



The  
Gender-Technology  
Relation  
Contemporary Theory and  
Research /

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*Introduction*

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## **The Gender-Technology Relation: Contemporary Theory and Research**

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What is the relationship between gender and technology? Are technologies inherently masculine? What sort of assumptions about gender go into their design, production and use? Are technologies implicated in women's oppression or could they play a part in women's liberation? Do the rapid changes we are witnessing in medical, industrial and information technologies pose threats to or offer opportunities for women? These are just some of the empirical questions which this book sets out to answer, by bringing together a selection of new articles by prominent writers in the field. Equally important to the book are a series of theoretical issues, concerning the ways in which the nature of the gender-technology relation can be understood. The collection contains articles which address one of the major theoretical debates of the 1990s: the relationship between feminism and social constructivism. Does constructivism pose a threat to, or provide a potential ally for, the feminist movement?

The last fifteen years have seen the development of an important new field of research: feminist studies of technology. Growing out of technology studies and feminist critiques of science, this work represents a significant and exciting body of research. To date, most energy has been expended by workers in this field producing detailed empirical studies of particular types of technology, for example, reproductive technologies. Whilst these have been valuable and illuminating, this focus has had two implications: firstly, there have been few attempts to examine the issues raised by *different* technologies, and secondly, theoretical understandings of the gender-technology relation remain underdeveloped. This book aims to begin to redress both these omissions. The articles address a range of different technologies, from cervical screening to telephones, and from food

processors to software design. By including discussion of a wide variety of technologies and technological cultures, we hope to give some indication of both the generality and the specificity of the issues raised by particular technologies. Are the gender issues raised by computer hackers' culture the same as those in a software installation? What questions are raised by new reproductive technologies that might also be relevant to understanding domestic appliances? Whilst it is clearly crucial to study technologies in their own specific contexts of use, design and production, it is also important that we do not foreclose the possibility of constructing more wide-ranging theoretical understandings of the gender-technology relation. We no longer need to argue the case that the relations between gender and technology deserve attention; that argument has been won. Our task now is to explore the *nature* of gender-technology relations. Fifteen years on from the early discussions, it is time to take stock and to ask where work on gender and technology should be going theoretically, methodologically and politically.

In this chapter we set the scene for the debates and studies which follow, by providing an introduction to a variety of perspectives on gender and technology. We start our consideration by examining the widely held conviction that technologies are masculine. This perspective – in various guises – lies at the heart of most theoretical work on gender-technology relations, and has its origin in a set of assumptions about what counts as technical knowledge. The next three sections consider three positions on gender and technology: eco-feminism, liberal feminism, and the more historical perspective which sees technology as masculine culture. The latter perspective is discussed in some detail, as it represents (in our view) the most sophisticated attempt to theorize gender-technology relations. We raise a number of critical points in relation to the perspective, before going on to examine some of the overlaps, tensions and dilemmas raised by the nascent dialogue between this feminist perspective and social constructivism. The issues raised have significance far beyond considerations of gender and technology; at their core are disagreements about the nature of power and patriarchy, about how we should understand gendered subjectivity or identity, the role of the analyst, and the kinds of epistemological positions which operate as 'foundations' for each perspective. By the end of this chapter – and certainly by the end of the book – we hope to have shown that in attempting to make sense of the gender-technology relation, one must necessarily engage with a whole series of questions which lie at the heart of contemporary debates right across the social sciences. But whilst these questions – in their broadest sense, questions about modernism and postmodernism – are often discussed in abstract and esoteric ways, here we

hope to illuminate them via engagements with what might be regarded as particular concrete phenomena – the relations between gender and technology.

### Gender and Technology

The cultural association between masculinity and technology in Western societies is hard to exaggerate. It operates not only as a popular assumption – from which much sexist humour about women's 'technical incompetence' has been generated – but also as an academic 'truth'. Some analysts see it as biological in origin, others as social, but there are few who seek explicitly to challenge the idea that technology and masculinity go together. Even feminist writers, usually at the forefront of attacks on assumptions about gender, have mostly accepted the association, and, rather than challenging its existence, have sought to understand how and why this state of affairs has come about – and how it might be disrupted. Faulkner and Arnold, introducing a collection of articles on the subject, give voice to a common belief:

To talk about women and technology in the same breath seems strange, even incongruous. Technology is powerful, remote, incomprehensible, inhuman, scientific, expensive and – above all – *male*. What does it have to do with women? (Faulkner and Arnold, 1985, p. 1, emphasis in original)

Whilst this quotation captures the tone of much feminist writing about technology, it is not the whole story. Interestingly, alongside the belief that technology is masculine, there exists in feminist writing a different argument – namely, a seemingly paradoxical appreciation that women are *not* entirely alienated from technology. Indeed, as feminist writers have argued, historically, women could be understood to have invented early technologies, and they continue to have relations to technology which are not characterized wholly by fear and alienation (Wajcman, 1992; Faulkner and Arnold, 1985). Some feminists see as a key task the 'recovery' of those female inventors and technologists who have been 'hidden from history' (Rothschild, 1983). Women's contributions to technological innovation, overlooked by male historians of the subject, are 'rescued' and accorded the respect which is rightfully theirs.

More fundamentally, feminist writers on technology have been concerned to interrogate the very nature of what counts as technical (Cockburn,

1992; Wajcman, 1991). They have shown that the technical has been defined in such a way as to exclude both those technologies which women invented and those which are primarily used by women. The link between masculinity and technology is thus an ideological link. Maureen McNeil (1987) warns that we should not accept too readily these ideological representations, but should retain a 'healthy scepticism' about the assumption that men have, and women lack, technological knowledge.

What is clear from feminist writing on technology, then, is that there is a dynamic tension between the view that technology is closely related to masculinity, and a perspective which sees this apparent association as itself ideological, based upon a narrow and specific understanding of the technical and a set of exclusions which position women outside the technical realm. Feminist analyses see-saw between these contrary views, trying to sever the link between masculinity and technology, whilst simultaneously attempting to acknowledge the force and effects of this deeply held cultural assumption. It is a difficult tension to negotiate, and mostly, as we shall show, feminist research remains within, rather than outside, the ideological problematic set by the assumption that masculinity and technology are intimately related.

### Eco-Feminism

One response to the perceived link between masculinity and technology has come from eco-feminists. Writers in this tradition see technology as an example of the way in which men try to dominate and control both nature and women. From this perspective, women are seen as being essentially close to, and in tune with, nature. As Susan Griffin puts it:

We [women] can read bodies with our hands, read the earth, find water, trace gravity's path. We know what grows and how to balance one thing against another ... and even if ... they [men] have transformed this earth, we say, the truth is, to this day, women still dream. (Griffin, 1984, p. 175)

This closeness to nature is conceived of as being rooted in biology, specifically in women's capacity to give birth. From this biological 'fact' flow a number of 'radical implications'.

I have come to believe ... that female biology – the diffuse, intense sensuality radiating from the clitoris, breasts, uterus, vagina; the lunar cycles of menstruation; the gestation and fruition of life which

can take place in the female body – has far more radical implications than we have yet come to appreciate. (Rich, 1977, p. 39)

Women's biology, it is argued, has led to a specific way of 'knowing' and experiencing the world, based on emotions, intuition and spirituality. Eco-feminists call for a celebration of the 'female values' which allegedly result from this – pacifism and nurturance. The eco-feminist position has been most powerfully articulated in relation to military technology, which is seen as the logical conclusion of masculine technological domination. It has also been influential in critiques of medical – especially reproductive – technologies, arguing that they represent patriarchal exploitation of women's bodies.

Part of the force and the attractiveness which eco-feminist arguments seem to hold lies in their very simplicity, and the way in which they bring to the fore questions about the gender politics of technologies. Ultimately, however, the essentialism of eco-feminism, its inability to deal with change, and its reproduction of traditional ideas about femininity – albeit in celebratory terms – make it flawed as a theoretical perspective and disempowering as a political one. It might be argued that the selection of values associated with nature is highly contentious. Why should nature be associated with creativity, tranquillity and harmony when it might also be seen as destructive, dangerously unpredictable and wild? There is something ironic about the fact that eco-feminists, and radical feminists more generally, locate women's essence, their power and their virtues, in their biology – reducing them specifically to their sexual and reproductive capacities – given the central role which feminists have played in challenging the idea that biology is destiny. Cross-cultural research has shown that there is no behaviour or meaning which is universally associated with masculinity or femininity; they are socially constructed and changing categories. Moreover, the values ascribed to women by eco-feminists originate in women's subordination; precisely those characteristics which other feminists have tried to historicize and have shown to be contingent – the product of oppression – are here valorized as essentially feminine. As Lynne Segal (1987) has argued, it is difficult not to see in this the politics of despair.

Eco-feminist positions suffer from another kind of determinism, in addition to the biological determinism discussed above. In this variant, society and technology are conflated, such that it is assumed that the essentially patriarchal nature of technology can simply be read off from the patriarchal nature of society. As such there seems to be no point in actually studying any particular technology, since its patriarchal nature can be assumed in advance. Perhaps more importantly, it also leaves no space for negotiation or resistance, and the only path open to feminists is one of

absolute rejection of technology – and indeed of society (Van Zoonen, 1992). Society is presumed to be made up of two discrete cultures – a male (patriarchal) one and an undervalued female one. The only principled course of action for eco-feminists is separatism – to retreat into their female culture and produce ‘woman-friendly’, feminine technologies and, alongside them, feminine intellectual work – ‘gynocriticism’ and ‘gynoscience’ (such as Daly, 1979).

### Liberal Feminism

If for the eco-feminists technology is inherently and inevitably patriarchal, then a different view is put forward by liberal feminists. For them, technology itself is neutral; what is at issue is the different ways in which men and women are positioned in relation to it. Women are conceived of as ‘lagging behind’ in their understanding and use of new technologies, and indeed in the fields of science and technology more generally, as a result of the roles which they have had to take on in a sexist society. For liberal feminists women and men are seen as both equal and, at some fundamental level, the same, sharing a basic humanity and rationality. However, women’s potential, it is argued, has been distorted by gender stereotyping. Women have been forced to take on particular sex roles (such as housewife and mother) which have concealed their true nature and capabilities. From this perspective, then, gender is conceived of as a system of representations, an ideology, which has been overlaid on authentic, unspoiled and equal human beings. The significance which is accorded to gender by liberal feminists varies. In some inflections its effects are seen as profound, it having spread its tentacles, through socialization processes, into women’s very sense of who they are and what they can expect; in others, gender is seen purely as a set of stereotypes whose effects, it would appear, are relatively discrete and superficial; gender is seen not in terms of social structure but as ‘the summation of numerous small-scale deprivations’ (Walby, 1990, p. 4). According to this latter view, it is stereotyped notions of what is appropriate work for women which keep them out of such fields as engineering or computing (Swords-Isherwood, 1985).

To combat what they see as the pernicious effects of gender stereotyping on women’s relationship to technologies, liberal feminists have advanced a whole series of programmes designed to help women ‘catch up’ – such as information campaigns to encourage women into ‘non-traditional’ careers, special educational or training programmes for women in science, engineering and computing, and affirmative action policies (see Cockburn, 1987,

1991, and Van Nostrand, 1993, for a critical analysis of training and equal opportunities in organizations). These initiatives have had limited success. For some, this is read as an indication that ‘more imaginative and far reaching programmes of positive action are required’ (Faulkner and Arnold, 1985, pp. 9–10). However, it is also possible to see the lack of social transformation brought about by these policies as resulting from the flawed theoretical perspective of liberal feminism.

One criticism that has been raised in relation to liberal feminism is that technology itself is not subjected to critical analysis (Karpf, 1987); it is thought of as ‘an independent factor affecting social relations without being affected by them’ (Van Zoonen, 1992, p. 14). As such, liberal feminism stands in stark contrast to much feminist writing about technologies which has argued that technologies ‘bear the imprimatur of their social context’ (Karpf, 1987, p. 162), that is, that they come to embody in their very design certain sets of gender relations or assumptions about gender. This view may itself be problematic. But, as we will argue later, it is not necessary to argue that technologies *embody* gender relations in order to highlight the relevance of the wider matrix of meanings ascribed to technologies for gender relations.

The ‘flip side’ of liberal feminism’s view of technology as neutral is the tendency to see women as the problem and to demand that they overcome the effect of sex role stereotyping and adjust themselves to technology. Although, in an abstract sense, sex roles are held to be imprisoning for both men and women, in practice liberal feminists have been preoccupied with the changes which *women* will have to make, and have left masculinity unchallenged. The male is treated as the norm, and women are supposed to adopt masculine ways of relating to technology.

Liberal feminism is clearly theoretically underdeveloped. Its critique of existing social relations does not bear sustained analysis, since gender is presented both as being profoundly important (the primary division in society) and simultaneously as having had no impact on technologies or any other social products. Its idea of a true and unspoiled human nature which lies untouched behind the distortion of gender is difficult to maintain. By recognizing the importance of processes of sex-role stereotyping and socialization, liberal feminism acknowledges the influence of society on individual identities and ‘seems just a step away from the idea that identity is not predetermined but socially constructed’ (Van Zoonen, 1992, p. 15). The problem is that it offers no principled way of distinguishing between those aspects of identity which are deemed to be natural and authentic and those which are seen as socially constructed. Finally, its assertion that gender is the primary division in society has led to a neglect of other dimensions of

power, in particular those of class and 'race', and to a tendency to ignore differences between women.

### Technology as Masculine Culture

The last decade has witnessed the emergence of a powerful critique of both the liberal and the eco-feminist positions. This challenged the view that women's uneasy relationship to technology resulted from a lack of access to technical training or employment, and from the effects of sex-role stereotyping. It also rejected the idea that women's absence from the technological domain could be understood by reference to the idea that there is some essential difference between the ways in which women and men relate to the world. Instead, it argued that women's alienation from technology is a product of the historical and cultural construction of technology as masculine (Cockburn, 1983, 1985, 1992, 1993; Cockburn and Ormrod, 1993; Wajcman, 1991). Masculinity and technology are conceived of as being symbolically intertwined, such that technical competence has come to constitute an integral part of masculine gender identity, and, conversely, a particular idea of masculinity has become central to our very definition of technology. As Wajcman puts it, 'the culture of masculinity ... is largely coterminous with the culture of technology' (1991, p. 19).

Technology, from this perspective, is seen as being much more than simply artefacts or 'hardware', but also refers to the knowledge and practices which are involved in its use (MacKenzie and Wajcman, 1985). These are thought of as both expressing and consolidating relations among men:

[Technology] fundamentally embodies a culture or a set of social relations made up of certain beliefs, desires and practices. Treating technology as a culture has enabled us to see the way in which technology is expressive of masculinity and how, in turn, men characteristically view themselves in relation to those machines. (Wajcman, 1991, p. 149)

One of the strengths of this body of work has been its attempt to locate the cultural connection between masculinity and technology historically. This has proved a valuable corrective to the ahistoricism and essentialism of some other perspectives. Women's exclusion and alienation from technology is seen as a consequence of a number of changes which occurred during the industrial revolution and the early development of capitalism in the West. Most notable among these changes was the separation of the public and

private spheres and the move of manufacturing out of dwellings and into factories. This resulted in a gendered division of labour which 'laid the foundations for male dominance of technology' (Wajcman, 1991, p. 21).

For some writers the introduction of capitalism is seen as decisive in *originating* women's exclusion from the knowledge and practices which constitute technology (Griffiths, 1985). Technologies which emerged in the period of the industrial revolution – or 'capitalist technologies' – are presented as being 'more masculine' than previous technologies (Faulkner and Arnold, 1985). This view stresses the idea that the shape of contemporary relations between men and women arose as a result of the introduction of capitalism and the legislation which accompanied it, denying women property rights and educational opportunities.

In other formulations, the development of capitalism is seen as *consolidating*, rather than originating, power differences between the sexes and their relationship to technology (Cockburn, 1985; McNeil, 1987). In a subtle and sensitive analysis, Cynthia Cockburn (1985) has argued that, as capitalism developed, already existing power differences between women and men were given a *new articulation* in relation to class differences, such that women lost out both as women and as workers. The machinery that was developed for the new factories was designed by and for men, and reflected male power as well as capitalist domination. Cockburn describes how male craft workers actively resisted the entry of women into the new spheres of production, refusing them membership of unions which would have offered them the means to bargain collectively for better positions. As such, women were denied the opportunity to 'enter and defend jobs deemed skilled' (Faulkner and Arnold, 1985, p. 8), and were forced into those jobs considered unskilled and which were accorded the lowest rates of pay.

It is the most damning indictment of skilled working class men and their unions that they excluded women from membership and prevented them from gaining competences that could have secured them a decent living. (Cockburn, 1985, p. 39)

It could be argued that there is a dialectical relationship between women and 'skill', such that women are concentrated in jobs which are deemed unskilled, and, conversely, that those occupations in which women constitute the majority of workers come to be seen as relatively less skilled than those dominated by men. 'Skill' is not some objectively identifiable quality, but rather is an ideological category, one over which women were (and continue to be) denied the rights of contestation.

The debate about the origins of the cultural association between

masculinity and technology is part of a much wider set of issues concerning whether 'patriarchy' can be said to pre-date Western capitalism, and to what extent asymmetrical gender power relations are necessary to, or are part of the logic of, capitalism itself. As a whole, it can be understood as part of the engagement of feminism with Marxism, and has been particularly valuable in highlighting the (frequent) invisibility of gender divisions within Marxian accounts.

Feminist research stresses that the exclusion of women from technology is as much a feature of contemporary Western society as it was during the early development of capitalism. Women are still rarely involved in the design of technologies, which are 'shaped by male power and interests' (Wajcman, 1992). Those who argue that technology is intimately related to masculine culture point out that the effects of this are profound. For them, technologies are not neutral artefacts which would be the same whether they were produced by men or women, but rather objects which 'bear the imprimatur of their social context' (Karpf, 1987, p. 162) – including the gender relations which constitute that context. Work on the 'social shaping' of technologies has highlighted the way in which military, industrial, national and class interests shape the design of a vast number of technological artefacts. Feminists have pointed out that technologies are also shaped by interests of a deeply gendered character.

The effect of male control of technology – and women's exclusion and alienation from it – is that the technologies produced for use by women may be highly inappropriate to women's needs, and even pernicious (e.g. the Pill) as well as embodying male ideologies of how women should live. (Karpf, 1987, p. 159)

Technologies, it is argued, are *gendered* (Cockburn, 1992). As a result of the context or culture of their production they come to embody particular assumptions about social relations, to embody 'patriarchal values' (Wajcman, 1991, p. 17). They can thus be seen as an index or sign of women's continuing oppression. More than this, however, once created, they come to constitute part of the *source* of this oppression. It is this double aspect – as both sign and source of women's oppression – which Cockburn (1992) describes as the 'circuit' of technology. Technology becomes physically implicated in the domination of women by men; it is 'constituted by, but also helps to constitute, social relations' (Karpf, 1987, p. 162).

One of the key concepts used by those who see technology as 'masculine culture' is identity. As we noted earlier, technology is seen not merely as hardware, as objects 'out there', but also as something which has important

symbolic dimensions which enter into gender identity. Masculinity, it is argued, is partly constructed through notions of technical competence: 'It is evident that men identify with technology and through their identification with technology form bonds with one another' (Wajcman, 1991, p. 141). In contrast, the idea that women lack technical competence is not merely a sex stereotype but 'does indeed become part of feminine gender identity' (Wajcman, 1991, p. 155). Identity, then, seems to be posited as an important mechanism through which the seemingly natural association between masculinity and technology gets reproduced. This is given a 'performative' inflection in some accounts, such that using particular technologies is seen as 'doing gender' (West and Zimmerman, 1987). Cockburn (1992) makes this explicit, asserting that gender is 'more of a doing than a being'. From this perspective, Wajcman (1991) suggests that one reason that most of the liberal feminist programmes designed to 'encourage' women into technical spheres have failed is that women are actively resisting technology because of the implications for their feminine identities. Sherry Turkle's (1988) work on girls' and boys' uses of computers underlines this point. She argued that women use their rejection of computers to assert something about themselves: as women: in rejecting computers they are *doing femininity*. To enter the field, she suggests, would be to endanger their very sense of femininity.

The notion of identity allows a way of linking discussions of large-scale social structures and historical trends with everyday, individual practices. This is summed up well by Margaret Lowe Benston:

Male power over technology is both a product of and a reinforcement for their power in society. Even at the household level, every time a man repairs the plumbing or a sewing machine while a woman watches, a communication about her helplessness and inferiority is made. (1992, p. 37)

It is in such mundane everyday experiences, it would seem, that the association of masculinity and technology is reproduced.

The perspective that considers technology as masculine culture is far more satisfying than either the liberal or the eco-feminist accounts. The understandings of both gender and technology are sophisticated and the emphasis on the *relation* between them is central to the articles which make up this book. Nevertheless, there are a number of problems and tensions in this work which are worth discussing if we are to move forward in our theoretical understanding of the gender-technology relation.

### The Essentialist Drift

The essentialism which besets radical and eco-feminist positions has proved extremely difficult to eradicate, even from the work of those authors who disavow it. The notion of a fundamental difference between men's and women's values underlies much more work in this vein. Faulkner and Arnold (1985), for example, argue that technology is 'alienating to women in the sense that the goals embodied in it are not necessarily women's goals' (p. 6). They point explicitly to military technology as an example of this disjuncture between 'women's values' and technology, and ask us to note the significance of the fact that weapons of destruction are often 'penis shaped', whilst reaffirming the need to 'take the toys from the boys' (p. 2). The notion of 'women's goals' is subjected to no critical interrogation; the idea that women as a group share specific goals and interests which, as in eco-feminist writing, are deemed to be anti-militaristic and pacifist, is implicitly accepted. Men as a group are also deemed to have their own distinctive set of interests which are not just different from, but inimical to, those of women (Karpf, 1987; Wajcman, 1991). A slightly different variant of this argument is found in Benston's claim that 'technology is a language' which does not allow women to 'say' what they want. That is, it is structured in such a way as to preclude the making of women's meanings. This argument suffers from the same problems of essentialism as Dale Spender's (1985) work on men's and women's different languages, on which it draws (see Segal, 1987; Cameron, 1985).

The problem with this work – a problem which, as we argue later, is common to much work which utilizes the notion of patriarchy – is that the relations between the key terms, 'men' or 'males', 'masculinity' and 'patriarchy', are not fully explicated. The writers draw on and move between the different terms, and different senses of the same term, inconsistently, in order to do particular discursive work. As a discourse analyst might point out, there is considerable variability in the way that these key terms are used (Potter and Wetherell, 1987), and it is this variability which allows writers in this tradition to explicitly disavow and yet implicitly draw upon essentialist accounts of the gender-technology relation.

### Dilemmas of Ideology

A central feature of this perspective is the argument that technologies are not neutral but gendered, and that the masculinity of technologies will not be changed merely by the inclusion of more women in the design process.

A gendered approach to technology cannot be reduced to a view which treats technology as a set of neutral artefacts manipulated by men in their own interests. While it is the case that men dominate the scientific and technical institutions, it is perfectly plausible that there will come a time when women are more fully represented in these institutions without transforming the direction of technical development. (Wajcman, 1991, p. 25)

It would seem from this argument that technologies acquire their gendered features by dint of more than the prevalence of male actors in their design, since the presence of more women is seen as not enough to change their character fundamentally. Yet, at other times, it is precisely the domination by men of the creation of technologies which explains their gendered nature. Men are depicted as designing technologies which are 'inappropriate' or even 'pernicious' for women's use (Karpf, 1987) and 'male interests' are said to shape their eventual form. Here we see an apparent contradiction, which revolves around the terms 'men' and 'male interests'. On one hand, the gendering of technology is held to have little to do with the prevalence of actual male subjects (and the absence of female ones) per se, but is implicitly attributed to some 'bigger' structure such as 'masculinity' or 'patriarchy' which transcends individual men. On the other hand, actual embodied males are deemed to act in terms of their own 'male interests', with the implication – sometimes made explicit – that the presence of women would, in fact, make a difference – that women would design *different* technologies.

In the first version, a notion of ideology is implicitly being mobilized. Masculine or patriarchal ideology is presented as subjecting both men and women, such that involving more women in technological design would be fruitless, or at least insufficient, as a measure to generate change. In the second version, however, no notion of ideology is posited, and men are depicted as simply acting in their own (male) interests. The implication is that if women were involved in envisioning technologies, they too would be able to design artefacts in line with their own (female) interests.

There are two issues here. The first concerns the use of these two inconsistent arguments. Wajcman argues that it is 'the ideology of masculinity that has this intimate bond with technology' (1991, p. 137) and not actual embodied men, some of whom may feel no connection to technology whatsoever. She draws on Bob Connell's work to argue that 'hegemonic masculinity ... is strongly associated with aggressiveness and the capacity for violence' and with 'control of technology' (1991, p. 143). Yet, as we have seen, there are many occasions on which an entirely different stance is taken: namely that men simply act in their own sectional interests in designing



technologies. To point this out is not mere pedantry, for this inconsistency goes right to the heart of this perspective, to the question of the very nature of the relationship between gender and technology.

Clearly, a notion of ideology is important. Without it we are left with the kind of essentialism espoused by the eco-feminists. But even if we take at face value the claim that it is the ideology of masculinity which has the connection with technology, a problem still remains: the nature of the relationship between the ideology of masculinity and actual human subjects is not addressed. Yet this is of utmost importance in understanding how the cultural connection between masculinity and technology is reproduced. The notion of identity seems to be posited as central, but the precise mechanism through which it works is not discussed. The issue of how the ideology of masculinity serves to perpetuate women's alienation from, and oppression by, technology remains largely untheorized. This represents a key task for the development of this perspective.

### The Problem with 'Patriarchy'

The tension between essentialist accounts and those which utilize a notion of ideology is a common feature of research which rests upon the concept of patriarchy. Whilst this concept is by no means central to all work which sees technology as masculine culture, it is nevertheless invoked sufficiently to merit some attention (Faulkner and Arnold, 1985; McNeil, 1987; Wajcman, 1991, 1992).

The use of the term 'patriarchy' in social scientific writing can be traced back to Weber (1948) who used it to refer to a particular form of household organization in which the father is dominant. Since then, it has been widely developed in feminist writing and has largely lost any connotations of generational power. It is now used primarily to capture 'the depth, pervasiveness and interconnectedness of different aspects of women's subordination' (Walby, 1990, p. 4). As Cockburn (1992) puts it: 'The notion supposed the existence in all societies of some kind of normative arrangements for governing reproduction, sex and gender' (p. 42).

A major problem with much writing on patriarchy is its tendency to imply that it is a universal and transhistorical phenomenon (Rowbotham, 1981; Segal, 1987). Patriarchy is held to exist in all cultures and to have existed in most, if not all, historical periods, so to use the concept is frequently to 'invoke a generality of male domination without being able to specify historical limits, changes or differences' (Barrett, 1980, p. 14). Clearly, this is a particular problem for radical feminist writing, but accounts

which take a materialistic or historical angle are not immune from difficulties. The question is: how useful is the concept of patriarchy for writers who wish to make historically and culturally grounded analyses of the gender-technology relation?

The problem for work in this vein is in theorizing the relationship between patriarchy and other forms of oppression and domination. This has been an enduring headache for feminists, particularly those located within a Marxian tradition. Zillah Eisenstein (1979), in one of the best known and most respected attempts at resolution, argues that patriarchy preceded capitalism, but 'capitalism uses patriarchy and patriarchy is defined by the needs of capital' (p. 28). Here, then, patriarchy is given a (token) analytic independence, but is then referred to solely in terms of its functions for capital. As Michele Barrett (1980) has argued, almost all materialist writing on patriarchy falls prey to this problem. As such, the theoretical value of the concept is unclear:

It is not clear to me what is being claimed here for the concept of patriarchy. For if patriarchal relations assume the form of class relations in capitalism, then however centrally the authors may pose patriarchal relations in the subordination of women, they do not resolve the question of the effectivity of patriarchy as the determinant of women's oppression in capitalism. (Barrett, 1980, p. 17)

This theoretical problem can lead, in writing about technology, to confusion about the extent to which men's interests and the interests of capital can be conflated. Margaret Lowe Benston, for example, argues: 'The logic of ruling-class men then leads to a technology that reflects ruling-class men's experience and view of reality ... [T]his view of reality is, to a large extent, shared by other men in the society' (1992, p. 35). Here, ruling-class and working-class men are given an identity of interests, and treated as a homogeneous group whose technologies alienate and oppress women.

If the theoretical value of the notion of patriarchy seems tenuous and problematic, then there are also serious doubts about its practical use in specific analyses. As Håpnes and Sørensen (in this volume) argue, the effects of patriarchy are difficult to 'unpick' and to differentiate from other structures. They point out that a reanalysis of Thomas Edison's work would face great problems 'in differentiating between the effects of Edison as a man versus Edison as an American versus Edison as a capitalist versus Edison as a person with particular cognitive characteristics'.

To be fair, the best research in this tradition does acknowledge this problem. Wajcman (1991), for example, notes the problems of disentangling

the effects of class and race from those of gender. Nevertheless, the question remains of how useful the notion of patriarchy is when it is so difficult to operationalize in research on the gender-technology relation.

### The Tendency to Functionalism

The final problem we wish to consider in relation to the 'technology as masculine culture' tradition concerns what we see as its tendency towards a kind of functionalism. As we noted earlier, a central theme of this perspective concerns the symbolic dimensions of technology and the way in which they enter into gender identity, such that an involvement or non-involvement with technologies is seen as part of the practice of 'doing gender'.

This performative turn in feminist research – and in constructivist work more generally – has been very valuable in drawing attention to the fact that the meanings of technologies do not merely exist 'out there' in the public realm, but become integral to our very sense of self. However, there is a danger that, in stressing the performative aspects of the gender-technology relation, the arguments become functionalist, explaining men's and women's relationship to technology only in terms of its functions for gender identity.

Cynthia Cockburn, dismissing the view that women's lack of involvement with many technologies is attributable to fear or passivity, has argued that women may *actively resist* technology because it is stereotyped as an activity appropriate for men. For a woman to enter into the technological field, she suggests, may be to forsake her very sense of femininity. This argument, then, is similar to that of Sherry Turkle, discussed earlier. Cockburn (1993) argues:

If an actor behaves as a man or woman within the frame of a technology study, manifesting certain authority or defence, say, that behaviour, exemplifying certain power relations, is not explainable without reference to those longer lived and widely spread patterns of culture and relationship, particularly those of class, 'race' and gender, that span between the worlds within and without the laboratory of a technology study.

It is the first part of this passage which we are interested in here. The problem is that the issue of what it means to act as a man or a woman – within the confines of a technology study or anywhere else – is answered in advance. That which should be the analytic question is, instead, built into the research as a set of assumptions. The result is that only people who have been

identified independently in advance as men or women can be seen as doing masculinity or femininity respectively. Moreover, only those practices which reinforce or reproduce existing patterns of gender relations are 'noticed' analytically. Gender relations, then, are always seen to be reproduced. There is no space for challenge or change and no theoretically principled way of dealing with those occasions in which biologically female actors engage in behaviours defined as masculine (or vice versa). It is a half-hearted kind of 'performative turn' which only remarks upon the occasions when a man repairs household appliances and a woman watches (Benston, 1992), and does not even ask whether or how gender relations might be challenged by a woman doing such repairs. It presents a bleak, and sometimes tautological, picture of the gender-technology relation: 'male use of technology communicates power and control ... [T]he whole realm of technology and the communication around it reinforces ideas of women's powerlessness' (Benston, 1992, p. 41). One implication of this view is that there is a stock of stable, routine ways through which gender is 'done', which are knowable in advance and can somehow be used as an index of the practice of masculinity or femininity. As such, it only directs our attention to those practices or performances of femininity or masculinity which are familiar, and which are assumed to 'exemplify' gender power relations.

Paradoxically, this view of gender relations being maintained by a limited number of (already familiar) practices – for example, the exercise of authority or defence – may actually lead us to *underestimate* the significance and persuasiveness of gender as a relation of dominance. Discourses of gender are fluid, and sexism is far more flexible than is traditionally assumed (Massey, 1991). As work on 'unequal opportunities' in employment has shown, discriminatory practice is maintained and justified in a whole range of ways, some of which even draw upon feminist discourse (Gill, 1993). Cockburn's analyses themselves acknowledge this point, showing, for example, that the ways in which men appropriate engineering as a masculine domain are far from obvious: 'At one moment, in order to fortify their identification with physical engineering, men dismiss the intellectual world as "soft". At the next moment, however, they need to appropriate sedentary intellectual engineering work for masculinity too' (Cockburn, 1985, p. 190). As her own analysis suggests, the practice of gender is much more complex and subtle than Cockburn's phrase 'if an actor behaves as a man or woman' would seem to imply. It is precisely this kind of detailed analysis which is needed if we are to understand the entangled relationship between gender and technology.

### Feminism and Constructivism

One of the most exciting developments in research on technology in recent years has been the beginning of a debate between feminists and other researchers taking a broadly constructivist position. Many of the issues discussed so far in this chapter have been taken up and dramatized in this engagement, with arguments about patriarchy, essentialism and interpretative flexibility. It is becoming clear that many feminist writers see themselves as working both within and against what they characterize as a 'mainstream' social constructivist tradition (Cockburn, 1992, 1993; Wajcman, 1991, 1992; Singleton, this volume), seeing many confluences of interest, yet also struggling to place gender relations centrally on the agenda of sociological studies of technology.

In writing from this position there is a risk of ignoring important differences between the various bodies of work which constitute the 'broad church' of constructivism. There are at least as many differences between the various strands of constructivist thought as there are between feminism and constructivism. There is also a danger of reifying the idea of a strong mainstream tradition in relation to which feminist researchers see themselves as marginal. Cockburn, for example, attributes to actor network theory (ANT) the status of dominant orthodoxy, yet it would not be difficult to make the case that ANT is as marginal as feminism to social constructivism.

However, putting aside these qualifications, it is clear that there are significant ways in which feminist constructivism, as exemplified by work on technology as masculine culture, differs from other strands of constructivism. One criticism which feminists have levelled at ANT is that it makes gender invisible (Cockburn, 1992). By focusing on the design and development phases of an artefact's life, constructivist studies often fail to see women at all. This is not necessarily attributable to chance: the research focus *keeps shifting* to 'new arenas where women are scarcely present' (Berg and Lie, 1993). Cockburn (1992) argues that 'Ironically, women's invisibility has been increased by the shift we have made from technological impact studies to social shaping studies. For a hard fact remains that, in matters of technological change, women are more impacted upon than impacting' (p. 38).

Singling out actor network research, feminists have argued that in an important sense women are simply not seen as actors at all. In order to 'see' women analytically, it is necessary to move beyond the network as normally defined (Cockburn, 1992, 1993). More fundamentally, Berg and Lie (1993) accuse constructivist researchers of treating gender as synonymous with women, and thus of believing that gender is not relevant when women are absent.

This raises an issue for both 'mainstream' and feminist constructivist research, namely, how the relevance of anything will be manifested – or can be demonstrated – in empirical analyses. This has been the subject of considerable discussion in relation to interests (Woolgar, 1981; Callon and Law, 1982). For many constructivist writers, the notion of interests should not be used as an explanatory resource unless it can be clearly demonstrated within the frame of reference of the analysis. Against this some feminists have argued that it is perfectly reasonable to impute interests to particular actors in order to explain their behaviour. The imputation of interests must be reasoned for and is always contestable but is an important part of sociological analysis (Cockburn, 1992). Transposing this debate to gender we are left with the question of whether and how gender can be deemed relevant in any given situation. Constructivist researchers argue that if gender is relevant then it will become evident to the researcher. Their argument is similar to that of ethnomethodologists and conversation analysts who claim that gender will be oriented to by participants if it is relevant as a dimension in any given situation. The category, they argue, must not be imported by the analyst, but should be allowed to emerge from the study of participants' interactional orientations; everything that is relevant to the interaction will be displayed discursively.

This faith that 'it will all come out in the (discursive) wash', however, is disputed by feminists. In an important reanalysis of a conference paper and the discussion which followed it, Deborah Cameron (1989) neatly highlights the problems with this assumption. The issue in question was a conversation analytic paper which analysed a transcript of a telephone call to the emergency services following an incident of domestic violence. Cameron (1989) points out that in this paper (written and presented by a male conversation analyst) no mention was made of gender because the parties in the telephone call showed no 'obvious' sign of orienting to it. Not only was gender not mentioned in the paper, but in the discussion following its presentation no one brought up the issue either. 'Feminists present felt constrained not to point this out; they were sensitive to possible accusations of vulgarity and bias' (Cameron, 1989, p. 16). Thus, not only was gender deemed interactionally irrelevant in the account constructed by the paper, but a transcript would reveal that it was also, apparently, interactionally irrelevant to the conference discussion. Cameron argues that this was not the case at all – in fact, women felt silenced and met separately at the conference to discuss this. Silence, like absence from networks, is itself gendered. Moreover, Cameron argues that the relevance of gender was displayed in the telephone call analysed, but that the majority of the men at the conference were simply not sensitive to it. This raises a whole set of issues about the

interpretative resources which (classed, gendered, 'raced') analysts bring to bear on their research, which are not even addressed by most constructivist researchers. As Berg and Lie (1993) argue, 'the relevance of gender does not spring to one's eyes unless gender is actively used as an analytical tool'. There is a problem, however, in that, if gender is used as an analytical tool, researchers run the risk of 'black-boxing' it, of treating its meanings as self-evident and stable, producing an artificial analytic closure. This is the basis of constructivists' attack on feminist research. Diverse, flexible and contradictory social practices are reduced to one thing, and analytic judgments are always made in advance. 'Feminist work is boring and predictable. You always know who done it right from the start: the plot is far too flat' (Hirschauer and Mol, 1993). The question which feminist research asks, it is argued, is how pre-existing social relations are expressed in and shape technologies (Ormrod, this volume). Feminists are accused of 'selective relativism', of seeing some things as socially constructed, but not others.

[T]he gender of individuals is taken to be constructed, but this happened a long time ago in the dark ages of early childhood. It was a once in a lifetime experience, beyond words, out of reach for ever after. We were not born a woman, but we became so and the outcome of the process is that we *are* one. (Hirschauer and Mol, 1993)

Underlying the disagreements between feminists and other constructivists are fundamentally different epistemologies. Writing about ANT, Cockburn (1993) argues:

The problem for us was the agnosticism in the ANT school concerning 'society' – that is a social world with distinguishable, if historically changing and culturally varied, structures existing outside and prior to the interactions of the observable laboratory or actor network.

Cockburn, like many other feminist researchers, employs an ostensive definition of society – concepts such as social structure are posited as background determinants of action. In contrast, ANT works with a thorough-going performative definition in which the very things treated as determinants of action in most sociological accounts are understood instead as consequences: 'Society is not what holds us together, it is what is held together. Social scientists have mistaken the effect for the cause' (Latour, 1986, p. 276).

ANT professes an epistemological or radical scepticism towards tradi-

tional sociological concepts, amongst them power and gender. Power is seen as a consequence of struggle, of attempts to enrol other actors, and not as something given and 'held' by particular actors. As such it is entirely counterpoised to most feminist understandings of power, which stress enduring relations of asymmetry and oppression. Cockburn (1993) argues that a theory of power which only stresses capacity is unable to account for gender relations in which power is often experienced as domination. Taking a stance against ANT, her characterization of gender relations may seem rather crude: 'Men dominate women as a sex, exploiting and controlling women's sexuality and reproductive capacities' (Cockburn, 1992, p. 42). This is as unable as ANT to grasp the diversity and flexibility of gender relations. Nevertheless, it does highlight an important weakness in actor network research to date: a failure to consider networks temporally. A theoretical imperative not to 'black-box' should not lead to the opposite failing: an inability to see that some networks are remarkably enduring. Power may be a consequence, accomplished and re-accomplished on a moment by moment basis and always contestable, but some networks are more stable than others.

It may be, as Cockburn says, that feminists and actor network theorists are asking different questions. In technology theory the key question has been how to explain change, while for feminists it seems more urgent to explain continuity, the enduring inequalities and the fact that gender relations survive so little changed through every successive wave of technological innovation. For feminists, research on technology is not just about adding to our academic knowledge, it is also an emancipatory project. One of the questions which it asks of any theoretical or methodological approach is whether and how it can contribute to women's liberation. Since feminism and other liberation movements have for so long been wedded to realist discourses, the challenges represented by constructivism and relativism present particular dilemmas. On the one hand, such positions offer the liberatory possibilities of deconstructing categories such as woman or man and all the ideological baggage which accompanies/constitutes them; on the other hand, feminists often feel they need to hold onto these very categories for political reasons. The deconstructive feminist critic may spend her days deconstructing gender categories, but find herself at the weekend demonstrating around 'a woman's right to choose' – mobilizing around the very category which she spends her working life deconstructing. Such tensions are not limited to feminists but apply to many involved in political struggles. It is precisely this desire to deconstruct the naturalness of the oppressive dichotomies which have constituted Western knowledge since the Enlightenment, combined with the need to intervene politically in the

world, which led Stuart Hall to describe himself as 'a theoretical anti-humanist, but a political humanist'. The question is whether a realist or objectivist discourse is the only one appropriate for a liberatory project or whether constructivism may itself have emancipatory possibilities.

This question is taken up in the first part of the book, which considers contemporary theoretical perspectives on the gender-technology relation. Susan Ormrod's answer is unequivocal: constructivism, she argues, is essential if we are to discuss relations of gender and technology in all their specificity and difference – and thus to be able to challenge them. The social is discursively constructed, as are our very subjectivities. Ormrod is critical of what she sees as the implicit social theory which informs many feminist critiques of technology, arguing that it is reductive and conservative in effect, and relies upon problematic dualisms such as individual and society, and male and female. Her chapter looks in detail at the problems with the notion of patriarchy, and the conception of power upon which it rests. Rather than focusing our energy on examining how pre-existing social relations of patriarchy express and shape technology, she suggests that we should explore what post-structuralist approaches have to offer feminists. By way of examples, she discusses two distinct but related approaches – one a variant of the discursive analysis associated with Foucault, the other actor network approaches. Both these approaches, she suggests, avoid the problem of 'black-boxing' and allow for dynamic and sensitive analyses of the gender-technology relation.

A contrasting perspective is taken by Keith Grint and Steve Woolgar in their chapter. They do not seek to reinstate realism, but rather to show the similarities between feminism and constructivism in their 'nervousness' about following through the radical implications of their critique of essentialism. Grint and Woolgar argue that rather than disavowing essentialism altogether, both feminism and constructivism have simply replaced technological determinism with an equally problematic social determinism. According to this, the properties of any given technology are said to derive not from its internal technical capabilities but from the circumstances and social relations involved in its development.

Grint and Woolgar discuss a number of problems with this view, arguing that they arise from a failure to acknowledge the *textual character* of technologies. Advocating a new position, which they call post-essentialism, they argue that what counts as a masculine, feminine or neutral technology lies in the interpretations that are made of it, not in the technology itself. Theirs is an unashamedly epistemologically relativist position, and the chapter devotes considerable attention to considering possible feminist objections to it. They argue that realist commitments have not served

feminism well, as 'the truth' about women has often been profoundly oppressive, and they highlight the liberatory potential of post-essentialism for feminism and other emancipatory struggles.

### Case Studies

In the second part of the book, we present a series of case studies, each concerned with examining the gender-technology relation. The subject matter here is diverse, taking in medical technologies (Hirsch; Singleton), domestic appliances (Chabaud-Rychter), telecommunications (Frissen) and information technologies (Tierney; Håpnes and Sørensen). What unites the chapters is the concern they share with highlighting the different ways in which gender relations are implicated in the design, marketing, understanding and use of technologies.

Valerie Frissen's chapter offers us a historical survey of the domestication of the telephone in Europe and America. Initially presented to the public as a tool for business, the telephone quickly became a medium for social communications, overwhelmingly used by women. In the days before direct dialling, women were recruited in their thousands as operators, hired for the pleasant and discreet manner associated with Victorian femininity. Frissen shows how these women – 'the voice with a smile' – played a significant part in the development of new forms of social interaction.

Turning to the contemporary scene, Frissen asks what kind of role women are playing in the new telecommunications environments. She focuses on four areas of development, examining each for its gender implications. Discussing a variety of issues such as safety and security, sociability and entertainment, work and instrumentality, and access and availability, she raises questions about developments as diverse as the growth in erotic chatlines, the uptake of cellular phones and the implications of call tracing technologies for gender relations. None of these, she argues, are either wholly liberatory or wholly oppressive for women, but they present potential for changing gender relations.

Frissen argues that gender was and remains largely invisible to those involved in the development of telephone services. In stark contrast, Danielle Chabaud-Rychter's chapter highlights the *salience* of assumptions about gender amongst those involved in the design of kitchen appliances. Drawing on research in a French company which produces food processors, Chabaud-Rychter highlights the way in which women's cooking practices are 'configured' by designers, and translated into mechanical actions. She explores in detail the process by which domestic practices are itemized,

categorized and counted in order to define markets for appliances. Interestingly, however, there is a 'double language' in use by designers: on one hand, the parameters of cooking practices are established and stabilized with precise measurements; on the other hand, the practical experience of the designers is drawn on liberally to explain or defend particular innovations. This double language produces objects which are hybrid, containing, in Chabaud-Rychter's words, 'both the domestic and the industrial worlds'.

The next two chapters focus on medical technologies. Hirsch's chapter, like Chabaud-Rychter's, is concerned in part with the relationship between public and private worlds. Hirsch reports on research into how married couples make sense of the increasingly rapid developments in new reproductive technologies (NRTs). He shows how two scenarios were repeatedly evoked by the couples he interviewed to express concern about how NRTs would be used. One scenario stressed the fear that NRTs could lead to children being seen merely as commodities – one more consumer item to be bought and sold. The other scenario conjured up an image of a 'brave new world' in which NRTs were used by 'big brother' to produce a master race. Hirsch notes that an interesting feature of these scenarios is that they draw on ideas not normally associated with 'conjugal reproduction': the market (consumerism) and the state ('big brother'). He suggests that the assumed separation between public and private (with its familiar gender mappings) in Euro-American culture is neither as clear-cut nor as durable as it once seemed.

Vicky Singleton's topic is the Cervical Screening Programme (CSP) established by the British government in the 1960s. Her chapter moves between the theoretical and the empirical levels as she explores what actor network approaches have to offer as a way of understanding the different actors involved in the CSP – health professionals, feminists and women's health activists, and lay women. She is simultaneously attracted to and critical of actor network approaches, arguing that they have not yet developed ways of incorporating difference, multiplicity and instability into their narratives and analyses. But feminism, she argues, faces similar problems. She shows that whilst feminist health activists offer women a voice which has been excluded from the 'government CSP actor network', they do so at the price of 're-black-boxing' and artificially unifying the category 'woman'. Singleton argues that we need a multi-perspectival approach, and need also to develop ways of thinking about the tension between our roles as analysts and our own political commitments.

In Singleton's chapter, we see clear echoes of the theoretical concern expressed by Ormrod and by Grint and Woolgar about the problems with the notion of patriarchy. This emerges as a central concern in the book as a

whole, and is also taken up by Tove Håpnes and Knut Sørensen. They are concerned about what they see as a tendency in some feminist research to treat gender categories as static and pre-given. This leads to romantic and essentialist analyses, they argue. Like Grint and Woolgar, they suggest that we have not yet developed an adequate language for describing the different kinds of masculinities displayed in the context of design or production of technologies, and nor can we say categorically what it is about the properties of a technology which makes it either feminine or masculine. Attempting to avoid these problems, their own research focuses on the culture of computer hackers. They explore the different meanings which various groups of young people attribute to hacking and to hackers, showing, for example, how girls used the notion of 'hackers' as a metaphor for everything they disliked about computer science, whilst, in contrast, the hackers themselves saw what they did as being creative and a rejection of mainstream computing.

Tierney's chapter, which concludes the book, is also concerned with questions of culture. She presents a fascinating analysis of the informal and subtle ways in which a particular group of workers within a software company – 'the lads' – were systematically privileged, so that they progressed up the career ladder much more smoothly and much faster than other colleagues. Drawing on considerable research in an Irish software installation she demonstrates how this group of young, single (or at least childless) men, were able to capitalize upon an informal, but exclusive, network, which involved playing football and poker, eating lunch and drinking together. In the absence of a standardized meaning, within the company, for what a particular job was worth (in terms of salary, status and task content), the lads' network became a powerful means of earning bonuses, getting positive appraisals and securing promotions. The informal atmosphere, the arm's-length managerial policy, and the inexplicit promotions strategy, then, worked to benefit this group of workers at the expense of others – particularly the women within the company.

Although Tierney's research is located in one particular company, her analysis offers us a way of thinking about work and technological cultures which has a far broader relevance. It is hoped that her work, together with that of the other contributors to the book, will provide an inspiration to others to tackle the difficult nexus of questions that constitute the gender-technology relation. Our collective analyses suggest that there are neither grounds for utter pessimism nor for complete optimism, but there are 'cracks' or interstices, and there are spaces for struggle and change. We need to develop a new language for talking about gender-technology relations, a language which does not rely upon simply reproducing the old, oppressive dualisms, but, equally, does not efface real differences of power, access and

control in relation to technology along gender, class, 'racial' and other lines. Alongside this theoretical project, a long-standing feminist political project remains: to develop gender-technology relations which will liberate and emancipate all women and men.

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Part I

## Theoretical Developments in the Gender-Technology Relation