be "enforced by peer pressure and tribal feeling". But I suggest that "peer pressure and tribal feeling" in a close community, when combined with the risk of ostracism from a community where one has found a refuge, can be a strong force to conform. Anyway, the Ethic apparently presented no problems to most people coming into the community, since they appeared to hold a personal ethos of very similar form before becoming hackers. Newcomers were not told of the Ethic, nor was it often stated explicitly; it was implied by the behaviour of hackers. Indeed, I have been informed by some hackers that they were not explicitly aware of the Ethic; they simply felt comfortable with the way in which other hackers acted.

Although the Ethic was first developed amongst the hackers at MIT and other places, it had its greatest flowering in the growth of home computing. In particular, it has been argued, the sharing of information led to the proliferation of small companies which fed the growth.

Levy (1984) describes the situation that he observed at the Homebrew Computer Club in America, but similar events took place in Australia, and no doubt other countries.

Since the first home computers were rather rudimentary, they provided a rich field for development

and hacking. Computer club meetings were often a turmoil, with groups discussing different computers, circuitry and programs. Ideas would be interchanged freely, suggestions flowed backwards and forwards, people would leave the meetings overflowing with ideas for hardware or software hacks, determined to return to the next meeting with a working model or program.

Levy reports that, in America, a number of hackers started their own businesses, based on ideas discussed at club meetings. This was not seen as exploitation, since they would return to the meetings with developmental models and circuit diagrams which would be freely distributed, not only to hackers but also to anyone who might be a business competitor. In return, ideas would be fed back to the designers who could then produce better designs. Similarly, hacker-run companies which produced software would often provide copies freely to the hackers, who would then suggest improvements, sometimes to the extent of modifying or rewriting the program and giving it back to the company which could then release an upgraded or improved version. Rarely did the hackers receive any remuneration for their work -- they did it for the love of hacking and as part of the ideal of providing the best possible software for computer users. In the atmosphere of the computer clubs, commercial monopolisation of ideas was seen as harmful to the aim of promoting the use of computers and making them available to everyone. No-one worried about copyright or secret designs, information was freely exchanged and could be copied by anyone. Hackers

and small businesses -- even when they were ostensibly in competition with each other -- worked together to produce the best computers and software possible.

It is probably not necessary to add that only companies influenced by the Hacker Ethic participated in this free exchange. Older, more staid companies, such as IBM, have traditionally kept their secrets and taken action against anyone who violated them: hackers were not part of their world-view of computing or business. When IBM released their PC, they released all the information on it and encouraged other companies to design peripherals and software, but that was done for commercial purposes not to cater for hackers. Some of the companies which took part in the hacker community when they were small, later changed their attitudes and refused contact with hackers. This was often the result of financiers and bureaucrats taking control of the business. A prime example is Apple Computers, which was originally begun by two hackers, Steven Job and Steve Wozniak. Apple now keeps its designs a very close secret, allowing information out only to its authorised dealers.

In Australia, particularly during the 1980s, it appears that a similar situation existed, although perhaps not to the same extent. It is certain, though, that some small commercial companies who produced add-on parts for computers allowed their designs to be published in magazines. Sufficient information was provided so that anyone who wished could produce their own rather than buy one.

It has often been said that hackers 'pirate', or produce illegal copies of software, but during this period no one particularly worried -- and it was part of the Ethic. If a program was needed by a hacker when working on his computer then he would copy the program and use it. Others copied programs and then set about improving them. Copying software to explore the computer or develop new programs has always been part of the hacker ethos of free exchange of information, regardless of the illegality of the practice. However, 'pirating' in the sense of producing illegal copies and then selling them was never part of the Ethic.

Hackers tell an interesting story about this period -- whether it is true or not is difficult to say at this stage, but in the light of events and the Hacker Ethic it may have a kernel of truth. The story is that a certain (unnamed) company wanted to produce a program for which there was a suitable demand -- usually said to be a word processor but sometimes another type of program. However, the cost of production -- especially the cost of getting all the bugs out of it -- was prohibitive. So the company produced a first version (which actually wasn't very good). They sold a few, but, more importantly, made free copies available to hackers. It is claimed that within a few months the company was able to recover a version of their program which not only had all the bugs removed but which had been improved tremendously. The company then released it for sale as a new, updated version of the old program.

Not only were hackers not upset by this behaviour, but it was seen as a clever way of producing better software and keeping prices down.

Cohen (1985:99) argues that in this way the past is used as a resource and that in such 'past-references' the community selectively reconstructs its own past such as to justify present actions which might be improper in some way. It is, he says, 'a selective construction of the past ...[which] lends enchantment to an otherwise murky contemporary view' (Cohen 1985:99). Thus, hackers are able, to themselves, to justify the illegal copying of programs by citing a period in the meta-historical past when copying was not only permitted but encouraged: a precedent had been set. Since the story is a-historical it cannot easily be checked for accuracy and, therefore, it is difficult for anyone outside the community to argue against it. The past is not so much rewritten, rather it is blocked off from rational scrutiny (Cohen 1985:99).

However, not all hackers will copy commercial programs. Some believe that they can do a better job than anyone who programs within a commercial atmosphere, others would like to free computing from its dependence on big business. It is in this spirit that the concept of 'shareware' developed.

The concept of shareware must be unique to the computer field. It could only occur under the influence of something like the Hacker Ethic. As a way of producing articles for sale it is almost bizarre, but it has distinct advantages.

The system works like this: A programmer writes a program which he or she feels has a market potential, but does not have the capital to exploit. The program is distributed to anyone who wants a copy, often through bulletin boards and clubs. Copying is allowed, even encouraged. Thus the first result is that distribution costs the author virtually nothing.

Anyone can now use the program to see if it suits their needs and is found to be useful. Information on how to use it is always included in a form that can be printed out at home. Thus, the second result: the program can be tried free of charge, before committing oneself, a practice not permitted with commercial software.

If the program is found to be useful, and there is an intention to go on using it, then a donation to the author is requested, usually in the vicinity of $50. Thus the third result: cheap software when compared to commercial programs which might cost many hundreds of dollars.

Payment of the donation often results in the author sending a properly printed instruction manual and a later version of the program. It might be thought that most people would be reluctant to send the donation since they already have the program, but there are some small software companies which run their whole business this way so they must receive enough donations to continue producing software.

For the user, shareware produces cheap programs which can be tried before they are paid for. Shareware avoids the largest contribution to the cost of commercial

software -- advertising and distribution. It might be thought that shareware would be of a low standard; although some of it is not very good, much of it is equal to -- and sometimes better than -- commercial software. Importantly, shareware embodies the ethos of the hacker community.

Rosenberg (1992:356) argues that adherence to the Hacker Ethic leads to system cracking. Discussions with hackers, however, suggests that very few take that path. Firstly, hackers are interested only in sharing information about computers, the personal details of someone's bank account or business are irrelevant. Secondly, hackers want to encourage the use of computers. Divulging information stolen from a computer will have the opposite effect of increasing social distrust and fear of computers. Thirdly, damaging data or crashing the system would not enhance a hacker's reputation, whether done intentionally or accidentally. Some hackers do admit to cracking, for the challenge of breaking into the system. However, there are only so many different systems to break, and once any one is broken, it is no longer a challenge: being second into a system does nothing for a hacker's status. In fact, any hacker who persisted in cracking would probably be ostracised: hackers are rather hostile to their being categorised with crackers, and especially to the use of the term hacker being used for both groups.

According to the Ethic, hackers -- and other people -- should only be judged by their performance, particularly their performance as hackers. The issue of hackers and their attitude to hacking is the subject of the next chapter,

but briefly, they reject the idea that a person's position or qualifications such as degrees or certificates automatically makes them worthy of attention. It is this attitude which has often caused friction, such as that between the hackers at MIT and Joseph Weizenbaum which I have already discussed. On the other hand, hackers are not concerned about another hacker's race, gender, age, class or financial position.

It is probable that the ethos is reflected in some of the accounts of hackers. Levy was a journalist who wrote a regular column in a computer magazine. Thus he could easily communicate with hackers -- he knew the jargon and was possibly a hacker himself. Turkle, on the other hand, was a sociologist investigating hackers for academic purposes. This might explain why she seems unaware of the Hacker Ethic. These are the only two writers who appear to have had personal contact with hackers and whose accounts give an insight into the way hackers see themselves.

The Hacker Ethic is a way of behaving, rather than a set of rules which must be obeyed if a hacker is to be accepted into the community. Despite Sterling's misgivings about enforcement, hackers conform to the Ethic because it is their 'natural' way of thinking and acting. It is the way that they would like all the world to be, open for experimentation and free of bureaucratic interference. Therefore, enforcement is not necessary, and there is no need to explicitly state the Ethic.

But, further, the Ethic has taken on a symbolic character. It is an ideal which separates hackers (and

potential hackers) from non-hackers. It defines the boundary between those who belong and the outside world. As Cohen says: "By definition, the boundary marks the beginning and end of a community....[It] encapsulates the identity of the community" (Cohen 1985:12). He adds:

> The quintessential referent of community is that its members make, or believe they make, a similar sense of things either generally or with respect to specific and significant interests, and, further, that they think that that sense may differ from one made elsewhere (Cohen 1985:16).

Hackers have no doubts that, in their Ethic, they differ from non-hackers. They are proud of the difference: it is part of being a hacker; it is what makes a hacker part of an elite group. It defines their community and places them apart from non-hackers.

Thus, already the separation between hackers and non-hackers is becoming apparent: the boundary is becoming visible. In the next chapter, I continue my argument that hackers should be analysed as a community. I discuss further the ways in which hackers see themselves and the symbols which define the boundaries between the hacker community and the rest of the world.

THE HACKER COMMUNITY

> These are the members of a subculture so foreign to most outsiders that it not only walls itself off but is walled off, in turn, by those who cannot understand it. The wall is built from both sides at once.
> ('Gandalf' in Zimbardo 1980a:63).

In this chapter I shall analyse some aspects of the hackers' relationships and continue my argument that there is indeed a global community of hackers. The importance of establishing that such a community exists, will become apparent in the next chapter when I contrast the hacker community with other communities. In my analysis I consider the symbols of the hacker community, and the ways in which those symbols define the boundaries of the community, in the manner described by A.P.Cohen in *The Symbolic Construction of Community* (1985).

Firstly, a consideration of the influences on the beginning of the community and the way in which it developed, and which I have already mentioned, will be used as a means of understanding the way in which hackers identify themselves with the community. I focus on two particular phases of the development of the community: firstly its origins at MIT, and secondly the form which it took when home computers became available. An analysis of the transformation of the computer field which led to the

second phase will bring out some of the differences between the two phases.

Next I shall consider in more depth the way in which the hacker community changed as the technology of computers changed. The transformation of the community which occurred when home computers became available was largely caused by the influx of new hackers from different backgrounds. Some of the boundaries were weakened, some were strengthened. The community was broadened and, to some extent, became less rigidly defined. At the same time it opened up new areas for hacking, and gave the community a new social identity.

Also, I discuss the ways in which different hackers entered the hacker community, to show how they brought different skills and approaches into hacking, and, further, how those skills and approaches in turn shaped the hacker community. An analysis based on Cohen's approach to the symbolic nature of the community and its boundaries as perceived differently from within and without, will then provide the basis for an understanding of the hackers' view of themselves.

Finally, an important point which must be examined is the absence of female hackers. Some suggested reasons for this absence will be considered, and an attempt made to explain it.

In *The Symbolic Construction of Community*, A.P.Cohen argues that "[the] consciousness of community is ... encapsulated in perception of its boundaries" (1985:13). The idea of community is itself essentially an embodiment of the symbolic perception of the boundaries

which define the limits -- the beginning and end -- of the community: "the boundary encapsulates the *identity* of the community" (Cohen 1985:12, emphasis added). These symbols need not have a physical or material nature, they are often ideas and hence attaching meaning to them may be problematic. Cohen argues that it is exactly this imprecision which makes symbols so effective; their subjective nature allows different, personal interpretations of the same symbols to coexist. There is thus no "tyranny of orthodoxy" (Cohen 1985:21).

He sums up his argument when he states that:

> [Community] is a largely mental construct.... It is highly symbolized, with the consequence that its members can invest it with their selves. Its character is sufficiently malleable that it can accommodate all of its members' selves without them feeling their individuality to be overly compromised. Indeed, the gloss of commonality which it paints over its diverse components gives to each of them an additional referent for their identities (Cohen 1985:109).

The boundary between the hacker community and everyone else is not a simple one, nor is there a single boundary. The hacker community is, rather, defined by successive steps, each of which separates it in some way from the wider community and from other computer users. Nor is the boundary everywhere rigidly defined, in some places it is amorphous and overlaps other groups. However,

when all the boundary defining mechanisms and the symbols of the hacker community are brought together, the result is a well defined group very different from any other. As both 'Gandalf', in the epigraph which heads this chapter, and A.P.Cohen (1985) have pointed out, the boundaries are constructed from both sides.

One of the most potent symbols which separates the hacker community from those outside is the computer. Another is the hacker community itself.

To the hacker, the computer -- any computer -- is a source of wonder, to be explored, understood, developed, and in which to become absorbed. Different hackers will stress one or more aspects rather than others, but they will all see the machine in a positive light. To outsiders the computer is more often seen as a threat; to their privacy, their employment, or their freedom. To many it is merely a machine to be used for some particular job (For example, see Turkle 1984:205).

The hacker community is also seen differently from opposite sides of the boundary. To the hacker, it is a place to belong and which provides a sense of identity, a way of life which promises the excitement of discovery and challenge and an ethos which, if allowed to, could reform the world. To some outsiders, particularly to women who have seen their husbands become strangers, the community is a threat to their family, to their way of living, and to their loved ones. To others it is an encouragement to obsession and antisocial behaviour.

Thus, the individual meanings given to the symbols vary, not only between insiders and outsiders, but also

between particular insiders, and between particular outsiders. In the cases of the computer and the hacker community, the main differences appear to be between the positive interpretations of the hackers and the negative interpretations of the outsiders. That both are referring to the same symbols supports Cohen's view that "[t]he symbols of community are mental constructs: they provide people with the means to make meaning" (Cohen 1985:19).

The young men to whom Levy (1984) spoke at MIT were already part of an elite group, since they were students at one of America's most prestigious universities. They were the students who had excelled at high school and college. But they were also aware that all their fellow students were as academically well-endowed as themselves, and that the competition would be fierce.

The traditional MIT welcome to new students made their status immediately apparent. They were greeted, at the welcoming ceremony, with the following: "Look at the person to your left ... look at the person to your right ... one of you three will not graduate from the Institute" (Quoted in Levy 1984:6). They were an elite, but there would still be selection of the best from that elite. Most hackers came to neglect their studies and although some did eventually graduate, most did not.

According to Levy (1984:6ff), one of the largest student clubs at MIT was The Tech Model Railroad Club, which owned a large model railway layout, in a room in the same building as the computer centre. Within the Model Railroad Club there were two main groups. The first group

were interested in building models to a high degree of accuracy; to them, the layout was merely a place where they could display their handiwork. The second group was comprised of those interested in running trains and to whom the layout was a system which could be planned and operated as though it were a real railway. Within this second group were some who dreamed of making the layout operate logically and systematically. Taken to its logical conclusion this approach implied that it would run better without human operators. To these people, the scenery and models on the top of the layout were less interesting than the underside where could be found the wiring and relays which controlled it all. It was this latter group which supplied the nucleus of the hacker community when they discovered the computers in a nearby room. They found a place where there were machines which operated logically and could be controlled completely, providing the rules were understood.

Levy spoke to a number of students who were what one might call 'tinkerers', who, before they discovered the computers at MIT, had been involved in amateur (ham) radio or built electronic projects from parts taken from old radio and TV sets (Levy 1984:61). Another had previously rebuilt old broken clocks by taking them to pieces, making replacements for broken parts and putting them back together again.

Some of the computer hackers also had a side interest in 'lock hacking'; taking locks apart to discover the pattern of their tumblers. In this way they were able to work out the pattern for the master keys which would open

any door in the computer building. With a master key, no-one could stop the hackers from exploring anywhere they desired, in their search for information to satisfy their curiosity. As Levy says: "The master key was more than a means to an end; it was a symbol of the hacker love of free access" (Levy 1984:93. See also Turkle 1984:232).

To the hackers 'lock hacking' symbolised free access to information and the freedom to explore, but to others it symbolised an unwanted invasion of their privacy and sense of security. Cohen states that most symbols are ideas rather than having a physical form (Cohen 1985:18). The master key, however, has both. The physical form of the key must be common to both sides of the boundary: the 'idea', though, is very different.

It can be seen that the hackers brought into the protean community a number of attitudes which would become part of the heritage of all hackers: the desire to take something apart and then put it back together again, probably improved; the search for knowledge gained from understanding of a machine and the rules by which it operates; a curiosity which was not limited by what is permissible, but only by the limits of what can be known. And, most importantly, that any knowledge gained should be freely available to anyone who had a use for it. These early hackers practiced the 'Hands-On Imperative', the basis of the Hacker Ethic, and part of the boundary which separates the hacker community from the wider society.

It is apparent that boundaries were already appearing between hackers and those outside the

community. Being university students, they were part of an elite group. Within that elite group the hackers were also separated from the other students who used the computer at MIT because of their deeper knowledge of its working. Levy recounts a number of situations where the hackers were aware that even graduate students had trouble in writing programs, but were unwilling to accept the help of the hackers. The computer itself, to the hackers a symbol of freedom to experiment and learn, was seen by most people in society as a threat and symbol of impersonal domination.

As I have indicated Cohen argues that the symbolic nature of these boundaries is perceived differently from opposite sides, but also by those on the same side of the boundary (Cohen 1985:12). Not all hackers saw the same values in the computer: to some it was the means of developing skills at programming; others sought to deconstruct the functions of the computer so that the understanding obtained could be used to develop new functions; yet others saw a future where computers would serve humanity by broadening intellectual horizons. The hackers took these different approaches into the community which in turn gave them an identity. The community was not *integrative*, in the sense that everyone held the same ideals and aims, rather it was *aggregative*, in that individual hackers felt themselves to have more in common with other hackers than with anyone outside the community (Cohen 1985:20).

The community became much more than a group of individual hackers, it became an ideal with its own standards and ethos. As Cohen notes, the boundaries are

constructed because either a community is, or wishes to be seen as, apart from other groups with whom they interact (Cohen 1985:12). So it was with the hackers: their consciousness of the boundaries made them more aware of their own community (Cohen 1985:13).

Most of these young men had little social life, even before they entered MIT. Whether they were socially ostracised because of their intelligence and interests, or whether they developed their interests because they had no social life is a debatable point. There have been numerous arguments about why people become socially inactive. Two opposite views related to hackers come from Zimbardo (1980b) and Turkle (1984).

Zimbardo (1980b) argues that the hackers' attitude was the result of social isolation, that they were turning away from difficult social situations with which they could not cope: they became introverted loners who lost touch with the rest of humanity. In this view, the computer became a substitute for interaction with people.

On the other hand, Turkle argues that much of the criticism of hackers is a response to the way in which hackers challenge the accepted causes of motivation. For the hacker, interest in the machine is sufficient justification for spending many hours learning about it or programming it, in contrast to the generally accepted assumption in capitalist societies that everyone is motivated by either money or ego (Turkle 1984:205). Turkle goes on to quote Marvin Minsky, an MIT worker in artificial intelligence, who -- commenting on the hackers' alleged social ineptness

-- said that "hackers are superior to the psychologists who trivialize human beings in their rush to stereotype and classify" (Quoted in Turkle 1984:206). Levy remarks that he found hackers very different from the stereotypes which he had been led to expect: "they were" he says "adventurers, visionaries, risk-takers, artists..." (Levy 1984:ix).

Whichever argument one accepts, the hackers were drawn together by a common interest in computers and the need to experiment and to understand. When they came together they formed a group which developed a social life of its own. The fact that they were able to have social relationships within the hacker community suggests that Turkle may be more correct than Zimbardo, and that the hackers' prior social problems were not necessarily caused by an inability to interact with other people, but rather that they did not want to mix with people who did not share their own interests.

Although the main focus of the MIT hackers was the computer and hacking they appear to have had a quite lively social life. Levy tells a story about the time that a new more powerful computer arrived in the next room to the old one. Most of the hackers quickly moved over to the new computer, but some stayed with the old one. A group of those who had moved over to the new computer devised a short song and dance routine, poking fun at the others, which was made up from the abbreviations for the instruction codes on the new computer. Levy comments: "What was lacking in choreography was more than compensated for by enthusiasm" (Levy 1984:42. See also Turkle 1984:196-7).

Apparently, it was common for any hackers who happened to be in the computer room late at night, to go out together for a meal -- usually Chinese, because in Boston the Chinese restaurants stayed open late. Not that their curiosity and hacking was left back in the computer room. They looked at a Chinese menu as a system to be hacked! Some went so far as learning sufficient Chinese to be able to order obscure dishes. Levy relates the story of a group of hackers who prowled around Boston looking for Chinese restaurants at which they had not previously eaten, in search of new and more exotic dishes. At one place they were offended that the Chinese waitress could not read Chinese -- it seemed so illogical.

Following from this interest in Chinese food, something of a ritual developed. On April Fools' Day the group would descend upon a new Chinese restaurant and order a previously untasted combination of dishes -- and eat it regardless of how it tasted! To the hackers there was nothing strange about this behaviour, it was all part of 'hacking' a new system, that is, trying to understand its own internal logic (Levy 1984: 68-71).

The hackers were not devoid of human feelings towards each other. Levy (1984:128-9) tells the story of a young hacker he calls Louis Merton, who was also a brilliant chess player. Merton, who apparently suffered from a form of infrequent catatonia, would sometimes enter a state where he went completely rigid for a short period. Between these episodes he showed no signs of anything wrong. On one occasion he was taken to a hospital where he

was admitted as a permanent catatonic. The hackers fought their way through a bureaucratic quagmire to get Merton released -- by this time he had woken up -- and from then on took care of him. They learnt that when he entered a catatonic state he could be awakened by inviting him to play chess. Levy adds: "behind their single-mindedness there *was* warmth, in the collective realization of the Hacker Ethic" (Levy 1984:129. Emphasis in original).

Although many of these young men had had problems with social interactions before they became part of the hacker community, through the community they learnt to be sociable (Cohen 1985:15). The difference being that they had found a milieu in which they could be comfortable and people with whom they shared similar attitudes.

Of course, each hacker attached his own meanings to the social and ritual aspects of this socialisation. There was no rule of the hacker community which said a hacker must go out and eat Chinese food, nor that eating Chinese food was a necessary part of being a hacker. Rather, it was part of the process of forming a community; the creation of symbols and rituals which each hacker could endow with his own meaning, but which would equip him to be part of the hacker community (Cohen 1985:15-6). As Cohen notes: "People can find common currency in behaviour whilst still tailoring it subjectively (and interpretively) to their *own* needs" (Cohen 1985:17. Emphasis in original).

Not all of the hackers at MIT took part in the social activities. Some wanted only to work with the computer to the point of ignoring everything else. They spent every

available waking moment hacking; sitting in front of a keyboard for many hours at a time, often at night when the official users were absent. It is probable that these people were the extreme cases mentioned by Weizenbaum and others, and which led to the categorisation of hackers as computer addicts. In some ways these people were peripheral to the community. In other ways they contributed very much to the folklore of the hacker community: they were the 'gurus' of hacking whose exploits became legendary (For example see Levy 1984:Ch.4. and Epilogue; Turkle 1984:203).

The hackers at MIT were, to a great extent, a product of the American university system. They were protected and isolated from much of 'the real world'. They were part of "that pure hacker paradise, the Tech Square monastery where one lived to hack, and hacked to live" (Levy 1984:421). At the time, the early 1970s, relatively few people in the world had seen a computer, and less had used one. The home computer was to change that situation; it brought computing -- if in a limited form -- to anyone who wanted it. The home computer revolution swept the world, changing both it and the hacker. It brought hacking out from the 'monastery' and into 'the real world'. More importantly for my discussion here, it brought people from outside the protected environment of the universities into hacking. The hacking community spread throughout America and into many other countries.

Many of the new hackers were older and had more experience of the world. Many were married with families

and had regular jobs. For these reasons, most were well aware that hacking could not be a single-minded pursuit but had to be only a part of their lives.

The new centres of hacking were clubs; many of them drawing together people of different social and economic backgrounds, and of all ages, who had a common interest in a particular type of computer. Where the individuals came from made little difference, hackers tended to ignore other boundaries in establishing the boundaries of the hacker community.

An informant told me about the meetings at a computer club here in Adelaide. The meetings were largely informal, although someone usually took on the job of gathering information from members on their latest projects for printing in a simple photocopied newsletter. Often the information was out of date before it was typed, the way in which people took up different projects being almost frenetic. But that was how the atmosphere at the club affected people. A new idea for a program or modification to the computer would circulate rapidly; the meeting sometimes turning into an impromptu lecture with questions and answers flying backwards and forwards as people sought information or offered suggestions. At other times, meetings would break up into small groups discussing this or that idea. It was nothing unusual, apparently, to see a youngster of fifteen in a deep discussion, on equal terms, with a sixty-year-old professional engineer. Age and qualifications did not matter: being a hacker did.

Someone would always bring along their computer to show off their latest project. A hacking session would often begin right there as ideas flowed. Others would bring packets of disks to take home copies of any programs available.

Although there was co-operation and support available within the club, there was also competition. As always there was a need to establish oneself as a hacker by hacking. This took the form of writing programs or trying to improve the programs written by others. Anyone who took a program along to a meeting had to expect that others would take copies home and return to the next meeting with additions or improvements. One of the favourite challenges was to rewrite someone else's program so that it performed the same operations but used less instructions. Squeezing a program down to its absolute minimum size was a challenge that few hackers could ignore. But the competition was always friendly, and rarely led to recriminations: the aim was status, but not power over others. Being able to hack with the best reinforced one's status as a hacker but that is all.

A good hacker could always write code on the spot: the best could do it directly into the machine in hexadecimal code. When one could think and program in hexadecimal code, one had achieved the heights of hackerdom. Considering that a typical processing chip might have around four hundred different instructions, each with its own code, the dedication and absorption

required to achieve this level of proficiency must have been total.

The clubs provided a place where hackers could gather with those of like mind, and where the Hacker Ethic flourished.

Clubs might have caused fragmentation of the hacker community but for a number of further developments. Computer magazines, both national and international, arrived on the scene, allowing hackers to publish their ideas and projects, and manufacturers to advertise add-on parts. Another development was the bulletin board. Hackers could leave their programs for others to copy, and communicate ideas to anyone with a modem and telephone. Many of the new hackers came from amateur radio and, using their old hobby in the service of the new, established communication networks world-wide. Methods of transmitting computer data via radio were developed and used to exchange programs. Thus, rather than becoming fragmented the community took advantage of technological advances to forge new ties. The hacker community became a truly global phenomenon, bound together by the multiple symbols of the computer, hacking and the Hacker Ethic. I discuss the implications of this easy availability of communications in the next chapter when I argue that it is an important factor in the difference between hackers and other global communities.

As the term hacker became more and more to be applied to those I term crackers, the true hacker community did decline to some extent. It became unpopular to call oneself a hacker, because most people misunderstood the

term, knowing only its criminal associations. Also the increased commercialisation of computer production has led to considerable standardisation and a consequent narrowing of the area in which hackers can provide any input into the direction of development. Development is now usually controlled by large companies: professional engineers and programmers, as well as bureaucrats, have taken away much of the control of information and development which previously belonged largely to hackers. However, it should not be thought that the community has disappeared. It is harder to find hackers who will admit to being hackers, but there are still many to be found.

There is one final boundary defining mechanism, which I have left until last because it is more 'real' than symbolic; that is jargon. Like all common-interest groups, hackers have a specialised jargon. Not that it is their's exclusively, they share much of it with other computer users; but some belongs only to hackers, for instance, the word 'hacker' itself. By Gumperz' definition, then, they become a 'speech community' who are separated from other people by the different way in which they speak to each other (Gumperz 1972:219). As Turkle points out, jargon not only marks the boundary, but also protects the in-group by limiting the knowledge of the out-group. Since the outsiders are less able to understand the conversation of the insiders, they have access to less information about the insiders and their interests (Turkle 1984:201).

The problem remains of why there were no female hackers. It is not, apparently, the technology which deters

women, since both Steven Levy (1984:86) and Sherry Turkle (1984:200) mention female computer science students. Nor is it the hacker approach to programming, since Sherry Turkle and Seymour Papert (1990:134-5) mention a female student who has a need to know the details of the computer's operation and understand the low level functions of her programs. She adopts a hacker-like approach because it is natural for her to do so.

But there is a difference between computer programming as a profession and hacking as a hobby. A technological profession might be a socially acceptable for a woman whereas a technological hobby might not. That women do have complex hobbies and pastimes becomes plain if one considers dressmaking and knitting. Knitting provides an interesting contrast to computer programming in that both are sets of instructions written in a specialised language: the loops and pattern changes in a knitting pattern bear a remarkable resemblance to a computer program. The influx of women into other technological hobbies, such as amateur radio, in recent years shows that women can, and do, follow such pursuits.

Levy recounts the time when a woman named Jude Milhon, a professional programmer and political activist, visited the Homebrew Computer Club, the largest in California. Milhon was "repelled by the concentration on sheer technology, exploration, and control for the sake of control" exhibited by the hackers (Levy 1984:215). Milhon knew a number of the hackers, and appears to have been more upset by the lack of female hackers than anything else.

Margaret Shotton discusses some of the possible reasons why male compulsive programmers predominate over women (she gives the figure at 97%). Some reasons she discounts herself, others parallel the above discussion. Shotton finally suggests that the particular type of man who becomes a compulsive programmer is one who has always been obsessed with his hobbies. He has difficulties with social relationships, and so adopts the computer as a refuge. Whilst there appears to be some truth in this statement, Shotton does not explain why only men suffer from the obsession with hobbies. Thus she does not really provide an answer to the question (Shotton 1985:125). It should also be noted that she is specifically talking about 'compulsive programmers' and not necessarily hackers.

Perhaps the only reason women do not become hackers is because there are no female hackers there before them: no-one wants to be first. But if Shotton is right, then there may be a small nucleus of women hackers which has not expanded to equalise the numbers.

There appears to be no satisfactory answer to the question of why more women do not become hackers.

In conclusion, then, it remains to sum up the hacker community. It is an almost completely male community because women appear unwilling to join it. It is an elite, and elitist, community; but one into which anyone can be accepted by demonstrating their ability to hack.

The community is defined by its symbols, some of which have their basis in real objects, other of which are ideas and concepts. The flexibility of those symbols allows a

wide range of interpretations both within and without the community. The boundary between the community and those outside it forms where the interpretations come into conflict. For some symbols the boundary is ill-defined, for others it is sharply delineated. It is the combination of these different interpretations of different symbols which determines the ultimate boundary.

The flexibility of interpretation allows individuals within the community to retain their independence to some degree, providing the difference is not too great. Since the symbols are mental constructs, the interpretation will be influenced by an individual's own private thoughts. Thus the community can accommodate many individuals without compromising their individuality. The common thread is that they share the same symbols.

The flexibility of the symbols also allows different commitments to the concept of the community. Those people who have a narrow and rigid interpretation of the symbols tend to form an inflexible, uncompromising, perhaps fanatical, core. Others, whose interpretation is more flexible, can step outside the community, if necessary. An example might be the person who is a professional programmer by day and a hacker at night. Both are, to some extent, necessary for the continuing existence of the community.

I have argued that hackers are part of a global community, based on common acceptance of the symbols of the community, albeit that individuals interpret those symbols differently. The community has developed its own ethos, community spirit and reason for being, and thus

deserves to be analysed at some depth. In the next chapter, however, I discuss some of the problems that would be associated with a deeper investigation. I argue that, due to the differences between hackers and other communities different methods of investigation would be necessary. The methods currently in use will not work with the hacker community.

NON-LOCALISED COMMUNITIES

In the last chapter I argued that hackers should be seen as part of a community and that, with the introduction of the home computer, its members spread world-wide. In this chapter I argue that the hacker community is different from other wide-spread communities in that it has both a different basis and a different structure. I contrast the hacker community with other groups which have been studied as communities, and argue that the differences between these other groups and hackers warrants consideration in relation to the study of communities.

Studies of community tend to be undertaken in one of two areas. Either the community is localised or contained in a small area which can be dealt with as a whole: people can be observed in their interrelationship with all the others who are also part of the community or outside it.

Global communities, on the other hand, are studied by concentrating fieldwork on local sections of the global community and then relating the local group to the whole (For example, Meyerhoff and Mongulla 1980). Features which are common to widely separated local groups suggest ways in which the global community has adapted to local conditions.

The first group which I consider is that in which membership of a local group brings a member into a wider group, such as Freemasonry and some sporting bodies. Although some of these groups may not be considered as

communities, others have characteristics which do warrant their consideration as such.

In this type of group a member joins a local organisation, and through membership of that group, becomes affiliated with a larger national or international umbrella organisation. For instance, a person is invited to join a local Freemasons' lodge by someone who is already a member, and will usually join the lodge of his sponsor. On joining a local lodge, the new member becomes part of the larger community of world Freemasonry. As far as I have been able to ascertain, it is not possible to become a member of the larger group without being a member of a local lodge. Thus, within the larger community, there is a high degree of attachment to one's own locality. Further, a member will become socialised into the larger community through the local community, where most social contact of ordinary members occurs, and where the appropriate rituals are learnt. Contact between local groups most often occurs at higher administrative or ritualised levels of the organisation.

The other type of group which requires consideration is based on ethnicity. Smith defines an ethnic community as 'a named human group claiming a homeland and sharing myths of common ancestry, historical memories and a distinct culture' (Smith 1992:438). These groups also often have a belief in themselves as the 'chosen' people (Smith 1992:441). The prime example of such groups is the Jews, who have carried their belief in being 'chosen' and their wish for a return to Israel, with them

throughout the world. But again, I would argue, the primary connection between individual Jews and the global ethnic community is through the local community.

I suggest that hackers do not fit within either of these classifications since they have no ethnic heritage nor is there a hierarchy of contact between local groups of hackers and the wider hacker community.

Local hacker groups vary tremendously in their organisation and structure. The membership might be anywhere from three or four to dozens. Some are informal, meeting whenever the group happens to come together, others are more formally organised, with elected officers and set times for meetings. There may be two or more groups which overlap in their areas of interest. Some of the members of one group may also be members of other groups, whereas others will be members of only one group. The particular members of a group also tend to vary over time, with some leaving and other new ones coming in.

Hacker groups tend to cluster around particular types of computers or micro-processors. Communications between these clusters may be at local, national, or international level. But an individual hacker may participate in any of these clusters or levels, with or without participation at other levels. This situation can perhaps be best illustrated with an example.

I spoke to some hackers who had been members of the South Australian Super-80 Users Group (SASUG), which is now, unfortunately, defunct. The Super-80 is a particular type of computer which was sold in kit form throughout Australia (but not internationally) by a large

electronics retailer. SASUG had contact with other groups interstate who formed around the same computer, through the exchange of newsletters. A national, commercially-published magazine often carried articles on the Super-80, and news and notes about a variety of computer clubs.

Some of the members of SASUG joined the Microbee Users Group of S.A. (MUGSA), since both the Microbee and the Super-80 are based on the same microprocessor and the designs are similar in many respects. These people passed ideas between the two groups and, in particular, adapted parts of the Microbee circuitry to the Super-80 to improve its performance.

Later, a split occurred in MUGSA which resulted in a number of its members leaving and joining SASUG. Since the club now catered for two different type of computer, it was necessary to change the name. Since both computers were based on the Z80 microprocessor chip, the club became the Z80 Users Group.

The Super-80 and the Microbee were both only available in Australia, so there were no user groups in other countries. But the Z80 microprocessor chip was very popular and used in many types of computers, any of which could run an operating system called CP/M (Control Program for Microcomputers).

Importantly, any program which would run under the CP/M operating system on one type of computer would run under CP/M on any other type of computer. Programs could be easily transported from one CP/M-based computer to another, which allowed ties to other groups

centred around other brands of computers which used the CP/M operating system.

Thus the members of the group had four possible contact points with other groups: the others could be Super-80 users, Microbee users, users of computers based on the Z80 microprocessor, or users of the CP/M operating system.

On the other hand, if we consider a local group which has formed around a different type of computer, such as the Commodore, we find that they have very little interaction with those mentioned above. Since the Commodore uses a different microprocessor and operating system, the users of it will have little in common with them. Thus, they will establish different networks around the world, even though they might do so through the same bulletin boards. Indeed, it is probable that Commodore users in Adelaide will have closer ties with Commodore users in Britain or America than with the users of Microbees in Adelaide, since their computers are so different. They would read different magazines, use different machine codes and have a different circle of contacts. The only common factor in the local relationship is that is that they are hackers.

These contacts outside the immediate group are mainly established on an individual rather than a group basis. Individual members establish contact with different others who share similar interests and rarely will two hackers be part of the same total network of contacts. Thus, within the hacker community, contact with others tends to be established at the lowest level, that of the individual,

rather than through some form of hierarchy. Further, the structure of the network will be seen differently from the points of view of different hackers, since each establishes contacts which suit his own purposes. Also, the establishment of a web of contacts does not depend on being part of a local group nor even on being in a particular locality, since bulletin boards can be accessed from anywhere in the world.

One of the primary reason for the dearth of local concentrations of hackers is that communications between widely spread hackers is no more difficult than communications with near ones. Bulletin boards can be accessed from anywhere in the world. Since telephone lines can be brought right into the room where the hacker works, such contacts are often easier to establish and maintain than would be, for example, a face to face meeting with a fellow hacker in the next suburb. Family commitments may mean that attending a local user group is difficult, but they will probably not prevent the use of a modem and bulletin board at odd hours of the day or night.

Thus, the hacker community is different from most other types of wide-spread communities. Its structure is different in that there is no necessity for an individual to be a member of a local group as part of being member of the larger group. There is no hierarchy of communications which might restrict the flow of information to individuals. Although hackers have their heroes and archetypes, there is no homeland which promises an idealised existence. A hacker is not formally inducted into the community, and is

obviously not born into it (although the question of whether hackers are born or made is one that is still being debated).

Further, I argue, there is no local, consistent interaction which can be equated with the local communities of other groups such as the Jews. Local contacts are no more important than global contacts. In the case of many hackers, local contacts are either non-existent or less important than the global ones. But global contacts are important for all hackers, because it is in that way that information and programs primarily circulate throughout the community. Being part of the global community turns out to be more important than being part of any local group. Thus examination of a localised group may not provide data which is useful in understanding the global community, it may even be misleading. To understand the global hacker community it is, then, necessary to study it as a whole, since the whole cannot be understood by understanding its parts.

Another way in which communities, both local and global, can be defined is through their symbolism -- the method used by A.P.Cohen (1985), and which I have used to define the hacker community. Whilst this method is useful for defining a community, it is less useful for analysing the individual responses of the people who make up the community. It tends to be too abstract.

I have argued that the hacker community can be defined, at least in part, by its symbols. However, those symbols are largely useful only in defining the boundaries between hackers and non-hackers, they do not, to any great extent, illustrate the inner workings of the community.

Since the inner workings are important in understanding the community, lack of data on them will make that understanding incomplete. In analysing the hacker community, data gathered at a local level will not be particularly useful in producing an understanding of the global community. Therefore fieldwork would have to be conducted on a global basis, by interviewing many thousands of hackers in numerous countries. Gathering data in such a way would have obvious difficulties.

In the next and final chapter, I briefly summarise the points which I have already made, and the problems which arise from them. I also offer some tentative beginnings to the ways in which the problems might be approached. I suggest that a possible solution to the gathering of data might be through the hackers own method of communications; the bulletin boards which have proliferated around the world.

CONCLUSIONS

I have argued in this thesis that computer hackers are a community. Using A.P.Cohen's (1985) method of symbolic analysis, I have examined the symbolism of various facets of hacking and shown how those symbols define the community. I have shown that the hacker community is international in its scope and that global communications and interactions between hackers are as important -- if not more important -- than local ones.

Also I have argued that the hacker community is difficult to analyse by studying localised sections of the global community. Unlike other global communities, hackers often have more regular relationships with their international compatriots than their local ones. Thus, examining a particular local section of the community will not necessarily produce the same or similar conclusions which would arise from studying other, different, local groups or the whole of the global community.

Thus, I further argue, the hacker community must be studied as a whole, and that methods usually used for studying global communities, which build a picture of the whole from analyses of its parts, will not work satisfactorily when studying hackers. Factors which tend to be important in global communities, and which provide a connecting sub-stratum between the parts, such as ethnicity, religion, or a 'homeland', do not exist in the hacker community. The hacker community can be seen as a complex communication network, in which ideas and information

flow between individuals, both in semi-organised ways and on an *ad hoc* basis. The major problem which arises from these factors is the gathering of data.

I suggest that data relating to the global hacker community might best be gathered using the hackers' own means of global communications, that is, through bulletin boards. Turkle (1984:200n) and Zimbardo (1980a) have both shown the usefulness of bulletin boards in gathering data about computer users, but only in a limited capacity; they each used only a single board at a single location. Their approach can only be considered as a starting point: the network of contacts must be expanded to wherever there are hackers.

GLOSSARY

ALGORITHM: a set of well defined rules for solving a problem in a finite number of steps.

ASSEMBLY LANGUAGE, ASSEMBLY CODE: a programming language which is very close to the machine code comprehensible to the machine.

BASIC: (acronym) Beginners All-purpose Symbolic Instruction Code. Simple, though rather lengthy and inelegant (to programmers) high-level computer language.

BINARY: a numbering system on the base 2.

BIT: one Binary digIT. One piece of data, either a 0 or a 1.

BOMB, BOMB OUT: a program failure.

BOOTSTRAP (BOOT): a set of inbuilt instructions within the computer which tell it how to load its own operating system. Also the procedure involved in starting up a computer.

BUG: an unwanted and unintended property of a program. An error. Hence, debug, to fix a bug.

BULLETIN BOARD: a computer system which is available for remote access by anyone (sometimes a fee is charged) via the telephone lines, where programs, messages, and so on, may be posted, either for a particular individual or for general access.

BYTE: a group of eight bits of data considered as a group.

CENTRAL PROCESSING UNIT (CPU): the part of a computer system which controls all its operations and performs the arithmetical and logical functions.

COMPATIBLE: the ability of one computer to deal with material intended and designed for a different type: programs, data, peripherals, and so on.

COMPILER: a specialised program that translates a source program into the code that the computer can understand. Used for high-level languages, such as FORTRAN, Pascal, etc..

CP/M: a computer operating system; Control Program for Microcomputers. Very popular in the early days of home computers; a forerunner of MS-DOS.

CRASH: any greater or lesser failure of the system. Requires that the computer be rebooted. Also applied to programs.

CRT: a Cathode Ray Tube, also called a VDU (Visual Display Unit) or monitor.

DATABASE: a collection of information kept on an electronic file.

DEBUG: to isolate and fix any errors in a program.

DISC: a medium for storing information. Data are stored on discs of magnetic material and are retrievable by high-speed read/write heads. They may be floppy discs which are removable, or hard discs which are built into the computer.

DOWN: for a computer to be out of action.

DUMP: transfer the information from a computer's memory to a disc or printer.

GARBAGE: inaccurate or useless data.

GIGO: (acronym) Garbage In, Garbage Out: a dictum that states that if one puts worthless data into a computer, then the machine can only give worthless answers back.

GLITCH: any form of unexplained electronic interference that involves the computer, either in the electrical supply or the program.

HACK: (1) a quick job that produces what is required but with little sign of standards or quality, (2) the result of a HACK JOB, (3) NEAT HACK: a clever technique, also a stylish practical joke.

HACKER: (1) someone who enjoys learning the details of programming systems and how to stretch and develop their potentials, (2)□one who programs enthusiastically and will spend hours so doing just for the pleasure of the discipline.

HARDWARE: the actual machinery that comprises the working parts of a computer. (A hacker joke: The hardware is the part that one can kick, as opposed to the software at which one can only swear.)

HEXADECIMAL (HEX): numbering system with a base of 16. A byte can be written as two hexadecimal numbers, each representing four bits which have 16 different possible combinations of 1s and 0s. Hexadecimal is written using the numbers 0 to 9, and the letters A to F, to represent the numbers 0 to 15.

HIGH-LEVEL LANGUAGE: any programming language which uses words and syntax very close to English, so that it can be read easily by humans. Must be converted to machine code by a compiler or interpreter.

HOME BREW: to build at home, as opposed to something which has been bought.

IDLE TIME: the machine is on and ready, but is not being used.

INPUT: to feed data or program instructions into the machine.

INSTRUCTION: a single step in a program - each program is thus made up of a series of instructions.

ITS: (acronym) Incompatible Time-sharing System, designed by the hackers for the MIT computer. It was 'incompatible' with other time-sharing systems since it used no passwords, and anyone could have access to any file on the computer.

LANGUAGE: any of the many systems and rules that have been created for programming a computer.

LASHUP: any form of makeshift or home-made machine or gadget.

LIVEWARE: the human beings who are involved with computers. WETWARE is the computer which runs in liveware, i.e. the human brain. (A hacker joke).

MACHINE CODE, MACHINE LANGUAGE: the binary notation 'translation' of any other language which can as such be 'understood' by the machine and is necessary for the machine to perform the required tasks.

MAINFRAME: the largest type of computer installation with great capacity, large and static equipment, requiring installation in air conditioned rooms and other special criteria for use.

MEMORY: the part of a computer in which data and programs can be temporarily stored and from which they can be retrieved when required.

MODEM: a MOdulator-DEModulator. A device which converts data from the computer into audio tones which can be sent over telephone lines, and vice-versa. Used for remote accessing a computer or bulletin board.

MS-DOS (DOS): (acronym) MicroSoft Disc Operating System, currently the most common operating system used on PCs.

PC: personal computer. Usually applied to IBM-PCs and compatibles.

PERIPHERALS: equipment linked to the central processing unit of a computer which enhance and increase its basic functions. Includes printers, disc drives, etc..

PIRATE: to illegally copy software, sometimes for sale.

PORTABLE: a program that will adapt simply for use on a variety of computers.

PRINT-OUT: a long strip of paper printed with a program or the results and processes of a computer's calculations.

PROGRAM: a series of instructions to the computer. Also the act of writing a program.

REAL USER: anyone who uses the machine for a specific purpose, rather than a hacker who is working on the machine for the joy of seeing what it can do.

RUN: a particular execution of a task or program by a computer.

SOFTWARE: the programs which give instructions to the hardware.

TIME SHARING: the simultaneous use of the same computer by two or more operators, each of whom works from his/her own remote terminal.

USER FRIENDLY: can be used without long months of training and is designed to make its operation as easy as possible.

USER GROUP: a computer club, made up of people who share a common interest; for example, users of the same type of computer.

WIZARD: a person who understands the most complex machines and can debug any problem that may come up.

ZAP: to wipe out anything contained in a computer's memory.

Most of these definitions are taken from Green (1984). Some have been edited. Others from various sources.

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