

# Queering feminist technology studies



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**Abstract** This article argues that the influence of heteronormativity on the conceptualization of women and technology in feminist constructivist technology studies creates serious problems for the analysis. This research aims to understand the coproduction of gender and technology in society, but does not approach the two elements in a symmetrical fashion. Hence, ethnographic studies can only exemplify how the gender of technology producers is reflected in the technology created. Masculine gender identity is stabilized as a cause for the masculinity of a technology that is shaped by social relationships. The criticism is fleshed out in a close examination of case study accounts of ethnographies among producers and users of technology. It is argued that a habitual reproduction of heteronormativity, present in the surrounding culture and in the technological communities studied, has prevented the adoption of approaches to the subject conducive to the objective of this feminist research. Acknowledging that destabilizing gender can undermine the critical thrust of feminist critique, the paper turns towards queer theory for ideas about how to produce criticism that does not rely on the stability of identity. The article closes with suggesting how a queer feminist approach could contribute to different readings of life with technology.

**keywords** *constructivism, feminist technology studies, gender and technology, queer theory, subject*

This paper examines the ways in which heteronormativity influences feminist research on gender and technology. It draws attention to the ways in which heteronormativity shapes analyses and concepts in empirical investigations, which is an issue in need of more critical debate (cf. Susan Driver (2005) and Victoria Hesford (2005) in this journal). The discussion also addresses the divide between a theoretical discourse that fully accepts ‘the end of the binary of femininity and masculinity’, and empirical research that ‘relapse[s] into the old pattern’ (Van Lenning, 2004: 26) within feminist technology studies.

The analysis focuses a particular research trajectory that will be called ‘feminist constructivist technology studies’, which is committed to

investigating the 'coproduction' of gender and technology (Faulkner, 2001). This sub-field within the wider area of feminist technology studies relies on ethnographic methods to analyse gender in relation to the construction and use of technology. This sub-field resists technological determinism but tends to 'black-box' gender identity as the major cause in the gendering of technology, which leads to analyses representing gender as stable and technology as malleable. This can be understood as a result of a failure to adopt new ways of theorizing gender. One reason for this shortcoming is the habitual reproduction of heteronormativity, which prevents a constructivist approach to gendered subjectivity. Instead the gendered subject functions as the determining factor in the gender/technology relationship, which counteracts the explicit objective of understanding coproduction.

The following discussion criticizes the ways in which heteronormativity is reproduced in ethnographic case studies and points to alternative feminist conceptualizations of the gendered subject. It is suggested that perspectives drawing on queer theory can contribute to a rethinking of gender in this strain of feminist technology studies. The examination begins with a presentation of feminist constructivist technology studies, illustrated with examples of how heteronormativity shapes the representations of women, men and technology. This is followed by a discussion of other, more open-ended feminist approaches to gendered subjectivity in relationships with technology. Finally, the paper turns to feminist elaborations of queer theory, in an argument for the benefits of shifting the theoretical framework, in order to facilitate the objective of analysing the coproduction of gender and technology.

## **Feminist constructivist technology studies**

Feminists have interrogated the relationship between gender and technology for at least three decades.<sup>1</sup> The works subsumed under the label 'feminist constructivist technology studies' in the present article comprise a sub-field within the area.<sup>2</sup> They investigate the construction of technology and its users in empirical case studies often by way of ethnographic research among engineers, designers and users of technology. This empirical research is conceptually interesting because it attempts to formulate constructivist perspectives toward both technology and gender. The analyses aim to critically capture the ways in which technology is shaped by gender and gender is shaped by technology.

Wendy Faulkner (2001) outlines the agenda of this research to a wider feminist audience in a way relevant to the present article. She understands its propelling force to be the question of how technology is gendered, a question that becomes possible by adopting a social constructivist perspective on technology.

Constructivist approaches to technology emerged in the field of social studies of technology as an explicit rejection of the technological determinism dominating previous social, historical and philosophical analyses.<sup>3</sup> They argue that technology is always shaped in complex processes that involve social and cultural factors, as well as material and technical

elements. Today constructivist perspectives range from applications of social theory, to radical re-conceptualizations of subjectivity and causation.<sup>4</sup> Feminists take social constructivism as one point of departure, assuming that technology is not socially neutral, but that it embodies social relationships, including gender, which order the contexts of creation and use. Faulkner argues that this perspective ‘obliges us to view gender *as an integral part* of the social shaping of technology’ (2001: 90, emphasis in original).

Feminist constructivist technology studies combine this perspective on technology with a view of gender as socially and culturally produced. The research is guided by ‘the sense that technology and society are mutually constituting – hence, the coproduction of gender and technology’ (Faulkner, 2001: 90). Technology is, in this view, created and used in a changing, socio-cultural system, and gender, as a feature of this system, is also shaped by technology. This adoption of a constructivist perspective on technology, fused with an understanding of relationships with technology as impacting on the processes that shape gender, can be considered a ‘double constructivism’.<sup>5</sup> To deliver on this promise a symmetry in the treatment of gender and technology, in relation to each other, is called for.

So far the bulk of research in the field has focussed on the gendering of technology. Results have confirmed that technology is dominated by men and associated with masculinity, and that it is easier for men to relate positively to technology (Cockburn, 1985; Wajcman, 1991; Rommes, 2002). A recent example is Nelly Oudshoorn, Els Rommes and Marcelle Stienstra’s (2004) article about the ways in which software engineering communities construct the user’s position. The authors explicitly commit to a constructivist approach; they aim to understand the ways in which engineers’ ideas about users inform the design process. Through ethnographic research in two comparable software design projects, both constructing systems intended for public use (DDS and New Topia), they discovered that, despite initial ambitions to produce designs that work for ‘everybody’, both projects ended up using what they term the ‘I-methodology’, i.e. designers taking themselves as the model for the user. The user was expected to be intrinsically interested in exploring the way the computer program worked. The researchers conclude that the process generated a user-position that favoured young men with an interest in computers:

Since the project teams of New Topia and DDS consisted mainly of men, and the few women involved in the design of the DDS largely adopted a masculine design style, the interests and competencies inscribed in the design were predominantly masculine. The fact that DDS and New Topia failed to attract the audience they intended to reach must therefore also be understood in terms of the gender identity of the designers. (Oudshoorn et al., 2004: 53)

The conclusion that the engineers’ gender identity produced the effects seems strange when the authors have conceded that women can ‘adopt a masculine design style’. Men’s gender identity becomes a stable factor, with the force to determine technology design. The women engineers appear not to have gender identities of the same strength, since they can

adopt the required masculinity, while the female non-users' position is determined by their gender identity. This statement illustrates an analytical asymmetry, which has haunted feminist constructivist technology studies from the outset.

More than ten years ago Rosalind Gill and Keith Grint (1995) identified several points of contention in the meeting between constructivist perspectives on technology and feminism. One was the risk of 'black-boxing' gender as an analytical tool, which leads to 'an artificial analytic closure' (Gill and Grint, 1995: 20). This appears to be what has happened in the example above and in other studies. Whilst feminist researchers have effectively appropriated and further developed a constructivist approach to technology in the ten years that have passed, their conception of gender seems to have congealed. The gender identities of technology designers and users are treated as stable traits that precede the creation of a malleable technology. This 'black-boxing' of gender undermines the aim to understand the coproduction of gender and technology. If gender is already there, as a fixed element it can only function as a cause in relation to the socially constructed technology. When, as in Oudshoorn, Rommes and Stienstra's article, the gender of the engineers is used to explain the masculinity of the projected and actual users, we end up with a 'selective relativism' in which 'some things are seen as constructed but not others' (Gill and Grint, 1995: 20).

A double constructivist analysis needs to be able to account for the gender of engineers as also being constructed in the process of creating technology and projecting users. This is something that Oudshoorn, Rommes and Stienstra hint at in their observations of female software designers, who do things in the same way as their male colleagues do, but it does not influence their conclusion. To address this they would have to approach gender not as an identity trait that comes from within the individual and determines their relationships with others, but as something emerging in the processes in which people and technology are enmeshed.

Feminist theorists have developed a number of ways to think differently about gender, but apparently these have not caught hold in feminist constructivist technology studies. Instead of addressing this head on, as if scholars in this sub-field had no knowledge of these approaches, I want to begin with a critique of heteronormativity, which I believe presents a major obstacle to the adoption of more open notions of gender.

## **Heteronormativity in feminist constructivist technology studies**

Heteronormativity, 'as the view that institutionalised heterosexuality constitutes the standard for legitimate and expected social and sexual relations' (Ingraham, 2002: 76), influences the way in which gender is represented and discussed in feminist constructivist technology studies. Texts in this field do not question the definition of gender as a heterosexual coupling of opposites, female and male, masculine and feminine. They represent heterosexuality as the model for all relationships between humans and between humans and technology. The analyses take the local

production of feminine women and masculine men, who relate to each other through sexuality, as a factual premise. The absence or disapproval of, for example, masculine women or feminine men, who may (or may not) relate to each other in different ways in the studied communities, is not seen as in need of explanation.

Heteronormativity is not something that feminist constructivist technology studies bring to their subject matter. However, they have, as of yet, not problematized it, neither in the communities they study, nor in their own analyses; this in spite of knowing that it is present in their empirical material and in the wider socio-cultural environment. That heteronormativity influences social relationships, not just intimate personal connections, ought to be a topic for a critical analysis in research that has as its foundation a belief that technology is created in social relationships, carrying social meanings and expressing social norms. Heteronormativity can be expected to operate in, and influence, technological environments. Faulkner is obviously aware of the link between femininity, masculinity and heteronormativity as she speaks of the two genders as ‘usually posited ideologically on an attraction of gendered opposites’ (2001: 88). She also points to ‘heterosexism’ as an ‘under researched theme in the gendering of technology’ (2001: 88) that ‘may provide at least a partial answer’ (2001: 88).<sup>6</sup> However, this insight does not lead to any discernible changes in her own discussion of women, men and technology, nor does it seem to have any impact on the field, as is demonstrated in an article by Elin Kvande (1999), about the ways in which women graduate engineers in Norway construct femininity.

Kvande recounts the words of one of her interviewees:

‘A female graduate engineer cannot dress in lace and frills because she won’t be taken seriously’, says one woman working as a graduate engineer. Many of these women have relatively clear ideas as to how they can express their femininity. We can also interpret this to mean that female graduate engineers have to be ‘one of the boys’, or ‘social men’, to be accepted and given career opportunities in organizations. (Kvande, 1999: 305)

Kvande does not discuss the informant’s designation of femininity as ‘dressing in lace and frills’, which I will return to later on. At this point another issue is in focus – that this analysis implies that femininity is something that women have and can choose to express.

The construction of women as possessing femininity, opposed to masculinity that emerges from men, runs through Kvande’s analysis. The main part of her text describes four strategies for ‘expressing’ femininity in male dominated workplaces. Kvande names these ‘homeless’, ‘one of the boys’, ‘compensators’ and ‘challengers’. The ‘homeless’, often new in the workplace, ‘adhere to the rules of behaviour’ in order to ‘fit in as much as possible and be accepted’ (1999: 311). The women opting to become ‘one of the boys’ aim to be “like” their male colleagues and to be treated like them’ while they distance ‘themselves from “the majority” of women’ (1999: 311). These two strategies are, according to Kvande, based on an idea of ‘sameness’ while the remaining two accentuate ‘difference’. The

'compensators' actively distance themselves from the culture of the profession and withdraw from it 'in favour of their other tasks, interests and values as mother and family member' (1999: 312). The 'challengers' also reject existing norms in the workplace but take them on, demanding changes that would allow them to achieve their goals of having 'a career as a graduate engineer and . . . a family and children' (1999: 312). These categories are said to be 'ideal types', compiled from interview data, and they reproduce the interviewees' construction of heteronormative gender by assuming that femininity and masculinity are mutually exclusive and emerge from female and male bodies respectively.

In Kvande's analysis there is no possibility for women to express something other than femininity, heteronormatively defined as the opposite of masculinity. The female individuals who adapt to the norms of the workplace and do 'sameness' cannot, in this model, be understood as doing masculinity. This is strange because if the norms of the workplace are understood to define a certain type of masculinity as preferred conduct, the women who try to fit in and live these norms ought to be regarded to be doing masculinity (or at least attempting to).

It is also obvious that Kvande regards the 'sameness' strategies as less sound options, as something forced on to the women but not tenable in a longer perspective because 'having children will shatter the illusion that it is possible to belong to the category "social men"' (1999: 324). Femininity is thus tied to reproduction. 'Sameness' is also judged to be politically inadequate since it 'prevent[s] the development of solidarity between themselves and other women, and this inhibits a common insight into the conditions women face in society in general' (1999: 323). Hence, women who would fit in with the men at the workplace cannot be true feminists.

In the article Kvande merges a claim to apply constructivism with a heteronormative model of sexual difference. In her framework the idea of women doing masculinity is inconceivable, and conduct that could be read in this way is deplored. This echoes a more widespread practice in which 'female masculinity is generally received by hetero- and homo-normative culture as a pathological sign of misidentification and maladjustment' (Halberstam, 1998: 9).<sup>7</sup> Kvande's article reproduces heteronormativity by representing the informants' construction of gender in a way that does not problematize it, but instead establishes and amplifies it as an analytical fact.

Another version of heteronormativity in the field is the assumption that all women relate to technology in a way that reflects heteronormative femininity. An example is Marja Vehviläinen's (2002) article about a Finnish initiative to promote computer literacy among women.

Vehviläinen begins with a discussion of gender and technology and commits to a perspective of 'gender, agency, and technology . . . as social constructions . . . shaped through . . . everyday practices' (Vehviläinen, 2002: 276). She presents ethnographies of two women's groups engaged in teaching computer skills in the late 1990s. The groups were different, with one considerably more successful than the other at bringing skills and confidence to the participants.

Vehviläinen's study is a careful empirical investigation, that most certainly captures the reality of the participants of the two groups, and her critique of 'the liberal view' of technology as neutral and the same for everybody is important. She concludes that '[I]n order to create voices of their own, women need to connect technology to their own experiences, which means struggle and work' (2002: 289). She also argues that diversity among women will only become visible in women's groups that begin from the experience of the participants. In such groups 'there is room for differences between women' (2002: 289). This assumes that differences between women have no relevance for their relationships to technology. In this analysis all women relate to technology in the same way, as outsiders, because technology is gendered masculine. Vehviläinen, thus, represents all women as identifying with a femininity that is the opposite of masculinity, which determines their relationship with technology. This may be true for women who identify with a heteronormative femininity defined in a relationship to masculinity, but not necessarily for those who do not, for example, many lesbians.

Research on lesbians and technology provides reason to believe that the assumption that diversity among women does not pertain to their relationships with technology is mistaken. In relation to computer usage Nina Wakeford's (2002) overview of lesbians online is illustrative. She dates the first online lesbian discussion list to May 1987. She also states that the early lists

... tended to be facilitated by women working in the computer industry who could use the computers at their organisation to run the mailing list distribution software. These women could spend up to four hours per day administering requests for subscription, dealing with messages being returned by non-functioning email accounts, or simply moderating the discussion which was happening in the forum. (Wakeford, 2002: 119)

This implies a very different relationship to computers than that which Vehviläinen assigns to 'women'. These lesbians had access to technology and skills that they could use to pursue their own interests.

Other examples of lesbians appropriating computer technology include explorations of hypertext as a medium for writing lesbian poetry (Hawthorne, 1999), a study of how Singaporean lesbians use new media to construct identity and community (Yue, 2003) and an online ethnography in a lesbian chat room (Poster, 2002).<sup>8</sup>

Despite awareness that 'institutionalised heterosexuality' (Faulkner, 2001) plays a role in the coproduction of gender and technology, it appears to be difficult for feminist constructivist technology studies to make analyses accommodate non-heteronormative ways of doing gender in relation to technology. Heterosexual women's relationships with technology are represented as the way all women relate to technology.<sup>9</sup> Technology is understood as masculine and women's relationships with technology are represented as analogous with heteronormative projections of women's relationships with men. The unquestioned assumption that all relationships between women and men are heterosexually structured, and

that this precedes and organizes everybody's relationships with technology, produces an analytical problem. This construction of gender reaffirms the link between masculinity and technology that was conceived as one of the issues that feminist technology studies set out to critique.

Paying attention to lesbians and technology can counteract the over-generalization of heteronormative femininity to women in general. However, it does not solve the difficulties with the lack of symmetry in a double constructivism, partly because the focus in such studies tends to be on technology use, and partly because they do not question the semiotics of gender associated with heteronormative practices. It is not particularly radical to point out that lesbians are at ease with technology because in heteronormative culture lesbians are often considered to be more masculine than 'women'.

### **The semiotics of heteronormativity**

The heteronormative representations of women, men and technology in this feminist field can be examined further with the aid of Judith Butler's (1999) notion of a 'heterosexual matrix'. As a 'grid of cultural intelligibility through which bodies, genders, and desires are naturalized' (Butler, 1999: 194, note 6) the heterosexual matrix defines the logic of heteronormative representation. It is 'a hegemonic discursive/epistemic model of gender intelligibility' (Butler, 1999: 194, note 6) that organizes the way bodies are made comprehensible. It is a logic 'that assumes that for bodies to cohere and make sense there must be a stable sex expressed through a stable gender (masculine expresses male, feminine expresses female)' (Butler, 1999: 194, note 6) in the way that the analyses discussed above do. These stabilized bodies of women and men are, in these studies, also represented as 'oppositionally and hierarchically defined through the compulsory practice of heterosexuality' (Butler, 1999: 194, note 6).

The notion of the heterosexual matrix captures the semiotic order that makes gender heteronormative and the exclusion of lesbians logical in feminist constructivist technology studies.<sup>10</sup> This is no surprise since Butler's concept is, in part, an articulation of critical lesbian feminist thought.<sup>11</sup>

Thought of as a grid with two crossing axes (masculine–feminine and heterosexual–homosexual), the heterosexual matrix allows us to see how the signifier 'women' in feminist constructivist technology studies is positioned in the 'feminine'–'heterosexual' corner. In the same way the signifier 'men' occupies the 'masculine' and 'heterosexual' corner in the grid. To be recognized as a 'woman' it is necessary to remain in the heterosexual–feminine corner.<sup>12</sup> Technology is located on the 'masculine' side of the grid; females with close relations to technology are thus constructed as more masculine. Females doing masculinity and lesbians (who are regarded as expressing a 'masculine' desire for women) are not covered by the signifier of 'women' in this semiotic grid. When 'women' is a heteronormatively constructed category individuals under study can, as in the examples presented above, automatically be positioned in opposition to a masculine technology.



The heteronormative representations of women, men and technology reaffirm the logic of the heterosexual matrix, which reciprocates through naturalizing dichotomous gender as something emerging from the interiors of two different kinds of human beings. This is a material-semiotic process repeated in the everyday of the technological communities studied. However, its habitual reproduction in the representational practices of this field of feminist research has further theoretical consequences, because it also produces gender as interiority. This semiotic order of gender, reproduced in heteronormative practices, is intrinsic to the figure of the modern subject: a notion of the subject which is not conducive to the analysis of 'coproduction', since it stabilizes all that is considered as human in the position of singular, autonomous agent.

The combination of a 'modern' conception of the subject with constructivist notions produces conceptual inconsistencies. This is visible in an article by Tine Kleif and Wendy Faulkner (2003) about men's enjoyment of working with technology. They compared hobby robot builders with software engineers. In the article, which is explicitly committed to the idea of gender as performed, they unpack the content of the pleasure and enjoyment that both groups used to characterize their relations with the respective technology. Kleif and Faulkner analyse, in depth, the links between masculinity and pleasure with technology that were made explicit in both groups. They also note a discrepancy between what the people studied said and what they did, with regard to gender:

As noted earlier, women's and men's accounts of themselves were more differentiated than their practices seemed to be. Such findings confirm the strength of stereotypes around gender and technology as norms; they also confirm that gender is actively performed rather than being laid down in early psychological development. (Kleif and Faulkner, 2003: 315)

With a discrepancy between saying and doing in clear sight and an explicit appreciation of the notion of gender as performed, the suggested conclusion seems a bit odd:

The authors suggest, tentatively, that technology is a gender-authentic and gender-available avenue for those men who particularly crave certainty because technology appears more certain, easier to understand, and easier to master than other worlds they inhabit. (Kleif and Faulkner, 2003: 296)

'Gender-authentic' is an intriguing phrase in a constructivist analysis. There is no further clarification in the article, only a reference to another publication and a repetition of the same phrase in the abstract. It seems likely that Kleif and Faulkner use the term as a way to account for the way their studied populations perform gender – as if there is something interior to people that is expressed in their relationships with technology. However, this choice of terminology results in a representation of gender as, on the one hand, something that is judged in terms of authenticity and, on the other, performed in ways that oppose speech to conduct. The relationship between the observation of gender differentiation as mainly performed in speech and the conclusion that technology is a

'gender-authentic and gender-available avenue' for 'men who crave a sense of certainty' (Kleif and Faulkner, 2003: 321) seems self-contradicting. The argument appears to draw on two different theories of gender, one focussed on doing and the other on essence. This inconsistency can be understood as resulting from a view of subjects and subjectivity incongruous with a constructivist approach to gender. This is also the point at which the gap between feminist theory and the empirical research on technology becomes visible.

## Gender, technology and subjects

Over the last two decades the wider field of feminist technology studies has conducted an energetic discussion about the constitution of the subject. The constructivist sub-field seems oddly disconnected from this debate. This failure to appropriate new ideas and concepts is a pity, because they open ways of thinking about gender and technology that are conducive to the issue of coproduction. Even paying some serious attention to the well-established notion of the cyborg, that set the discussion off, would help.

As a 'theorized and fabricated' hybrid 'of machine and organism' (Haraway, 1991: 178) the cyborg is a way to understand the ontology of the political feminist subject that takes its constitution in complex relationships into consideration.<sup>13</sup> It is a figure that confuses 'all modes of identity (particularly gender) categorization' (Lloyd, 2005: 16). However, in feminist constructivist technology studies it seems to appear only as a 'buzz word', used without 'effort to think through what it *adds* to call something a cyborg' or 'what *difference* it makes' when we describe the world, to restate a criticism from the mid 1990s (van der Ploeg and Van Wingerden, 1995: 399, emphases in original).<sup>14</sup>

If feminist constructivist technology studies would find Haraway's concept overused or dated, the idea captured in the notion of the cyborg has been further elaborated and reworked in the feminist discussion. The concept has matured enough to make its shortcomings visible.<sup>15</sup> Dianne Currier argued, in this journal, that the cyborg 'ultimately fails to make the break with the logic of identity' (Currier, 2003: 323). She also thinks that there has been a stabilization of the cyborg as a prosthetic relationship of humans and technology, which 'leaves largely intact those two categories – (human) body and technology – that preceded the conjunction' (2003: 323).

To approach subjects as constituted in contingent relationships with technology, Currier turns to the notion of 'assemblages' as 'functional conglomerations of elements' that are not the result of addition because 'the component elements are not understood as unified, stable, or self-identical' (Currier, 2002: 531).<sup>16</sup> Assemblages are emergent effects in 'forces and flows of components' that 'meet with and link to the forces and flows of other elements' (2002: 531). This idea entails a different notion of cause and effect from that employed in feminist constructivist technology studies, because 'a self-identical body or object does not exist as origin,

prior to or outside the field of encounters that articulate it within any specific assemblage' (2002: 531). The relevance of this approach for breaking out of analyses that position men's gender identity as the cause of the masculinity of technology and technological work is obvious. It also has radical consequences for the understanding of identity, which 'does become peripheral: it is a by-product, which may appear within the operations of assembling' (Currier, 2003: 333).

Currier draws on Gilles Deleuze and Félix Guattari's (1987) critique of the modern subject.<sup>17</sup> They argue that subjectivity is not the expression of essence, hidden in human bodies, but an effect of actions performed in assemblages of several humans and non-humans. Brian Massumi interprets this to mean that human "subjectivity" in the sense of personal thought or feeling is a special case existing only on one level of a dissipated human body system: the bounded, dominated level of the body as subjected group' (Massumi, 1992: 80).<sup>18</sup>

This view of subjects, subjectivity and identity as effects emerging from complex relationships also rejects the semiotic order of the heterosexual matrix. Humans, signified in the heterosexual matrix, are produced as autonomous, unified entities with identity traits, such as gender and sexuality, which determine their relationships with other humans and other elements in their environment. The notion of assemblage struggles against this 'semiotic subjugation'<sup>19</sup> by refusing to submit to a view of the subject as a stable entity with an inner core that determines its relationships with others. Assemblages are always in motion and cannot be kept stable in any semiotic grid. This human is a being in motion, an effect of many processes, not clearly delineated as outside and inside once and for all but always in a 'metastable assemblage'. Such 'metastable assemblages' cannot be the sites of fixed sexual, or gender, identities with determining functions.

'Assemblage' refigures subjectivity as constituted in complex relationships with technology, placing the relationship as the crucial mechanism, not identity. This indicates the direction in which feminist constructivist technology studies need to move in order to approach the desired objective of understanding the coproduction of gender and technology. It would enable analyses that do not commit to any particular understanding of what gender is, before investigating how it is produced in particular circumstances. However, the approach in itself points to description rather than critique<sup>20</sup> and abandoning gender as a fixed point that grounds critique can cause problems for feminists. From a feminist perspective Deleuze and Guattari's ideas 'seem no more attentive to questions of the specificity and particularity of women than psychoanalytic frameworks' (Grosz, 1994: 182). Their thinking displays 'little if any awareness of the masculinity of their pronouncements, of the sexual particularity of their own theoretical positions' (Grosz, 1994: 182). This problem also pertains to social constructivist approaches to technology; it surfaced in the meeting between this perspective and feminism in technology from the start, according to Gill and Grint (1995). Still, if the objective is to understand the coproduction of gender and technology, the critical analysis cannot

assume a gendered subject as the starting point. Research that abandons gender as a fixed heteronormative binary needs another platform that enables critique. In the remainder of this paper I will discuss some possibilities suggested in feminist analyses drawing on queer theory.

### Queer beyond identity

Faced with the risk of losing the 'subject' of critique, the elaborations of 'non-humanist' concepts by feminists inspired by queer theory can offer valuable ideas. Queer theory offers ways of critiquing power relations premised on sexuality and gender while rejecting the idea of the modern subject. Already from the outset, in the early 1990s, one formulation of queer aimed to move beyond identity, arguing that the point with this concept was not to 'confront the logic of heterosexuality by being another kind of identity' (Kennedy, 1994: 140).<sup>21</sup> In contrast to lesbian and gay politics that stabilize sexual identity, the impetus of queer is to 'disturb all sexual boundaries, and create sexual mayhem, so that any individual may occupy or perform any sexual or gender identity, rather than have a true identity; in this way, queer undermines the very notion of a truth of sexuality' (1994: 140). This articulation of queer encourages theorizing that moves beyond the critique of heteronormativity in a rejection of the modern subject. The anti-identity position also resonates with Currier's understanding of assemblages and it promotes conceptualizations of the human that do not rely on the idea of the modern subject to formulate criticisms of power asymmetries producing sexuality and gender in specific constellations.

In recent works philosopher Elizabeth Grosz demonstrates the potential of queer theory to take the discussion beyond the well-trodden paths of identity. She argues for a reorientation of feminist theory, claiming that its reliance on identity politics has imposed limitations by tending to 'understand identity as the synthesis of one's past (one is where one was born, what class, race, and sex one was born into, the events or history that constitute one's life) rather than a synthesis oriented to an open or indeterminable goal, a trajectory or direction' (Grosz, 2005: 213). In her view the temporality of identity politics is mistaken: '[O]ne's sexuality is contained in the *next* sexual encounter, rather than in the synthesis of all one's past sexual activities' (2005: 213, emphasis in original). In the context of technology studies such a temporal reorientation would put humans on an equal ontological footing with technology, which is already understood to be open to reformulation in relation to future encounters. Grosz further suggests that feminist theory needs to be conceived of as a 'struggle to render more mobile, fluid, and transformable the means by which the female subject is produced and represented' (2005: 193). Adopting this aim would be beneficial to the project of understanding the coproduction of gender and technology, since it would strive to 'mobilize and transform the position of women, the alignment of forces that constitute that "identity" and "position," that stratification which stabilizes itself as a place and an identity' (2005: 193). Empirical feminist studies of gender and technology

need to be able to follow up on the constructivist claim that things could be otherwise; in order to do so they need theoretical frameworks that are open to the idea of ‘a future in which forces align in ways fundamentally different from the past and present’ (2005: 193). Feminist constructivist technology studies should not be satisfied with struggling for recognition ‘by the others who occupy social dominant positions’ (2005: 194). A doubly constructivist analysis that aims for change needs to move beyond the comfort zone of heteronormativity.

## Re-reading gender in technological communities

To move from the abstractions of queer feminist philosophy to the critical analyses aimed for by ethnographers, a return to Elspeth Probyn’s discussion of ‘belonging’ from the mid 1990s is useful. She proposes that ‘instead of inquiring into the depths of sociality, let us consider the social world as surface’ (Probyn, 1996: 19). This signals a departure from conventional social research that is looking for underlying causes of phenomena, thought to merely be expressed on the surface.

This initial idea in Probyn’s book enables a re-reading of Kvande’s representation of women engineers. Instead of understanding the studied engineers as expressing their femininity in ways calculated to fit the implicit rules of the workplace, a focus on the surface points in the direction of the interview situation. The designation of femininity as ‘dressing in lace and frills’ and being in total opposition to the engineering workplace invokes a very unrealistic stereotype. The quoted engineer constructs femininity as very different from anything that could be encountered in the workplace, consequently the latter will always be understood as masculine. This construction of gender is indicative of the heteronormative practice of keeping femininity and masculinity apart, even when women and men work together and do the same things. This statement can be read in relation to the particular situation: the interviewee assures the researcher that she knows how to do femininity and how to draw the boundaries for feminine conduct. The utterance produces multiple belongings – with a society that distinguishes sharply between femininity and masculinity as interior stable cores; with femininity as a project for women; and with the masculine norms of the workplace. The interviewee performs heteronormative gender verbally in a way that produces an interior that belongs with the feminine and an outside that fits in with the masculine workplace. Instead of reading this speech act as bearing witness to a stable but hidden identity, Probyn’s approach suggests that it can be understood as a way of doing the interior/exterior distinction that is important for establishing subjectivity. The ‘perplexity of living’ is, in the few words quoted by Kvande, handled in a way that speaks to the ‘desire for some sort of attachment, be it to other people, places, or modes of being, and the ways in which individuals and groups are caught within wanting to belong, wanting to become, a process that is fueled by yearning rather than the positing of identity as a stable state’ (Probyn, 1996: 19).

Focussing on the surface and the situation at hand also facilitates a

rethinking of the discrepancy between the gender differentiating talk and the observed conduct among the engineers studied by Kleif and Faulkner. Instead of interpreting this talk as expressing something non-linguistic that precedes it, paying attention to the surface could mean looking at what it does. The talk performs the gender difference that heteronormativity requires, a difference that it is not possible to behaviourally enact as a software engineer who is committed to their work. As a productive force this talk produces belongings in the complex situation of the technical workplace.

Probyn further argues for the indeterminacy of relations and surface belongings: 'such forms of sociality, driven by desire, produce unexpected connections as they rub against each other, displaying on the surface their anteriority' (Probyn, 1996: 35). In relation to Vehviläinen's understanding of gender, a preparedness to notice unexpected, moving connections could have enabled links to studies of lesbians and technology, which could have opened new questions. An analysis open to 'unexpected connections' could ask in which ways desires for different belongings influence relations with technology. If an anterior desire to belong with other lesbians renders it unimportant to maintain a distance to technology, this needs to be paid serious attention because then heteronormativity is a force that disables a connection between many women and technology.

That 'surface belongings and desiring identities refuse to stand still' (Probyn, 1996: 35) is an argument that speaks to the way in which futures are produced. While the modern subject was a product explained by its past, the non-humanist perspective features the assemblage as moving towards the future. The human element of such 'post-human' subjects may be understood to aim towards connections with others. The complexity of forces that influence the actual movement of any assemblage makes it impossible to predict how these connections will occur, or what effects they will have. In such a conceptual framework the ways in which gender influences technology cannot be explained by looking at the past of the humans involved. If identity is an effect of connections made between surfaces that rub against each other the failure of DDS and New Topia, analysed by Oudshoorn, Rommes and Stienstra, needs to be thought of in relation to which belongings are produced at the different points of contact. What are the conditions for generating different assemblages incorporating this technology? Perhaps the perceived masculinity of the design style is constitutive to some gender identities but not to others. Different desires to connect with that which is culturally masculine may produce different belongings for assembled men and women, heterosexual and homosexual, constituted in this technological context.

This brief re-reading does not answer the question of coproduction, but it points to other ways of thinking that can generate new empirical questions and critical analyses. If gender is coproduced with technology it needs to be approached as emerging in between the elements assembling into subjects and objects. In this paper I have argued that feminist constructivist technology studies have, so far, not been able to capture this. The

notion of assemblages, elaborated in order to capture the anti-deterministic constitution of subjects in relationships with technology, suggests ways to analyse gendered identity as produced in these relationships. Thinking of gendered subjectivity as an effect of assembling makes it possible to get away from the idea that identity is the only determinant for behaviour and experience. This would imply 'a shift of epistemological framework, where identity no longer functions as the ordering framework, but rather is itself a product of historical circumstance' (Currier, 2003: 333). Such a shift is what the present paper has argued for in claiming that the current analytical impasse in feminist constructivist technology studies requires a thorough rethinking of gender, away from the heteronormativity that stabilizes the subject as cause, toward a feminism that has surpassed gender as a deterministic binary. In turning to feminist elaborations of queer theory I argued that rejecting the modern subject as the anchor point does not have to lead to an abandonment of critique of power relations based on gender and sexuality. Instead it may offer ways of reconnecting empirical research among engineers and technology users with current feminist theorizing.

## Notes

1. See Judy Wajcman (2004) for a recent introduction to feminist technology studies, which she calls 'technofeminism'.
2. Wendy Faulkner (2001) uses the term 'feminist technology studies' for this sub-field to distinguish it from 'women and technology', in which technology is taken as a neutral given. The present notion of 'feminist constructivist technology studies' specifies this further to indicate feminist research within the field of science and technology studies. This sets them apart from feminist research on technology pursued in other subjects.
3. There are several different forms of constructivism in technology studies, drawing on different theoretical and philosophical frameworks (see Mackenzie and Wajcman, 1999 for an introduction). In feminist constructivist technology studies these differences tend to be less important since they all challenge the presumed autonomy and social neutrality of technology.
4. One radical approach is actor-network theory which argues that social theory is mistaken in assuming the existence of social structures, agency as a human property and subjectivity as a cause for actions and events (Latour, 1992). This approach demands that equal attention is paid to the ways in which technical artefacts exercise delegated agency, which would generate a different understanding of the social order as well as of the relationships between humans and the non-human. Other constructivist perspectives are considerably less categorical in their critique of social theory (cf. Pinch and Bijker, 1987).
5. The term 'production', used by Faulkner, marks a critical approach to the idea of closure, common in constructivist technology studies. Feminists argue that a technology in use is not permanently settled when it leaves the context of engineering; it is continuously being re-configured in relation to changing contexts of use and cultural interpretation. The present discussion does not address this aspect, hence, for terminological

convenience the terms 'production' and 'construction' are used interchangeably.

6. Faulkner refers to Flis Henwood (1993) on this topic but does not elaborate further.
7. Halberstam's (1998) discussion of 'female masculinity' has nothing to do with workplace conduct, but the notion itself is illuminating because it links bodies and gender in ways less common. It is considerably more common to view all female conduct as feminine and to associate masculinity solely with men, like Kvande does in the article discussed. Halberstam's notion highlights that this is not a neutral practice but that it is based in heteronormativity and has consequences for Kvande's analysis.
8. The studies of lesbians and technology mentioned here do not assume a constructivist perspective, nor are they substantially referred to in feminist constructivist technology studies. I therefore regard them as outside of this field.
9. When lesbians appear in case study populations they seem to have closer relationships with technology, which gets mentioned as an aside or in the footnotes (see Rommes, 2002: 243, note 251 for an example).
10. Using the notion of 'the heterosexual matrix' in relation to the written representations of gender in feminist technology studies deviates from Butler's original intentions. In line with this deviation I will not engage with the extensive debate on the problems with this concept that have been thoroughly worked through in the 15 years since it was first introduced.
11. Butler explicitly mentions the work of Adrienne Rich and Monique Wittig as inspiration for the concept (1999: 194, note 6).
12. This interpretation of the heterosexual matrix is inspired by Monique Wittig's claim that:

Lesbian is the only concept I know of which is beyond the categories of sex (woman and man), because the designated subject (lesbian) is *not* a woman, either economically, or politically, or ideologically. For what makes a woman is a specific social relation to a man . . . which implies personal and physical obligation as well as economic obligation . . . a relation which lesbians escape by refusing to become or to stay heterosexual. (Wittig, 1992 [1980]: 20, emphasis in original)

13. Haraway also explicitly positions the cyborg as a figure outside the relationships of power captured in the notions of heteronormativity and the heterosexual matrix.
14. For example Faulkner points to the resonance between the constructivist insistence that technology is integral to the social fabric and Haraway's 'conceptualization of our cyborg-like existence' (Faulkner, 2001: 90) without further elaboration.
15. This is in spite of Haraway's own view that the concept still has much to offer (Haraway, 2000).
16. Another revision of the cyborg is undertaken by Zoë Sofoulis (2002) who turns to the 'actor-network hybrid' that shares with the cyborg an emphasis on the relational character of subjectivity and extends these relationships from the realm of the human to include non-humans.



17. Some feminist constructivist technology studies echo this perspective, via actor-network theory (ANT), informed by the same debates in French philosophy – for example, Ingunn Moser, who expresses an interest in the ‘. . . complex ordering practices and enactments, to the hybrid collectives which make these practices and enactments possible, and to the agencies and subjectivities they enable’ (Moser, 2003: 31). However, Moser does not elaborate on the relationship between feminism and ANT in the discussion of hybrid subjects. Her study develops a phenomenological understanding of hybrid subjectivity as individual experience and situated practices.
18. This resonates with one statement in Haraway’s original articulation of ‘the cyborg’: ‘Why should our bodies end at the skin, or include at best other beings encapsulated by skin?’ (1991: 178). However, as pointed out by Currier, this aspect of the cyborg is not further developed in the original argument, and other statements appear to contradict it; hence, the cyborg can easily be read in a prosthetic sense.
19. Guattari’s discussion of capitalist repression in terms of ‘semiotic subjugation’ can be adapted from the context of critique of capitalism into that of heteronormativity: ‘Dominant power extends the semiotic subjugation of individuals unless the struggle is pursued on every front, particularly those of power formations. Most people don’t even notice this semiotic subjugation, it’s as though they do not want to believe it exists . . .’ (Guattari, 1996: 12).
20. In this it is similar to constructivism in technology studies and open to the same criticism levelled against the latter by feminists in the early 1990s (Cockburn, 1993).
21. Queer theory is far from a unified field. Noreen Giffney outlines the division between those who use it as ‘another, shorthand name for lesbian and gay studies’ (2004: 74) or as a way to ‘expose *all* norms for the way they define, solidify, and defend their shaky self-identities by excluding those (dissident others) who fail or refuse to conform’ (2004: 75, emphasis in original). The present paper favours the latter alternative.

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