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Modernity, Postmodernity & Reproductive Processes ca.1890-1990

or, "Mommy, where do cyborgs come from anyway?"

Adele Clarke

"Science, more than any other investigative and descriptive activity, creates and conceals the context from which it arises" (Duden 1991:20).

"Cyborg anthropology is a dangerous activity" (Downey, Dumit and Williams 1992:4).¹

Valerie Hartouni (1991:30) recently examined the stories behind two headlines about medical cyborgs from the late 1980s, "Brain-Dead Mother Has Her Baby," and "Orphan Embryos Saved." She asks:

What makes these headlines make sense? Why might they seem sensible today when only twenty years ago they would certainly have been preposterous? ... What beliefs, assumptions, and expectations allow them to be coherently rendered, taken seriously, understood as "fact" rather than "fiction"? What is the world they simultaneously construct and contain? What are the stories they tell about reproductive possibilities, relations and relationships in late twentieth century America, and what is the terrain they occupy and contest in that telling?

In response, I will argue that modern approaches to reproductive bodies and processes were and remain centered on achieving and/or enhancing control over those bodies and processes (Clarke 1988).² In contrast, postmodern approaches are centered on re/de/sign and transformation of reproductive bodies and processes to achieve a variety of goals. In short, I argue that the common distinction embodied in the term "the new reproductive technologies" which appears in scholarly as well as popular media constitutes a constructed, conceptual as well as a practical—in practice—boundary.

However, there is tremendous variation within both modernist and postmodernist approaches to reproductive phenomena and considerable traffic across the variously constructed boundaries between them, some of which I shall try to unjam. I begin by deconstructing reproduction into its component processes, and then lay out what I mean by modernist and postmodernist approaches to them. Next I work out some of the border problematics including the robustness of the boundary, the simultaneity in time and space of modern and postmodern approaches, and how the ending of the human/nonhuman distinction is being framed. While centered on reproductive bodies, the paper has implications for thinking about bodies in general some of which I note in concluding.

i. Deconstructing Reproduction:

In order to grasp the nature of modern and postmodern reproductive practices, we must deconstruct reproduction into its component processes as those processes have themselves been constructed culturally and historically by scientists, clinicians, technologists and the rest of us. Only then can we empirically analyze the specific concrete technical and organizational practices associated with each of these processes across very different times and circumstances. Today the major reproductive processes or categories of study and intervention include: menstruation, contraception, abortion, assisted conception, pregnancy, heredity/clinical genetics, childbirth, menopause, and male reproductive processes. In terms of organizational and technical practices, each of these processes has been developed differently, by different constellations of scientists, technologists, clinicians, manufacturers, consumers and so on. These differences are central to my argument.

We must also deconstruct the body. When I say control over and transformation of bodies, I am speaking of bodies in the multiple, drawing specifically on the framework of the three bodies provided by Nancy Scheper-Hughes and Margaret Lock (1987:6):

- 1) *body(ies) viewed as phenomenally experienced, lived individual body(ies)/self(ves);*
- 2) *social body(ies), what anthropologists term a natural symbol for thinking about relationships among nature, society and culture; and*
- 3) *body(ies) politic, artifacts (and I would add inscriptions) of social and political control.*

Thus my framing of the modern qua control over and postmodern qua transformation of the reproductive body is exercised across all three bodies. I would add to Scheper-Hughes and Lock's framing that all three bodies are also economic bodies.

That is, the distribution of resources for life are of concern individually, socially and politically. The economics of bodies is of central concern here.

How have control over and transformation of reproductive bodies and processes been achieved over the past century? First, the expanding legitimacy of and investment in the scientific study of reproductive processes have, in a tandem co-constructive fashion, supported and been supported by the legitimacy of intervention in reproductive processes. Here representing in the "lab" is almost immediately followed by intervening (Hacking 1983) in the field, coop, sty, pasture, operating room and bedroom. The legitimacies of both representing and intervening in specific reproductive processes were and remain variously contested (Clarke 1990a; Clarke and Montini 1993). But technoscientific capacities for intervening have quite dramatically expanded from control over reproductive processes to "manipulation" (e.g., Austin and Short 1972, 1987) and transformation of both processes and products. Crucially, the human/nonhuman distinction is of decreasing relevance to reproductive and genetic scientists.

Second, individuals and collectivities of various sorts of both women and men have sought to control and transform their own reproductive processes, sometimes through the use of technoscientific products and other times not. It is important to remember that attempts to control reproductive processes have likely been made throughout human history and, moreover, many premodern as well as modern attempts were likely more scientific (read empirical) and much more effective than has heretofore been understood (e.g., Riddle 1992; Ginsberg and Rapp 1991).

ii. Modernity and Reproductive Processes

"The body is the first and most natural tool of man" (Marcel Mauss in Scheper-Hughes and Lock 1987:6).

"You should always be in control of your tools" (The Handyman's Guide to Household Repair 1981).

One definition of modernization offered by the National Academy of Science in 1963 is the "extension of deliberate human control over an increasing range of the environment." Enhancing control over reproductive phenomena was of considerable and widespread concern much earlier in the U.S.—by the late nineteenth century—embedded in ideologies of science as progress, technologies as liberatory, and the West as leading the way into a secure future through (self/bodily) control and careful management. This is the model of development exported then and still.

The basic social process through which modern control over reproductive processes was and is today achieved is industrialization (Clarke 1988). Here I mean what Harvey (1989) would call a Fordist emphasis on the production of goods, technologies, and services and their (re)organization to achieve and enhance control. Bodies too are organized around Fordist principles of centralized control (Martin 1992) in terms of reproduction and more generally. Modern industrialization has occurred at both the most public social and political levels and the most private individual levels and these are inextricably enmeshed. I must note, however, that neither human nor agricultural reproduction has been at all thoroughly industrialized, although rationalized approaches have guided developments for over a century (Rosenberg 1979).

By the turn of the twentieth century, the stage was set for the explicit application of the concepts and technical innovations of modernity/industrialization to be applied to human reproduction. The most important factor was the industrial revolution and subsequent reduction in the value of child labor (e.g., Lancaster et al. 1987). Known as the demographic transition, a secular trend toward small families began to be reflected in the U.S. in declining birth rates after about 1810.³ By the turn of the twentieth century, a significant minority of the U.S. population was affected and the economic costs of having children were articulated in startlingly familiar ways among the upwardly mobile, non-agrarian, white middle classes. One physician said in 1903, "The fittest to survive in our civilization are the trained and educated," and the President of Harvard said that one should have only the number of children you can afford to raise well (Gordon 1976:150, 153). This has become a dominant if not the predominant ideology in the U.S., where children are now commonly viewed as ends in themselves, not means to other ends (Blake 1980:197). This distinctively secular ideology assumes the decline of religious explanations of the natural and social world, grants legitimacy to an array of interventions in making life, and reflects a shift in the economic meanings of human reproduction.

On the darker side, children are themselves becoming commodities. As people drastically limit their quantities of children, they seek to improve the chances for high quality according to their own standards, including heredity and sex preselection. **Through postmodern approaches, one can now supplement quantity control with quality control.** I would frame this as

a *re*/commoditization. (We can no longer claim innocence, and romanticization of the past will buy us nothing.) That is, historically (and still) children have been valued for their labor power as substitute and supplement to social security and state welfare, especially for the aged and infirm. Their labor power was commoditized. Today among the affluent, the value of children may lie in different social securities of identity, embodiment, enmendment, achievement. This advertisement for Barbara Walters' television show (Figure 1) is a popular culture icon of desirably engendered and perfected embodiment as child. Beingness is commoditized: racialized white (Frankenberg 1993), gendered male, tall, athletic, healthy and smart (as implied by IQ).

Historically and still, ideological support for small families served as the foundation for the explicit application of the concepts and technical innovations of modernization and postmodernization to be applied to human reproduction. But what do I mean by the term modern *industrialization* of reproductive processes? First, it was and remains embedded in an economic market system. Yet it is more than the factory system, more than mass production and

an elaborated division of labor. Modern industrialization is a set of approaches to achieve a high degree of control over (*re*)production processes, including rationalization (segmentation of a larger process into smaller sub-parts more amenable to

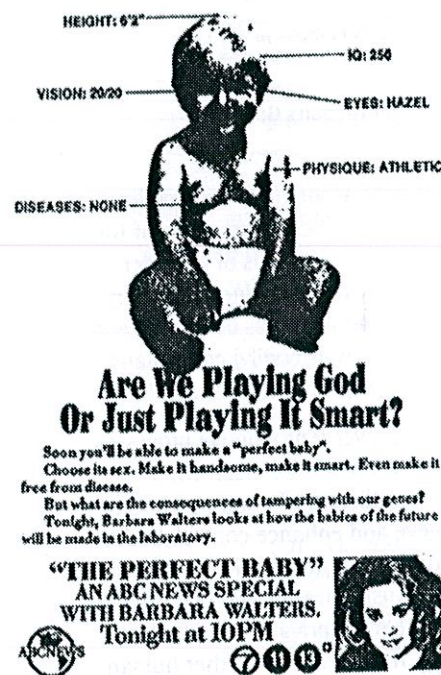


Fig. 1

manipulation), standardization, efficiency, planning, specialization, professionalization, commodity and technological development, and profitability (Clarke 1988).

The major initial investor in modernizing human reproductive processes through industrialization was the Rockefeller Foundation which, through financing the National Research Council's Committee for Research on Problems of Sex (Aberle and Corner 1953), supported the "heroic age of reproductive endocrinology" (Parkes 1966) between the world wars. This Committee "virtually paid for the development of [reproductive] endocrinology in the United States during the period when the female sex hormones were identified and clinicians began to use hormone extracts to treat disease" (Reed 1984:313). In 1934, Warren Weaver, head of the Natural Sciences Division of the Rockefeller Foundation, wrote what we might today frame as an ode to modernity. He asked:

*Can man gain an intelligent control of his own power? Can we develop so sound a genetics that we can hope to breed, in the future, superior men? Can we obtain enough knowledge of the physiology and psychobiology of sex so that man can bring this pervasive, highly important, and dangerous aspect of life under rational control? ... Can man acquire enough knowledge of his own vital processes so that we can hope to rationalize human behavior? Can we, in short, create a new science of man?*⁴

Weaver was comparing the rationalized control man was developing over his physical environment to hopes for such control in the future governing "man as a conceiving, child-bearing, thinking, behaving, growing and finally dying organism."⁵ Genetics, reproductive sciences, endocrinology, nutrition, psychobiology and psychology composed Weaver's "new science of man."⁶

Looking at the summary chart (Figure 2), modern approaches to reproductive processes center on control for various purposes via monitoring, planning, limiting, bounding, setting up barriers. The means are Fordist emphases on development and mass production of new consumer goods (e.g., commercial menstrual products); development and mass production of new technologies (e.g., hormones, contraceptives, pharmaceuticals like "twilight sleep" used in childbirth); and the organization and mass distribution of basic reproductive services including obstetrics, functional (i.e., non-surgical) gynecology, and "family planning." Expanding production, distribution and consumption—widening, deepening and lengthening the consumer pool—was a means of achieving those goals. Payment derived from individuals and, increasingly, the welfare state.

One of the distinctive features of modern approaches is their universalizing tendencies. They were and remain aimed at the masses while they operate, for the most part, in/on individual women's bodies. Nelly Oudshoorn (1993) recently analyzed the "one size fits all" approach to making scientific contraceptives such as the Pill and IUD. Diversities among women from weight, height, and nutritional condition to social situation and access to health care were and are largely erased. They are replaced by disembodied universalizing abstractions such as "woman-years of use" and "woman-cycles." "One size fits all" is viewed as requisite for mass distribution (see also Bell 1994).

Modern approaches focus on specific reproductive processes. Here, for brevity's sake, I merely list these in the chronological order of application of industrialized approaches to them: childbirth, menstruation, pregnancy, menopause, contracep-

APPROACHES TO REPRODUCTIVE PROCESSES

MODERN

Goal: control over reproductive processes bodies via universal technologies;

Means: Fordist emphases on

- 1) development and mass production of new goods (e.g. commercial menstrual products); new technologies (e.g. hormones, contraceptives);
- 2) organization and mass distribution of basic reproductive services (e.g. obstetrics, functional gynecology, "family planning")
- 3) "one size fits all" approach to mass product and technology development
- 4) universalizing of women and technologies

Reproductive Processes focused on:

childbirth
menstruation
pregnancy
contraception
abortion
menopause

Lived body: to be controlled (ideally across the full life span); changes and new directions to be planned

Social body: naturalized "traditional nuclear family" to be created and maintained via rationalized management

Body politic: population control via contraception; enhanced legitimation and legalization of interventions in reproductive processes.

POSTMODERN

Goal: transformation of reproductive processes for a variety of specific and often highly local, individual, and differentiated goals;

Means: emphasis on flexible accumulation via

- 1) elaboration of specific services (re)organized for selectively targeted delivery:
infertility services
sex preselection services
fetal treatments and surgeries
- 2) elaboration of specific services (re)organized for mass delivery toward targeted individuals/families:
—genetic screening and counseling
—fetal screening and counseling
- 3) individually tailored technological alternations
- 4) differentiation of women, men and technologies

Reproductive Processes focused on

conception/infertility
pregnancy
heredity/clinical genetics
male reproduction

Lived body: to be transformed and customized/manipulated; cyborg with "tailor-made specificities"

Social body: transformed and/or reconstructed heterogeneous "families" with new meanings for gender, mother, father and family (biological/social/surrogate/donor/other) via constructing cyborgs

Body politic: "deconstruction of motherhood?" "family" as a new industry/market and policy niche; surveillance strategies; the state confronts cyborgs

Note: simultaneity of premodern, modern and postmodern approaches sustained through present moment.

Fig. 2

tion, and abortion. Each of these modernist processes is framed and experienced in the three bodies. The modernist lived body is to be controlled and changes are to be planned. Ideally control can be exercised across the life course from birth through menopause (Clarke 1990b). For the modern lived body is Elias's (Duden 1991:14; see also Bordo 1993; Glassner 1990) self-controlled body. It is not an unchanging body, but rather changes derive from the exercise of individual willpower to shape that body (Crawford 1985), rather than application of technoscientific transformatives—one shot cures. There is a low-tech vigilance requisite for the modern body to be maintained (in contrast to high-tech postmodern transformations).

The modern social body is the traditional heterosexual nuclear family, maintained via an array of management efforts (e.g., Banta 1993). That is, exertion of control over reproductive processes is framed in terms of achieving the ideal nuclear family in as safe and secure as possible fashion. The major technical innovation of modernity in terms of the social body lay in the area of contraception, for the goal is smaller and planned/controlled families. This goal is not necessarily shared across

the diversities of class, race and culture, but it is ideologically pervasive. The means of achievement here disaggregate/disassociate sex from reproduction. Thus (hetero)sexuality was/is framed or assumed to be ubiquitous and, quite radically, was NOT to be the focus of control. In Adrienne Rich's (1992) terms, heterosexuality was "compulsory." However, sex need not be resisted and only certain consequences of sexuality are to be controlled: pregnancy and sexually transmitted diseases.

In terms of the body politic, modernity is centered on population control via contraception and enhanced legitimacy of intervention in reproductive processes. Initially the legality of exercising control over some reproductive processes needed to be established. For example, in the U.S. the legality of contraception was not guaranteed nationally until a 1966 Supreme Court decision (Griswold versus Connecticut). In 1970 contraceptives were taken off the obscene devices list of the Comstock Law. Not until 1972 did the Supreme Court guarantee the unmarried the same right to contraception as the married. The U.S. Agency for International Development began distribution of contraception in 1963; shortly after this President Johnson's "War on Poverty" (which poverty won) allowed a local option policy for publically-funded family planning services (Reed 1984:377-8).

Let me note here that both the social body and the body politic seem to drag their heels in terms of modern control over reproduction. Also, modern approaches are sustained through the present postmodern moment.

iii. Postmodernity and Reproductive Processes

"The body is the first and most natural tool of man" (Mauss cited in Scheper-Hughes and Lock 1987:6).

"If it is not 'the right tool for the job,' practices can be devised to make it the right tool" (Casper and Clarke, 1990).

Let me return here to Hartouni's (1992:30) analysis of the two headlines about the brain-dead mother and the orphan embryos:

Conceptually, both headlines produce a kind of mental astigmatism; meanings temporarily blur, lose definition, appear distorted, and are resolvable only with some sort of conceptual retraining or adjustment. They require us to do conceptually, it seems, what lenses would do optically ... But just as lenses may enable us to see the world, they also transform the world we see ... The headlines ... engage us in the making of [the world]...

I am asserting that the world to which she refers is postmodern. In postmodernity, specific reproductive processes are transformed for a variety of highly local, individual and heterogeneous goals. The reproductive body is transformed by customizing, tailoring, re/de/sign/ing. The means of achievement emphasize late twentieth-century approaches which Harvey (1989) calls flexible accumulation via two overarching strategies. First is the *elaboration of specific services* (re)organized for selectively targeted delivery. Here we find infertility services aimed at those who can afford them; sex preselection services aimed at those who can afford them and at specific cultural groups constructed as desirous of such services (Thobani 1992); and fetal treatments and surgeries likely to be aimed at those who can afford them. Fetal research and treatment sponsors may focus on the state as well as a source of funds for both research and service delivery (Casper 1994b).

The second strategy is ultimately centered on *case-finding*. It involves the elaboration of screening protocols (re)organized for mass delivery to locate individuals/families targeted for specific interventive services. Here we find genetic screening and counseling seeking problematized hereditary traits, and fetal screening and counseling seeking both hereditary and congenital problems for fetal treatments. In postmodernity, capital has fallen in love with difference.

The reproductive processes focused on in postmodernity center around assisted conception and infertility treatments, the "new" reproductive technologies, only recently widely available in the US in terms of both technological innovations and organized service delivery.⁷ Earlier there was little potential for mass production and only a limited though constant distribution market for such services (e.g. Corner, 1957; Kelly, 1928; American Foundation, 1955). The "new" techniques include artificial insemination (AI) available on a limited basis since the 1930s⁸ in vitro fertilization (IVF),

embryo transfer (ET), gamete intra-fallopian transfer (GIFT), and an array of hormonal and other infertility treatments. While most were pioneered in the 1930s in animal agriculture (Biggers 1981; 1984; 1987), a 1955 assessment of the infertility field (American Foundation, 1955:137) found that "literal application of the results of

animal research to correction of human infertility has been thus far disappointing." This is no longer the case as whatever boundaries between reproductive agriculture and medicine existed collapse (Austin and Short, 1987).

Helping make babies when none was thought possible is miracle medicine. Unlike services to prevent (at least some significant proportion of) infertility in the first place (such as sex education, STD education, appropriate birth control education, and so on), current infertility research and services are high-tech, "cutting edge" biomedicine. They are also what has been called "boutique medicine"—medicine mostly for the wealthy—as most such procedures are not covered by private health insurance much less by Medicaid.⁹ The term "boutique medicine" also gets at the specialty "tailor-made" specificities of such cyborg services. Ruzek (1988) has found a continuity of focus since the nineteenth century on ensuring that middle and upper-class women do have children, and we can see the "new reproductive technologies" as sustaining such concerns.

In postmodernity, pregnancy is the focus of an increasingly wide array of new surveillance technologies (e.g., Terry 1988; Stanworth 1987), including fetal surveillance related to potential surgical interventions *in utero* (Casper 1994a, b, 1995).

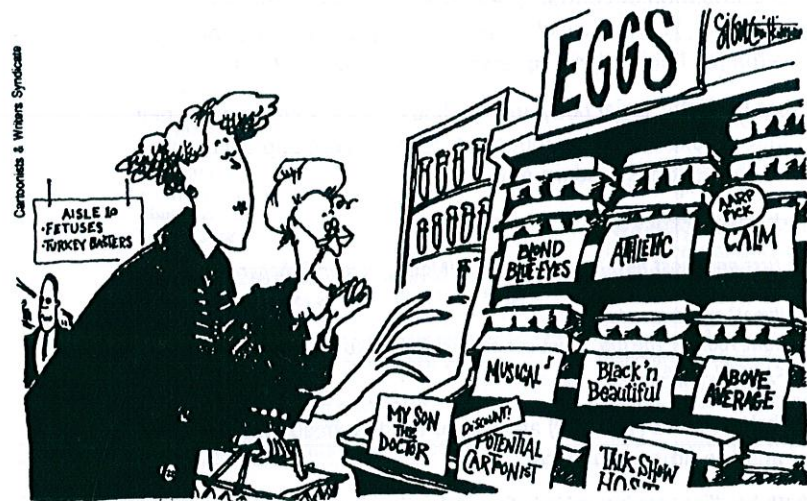


Fig. 3
Signe Wilkinson,
Philadelphia
Daily News

We saw in modern approaches the universalizing of women and their bodies so that "one size fits all." In the postmodern lies the moment of the disembodiment of women. Pregnant women's bodies are erased to make way for the one true person—the fetus (e.g., Petchesky 1985, 1987; Duden 1993; Casper 1994a). Heredity is also increasingly addressed via clinical genetics (Beeson 1983; Paul 1993; Wertz and Fletcher 1987). Male reproductive phenomena are now being increasingly studied and a medical specialty, andrology, has emerged focused on nonspermatogenic functional physiology (Pfeffer 1985). Sperm banking is organized around the construction and maintenance of male difference (Moore and Schmidt 1994). Reproduction in outer space is also a focus of concern (Casper and Moore 1995).

The postmodern lived reproductive body is transformed, manipulated, customized—often involving the creation of cyborgs with what Emily Martin (1992) has called "tailor-made specificities." The postmodern lived body is neither stable nor singular. Like multiple selves and appearances, it is transformed and transformable (e.g., Finkelstein 1991; Bartel 1988; Bordo 1993). It is cyborg, described most hopefully by Haraway (1992a) as a body with "prosthetic devices, intimate components, friendly selves, an aspect of our embodiment." Cyborgs flexibly accumulate desired characteristics and capacities as Hogle (1994a,b, 1995) points out, and can delete the undesired. Bodies are customized—to fit fashion and to fit (re)constructions of "family" or other framed goals via reproductive technologies. Postmodern bodies can shapeshift. In many cyberspace games, players are invited to configure their bodies and identities themselves from a selection of parts. In some games the most interesting body parts cost more. Art reflects life.¹⁰

Analytically here we need to see the postmodern lived body not only in terms of reproduction but across its many contexts. **The [manipulated] body is social performance—performance art in all its temporality.** Bodily modifications flow across many zones. Once one is breached then others seem to follow. For example, a significant proportion of women who have breast implants for cosmetic reasons proceed to have face-lifts and so on downstream (Bordo 1993; Wepsic 1993). Plastic surgery has been called psychiatry by other means (Haiken 1992; and see Goldsmith 1993), and is certainly pervading a much wider market (e.g., Japenga 1993; Balsamo 1992). It is now about a \$1.75 billion-a-year industry in the U.S., with about 1.5 million people per year undergoing plastic surgery of some kind (Bordo 1993:25).

But we need to note that the manipulation of body parts and the creation of cyborgs also includes many kinds of transplantations, joint replacements, implantations, coronary bypasses, angioplasties, and so on. Linda Hogle (1994a,b, 1995), who is studying the procurement of biological materials for transplantation and research, discusses how body parts are becoming widgets—standardized items to replace as needed—or desired. Her research focuses on how the organization of procurement and delivery has itself been transformed from an altruistic patient service provided by tertiary hospitals to an increasingly international for-profit market-based industry. Technical developments are centered on preservation of the materials for transportation, such as fast acting liquids for freezing the contents of the entire peritoneal cavity while the family can then be asked to donate organs. Workers used to sell their labor, a supposedly renewable resource, but now at least in Egypt they are also selling their organs—assuredly non-renewable (Hedges 1991). Animal organs—such as baboon hearts—have also been used and transformed for use.

Thus our conceptualization of cyborg needs to be revised. We have had a human/technology continuities model which needs to be augmented with human/technology/human models (denoting technological mediations among human body parts, some of which were not born together) and human/technology/animal models as well. We also need to begin thinking about some of the implications of these new models for manipulating reproduction. **When will there be transplantable wombs and fallopian tubes? Which women's bodies would seem most likely as donors of wombs, tubes, life? Will families be approached to donate whole brain-dead women's "living cadavers" to serve as free-standing wombs to be implanted via IVF? Postmortem maternal ventilation has already been ethically justified (Elias and Annas 1987:261). Will free-standing technoscientific wombs be cyborgs?** Will baboons or other primates be used for gestating selected humans instead, bred specially for such purposes? Keller (1989) has argued that artificial wombs will be developed because of their appeal to a great variety of interests—including those of some women as well as scientists and those romantically involved with eugenics (e.g., Kevles 1985).

In postmodernity one goal is to transform the currently lived body into the desired lived body aligned with a desired social body. The social body can also be transformed and/or reconstructed multiple times with new meanings for mother, father and family (biological/social/surrogate/donor/other). Certainly the discourses and vocabularies of kinship in the U.S. and other Western countries have been undergoing dramatic elaboration. Postmodern social bodies can be "designer" "families," "artificial families" (Snowden and Mitchell 1981), or postmodern fragmented families (Stacey 1990). We can view the "family" as a new industry/market niche (Strathern 1992). Chico's (1989) study of the letters people wrote inquiring about sex preselection in the U.S. found a strong conceptualization of the "complete [heterosexual] family," minimally including children of both sexes and sometimes much more delimited. Transformative technologies now permit a much wider range of such designed or engineered conceptualizations, and people also create new families from diverse communities—such as the houses of voguers in the film *Paris is Burning* by Jenny Livingston. Designer cats and other pets are under construction, opening the concept of family more clearly to the nonhuman (Rowland 1992).

Postmodern familial design capacities allow a new disaggregation. If in the modern framework, heterosexuality could be set free from its reproductive consequences, in the postmodern frame, gender, sex and sexuality can all be disaggregated from reproduction. For example, there was a billboard in San Francisco of two women standing close together, one pregnant and the other with a hand on her belly. The caption was, "Another traditional family." One possible reading is that it honors Roberta Achtenberg, a lesbian San Francisco Supervisor nominated and approved for a post in the Clinton administration, the first "out lesbian" to go through U.S. Senate confirmation hearings. She is "married" to a judge and they have one child (Lynch 1993a, b). They too constructed their version of a complete family.

In terms of the body politic, on the critical end, postmodern reproductive technologies can be implicated in the "deconstruction of motherhood" (Stanworth 1990), to the disadvantage of women. Yet others (e.g., Casper 1995, 1994a,b) assert that both de/ and re/constructions occur—that the former imbricate the latter. Certainly we

are seeing the privatization of the costs of achieving a "complete family" if new reproductive technologies are needed. Also, the "deconstruction of motherhood" requires legal and political (re)interpretations (e.g. Cohen and Taub 1989; Blankenship et al. 1993), since even doing the census is affected. Politically we know that surveillance strategies will be utilized. To date, it is largely poor women and women of color who have been surveilled (Terry 1988); but will other women as Rowland (1992) has noted, perhaps especially elite women (Ruzek 1988), become the objects of intensive surveillance as they are already the marketing targets for "new" reproductive technologies? How will nation-states address which kinds of cyborgs? Who/what will need a passport? Or will cyborgs [continue to] float unregulated and flexibly accumulating, micro-versions of multinationals?

In sum, I believe we are just moving into postmodernity regarding reproductive processes and that social bodies and bodies politic are the laggards. These domains will also be sustained sites of major contestation. One rationale articulated for the desirability of transforming individual bodies is that it is easier to change the individual than to change society—our social and political frames of action (Haiken 1992).

IV. Porous Boundaries/Border Crossings

Now that I have created something of a master narrative, I can begin to problematize and deconstruct it. First, a core argument of this paper is that what is "new" in the "new" reproductive technologies is *recognition* of their transformative capacities. What they are transforming is conceptions of what it is to be human, male, female, reproductive, parent, child, fetus, family, race, and even population. That is, the "new" reproductive technologies in their postmodern splendor are constitutive of what Paul Rabinow (1992:8) termed the remaking of life itself. I have chosen to "name" modes of *control over* reproductive phenomena "modern," and modes of *transformation of* reproductive bodies and relations "postmodern," and I find this effectively captures an important distinction. But it is the *distinction* that is most important, especially the economics of the distinction—the shift from Fordist mass production and distribution to targeted niches for flexible accumulation.

For modern approaches, race is the tacit trope and racism as sets of practices live, for example, in the technologies of contraception created and in the uneven, unequal and unjust techno-organizational mechanisms of their distribution (e.g., Rutherford 1992:267). For postmodern approaches, class is clearly and commonly involved for the "new reproductive technologies" are mostly very expensive, usually uncovered by private or state health plans, and also very unevenly distributed (e.g., Gimenez 1991). Yet both race and class can be manifest in both and, of course, gender is everywhere implicated.

My second key boundary crossing point concerns the simultaneity of premodern, modern and postmodern approaches to reproductive processes. Modern modes of *control over* reproductive processes as I have framed them are requisite for and generally presumed by postmodern approaches which *transform* reproductive processes and bodies. There is an historically cumulative but not exclusive relation.¹²

Third, one of the major distinctions of the western enlightenment has been the planet-wide distinction between humans and everything else (the nonhuman), a dualism which has been defended vociferously, including contestation regarding

who/what counts as human, often posed in terms of race. Elsewhere¹³ I discuss at length some of the problematics of how the collapse of the distinction between the human and nonhuman is being framed and addressed, including the work of Haraway (1989, 1992b), Latour (1993), Casper (1994a) and my own studies of American reproductive sciences. What the collapse makes visible is a stunningly heterogeneous array of cyborgs and hybrids, along with the vulnerabilities of other co-habitants. The implications of this collapse for matters of ongoing life, especially reproduction, are momentous and need to be addressed.

Vi. Conclusions

Reproductive technologies must be understood not only within the broader structural context of the postmodernization of human reproduction but also within their more immediate contexts of service delivery—medicine and other biomedical technologies. The comparative question is whether the development of such new reproductive technologies is fundamentally different from other medical technologies—or do they fit the same basic pattern? I would argue for both positions. First, new reproductive technologies are *different* because most have been so deeply targeted at a select subset of only half the population—women. They are exceptionally highly gendered cyborg makers. Second, they are *like* other medical technologies in that they enhance control over human life and death. The means are very sophisticated technologies which permit successful intervention *at the individual level*—classic late capitalist Western biomedicine qua privatized "boutique medicine" (e.g. Roth and Ruzek, 1986; Riessman, 1983). Like other medical technologies in the U.S., these have been relatively unregulated (e.g. Blumenthal, 1983), although this may change (Eichler 1989).

The modern/postmodern model seems to me to hold water/hold meanings but requires further exploration of actual conditions of concrete practice and application. I would argue that one major social issue continues to be the overall *legitimacy of intervention* in reproductive processes. Another controversial issue concerns *access to interventions*: who decides who uses which means of control and under what conditions? There has been considerable coercion in the U.S. and elsewhere around modernist approaches. There are also resistances for many reasons—against genocidal activities, against racism, against the wanton distribution of unsafe drugs and technologies, and so on (e.g., Arditti et al., 1984).

Postmodern approaches are vividly portrayed but are not yet very common practice. Selective distribution and the need to "afford" them limit access. Yet there also seem to be moments of possible coercion here—such as convincing women to endure the rigors of IVF or forcing mothers of prospective fetal patients to undergo multiple surgeries and literal confinements—which will lead to contestation. There is also the risk that people will be inadvertently enrolled by such technologies because of the "revolutionary" hype surrounding them. On the one hand these technologies can bestow pmo chic.¹⁴ Yet on the other hand a retreat into what Haraway termed organicist romanticism is also dangerous.

But I anticipate even more intense debate about the legitimacy of transformations enabled by these technologies: it is not only lived bodies but also social bodies which will require changes in the bodies politic to make these postmodern transformations "practical." Mary Douglas (1966) noted many years ago that things that fall outside cultural systems of classification are often perceived as dangerous

abominations. Certainly postmodern reproductive lived bodies, social bodies and bodies politic are and will likely continue to be so perceived by at least some segments of society.

We have already reached a fundamental crisis in the West regarding death. How will we redefine life, human/nonhuman boundaries and cyborgian/hybrid continuities with respect for the nonhuman and the other/once-human? Along the way we must come to better understandings of how nature, life, justice and reproduction are co-constructed, co-constitutive. Reproduction has been, is, and will in all likelihood continue to be charged with intensifying politics of hope and despair, pleasure and danger for individuals, collectivities and societies. It is a site worthy of our sustained concern.

Notes

1. This paper is an abstracted version of one slated to appear in *Making Sex, Fabricating Bodies: Gender and the Construction of Knowledge in the Biomedical Sciences*, edited by Joan Fujimura and Anni Dugdale. It is dedicated to the memories of my colleagues Barbara Rosenblum and Anna Hazan who helped me with a much earlier version in a writing group. I want to thank Kathy Charmaz and Marilyn Little (the other members of that group), Carol Conell (my faculty sponsor in the NIMH Postdoctoral Program in Organizations and Mental Health at Stanford University which provided early support), Joan Jacobs Brumberg (formal discussant of the paper at the Conference "Between Design and Choice: The Social Shaping of New Reproductive Technologies" sponsored by the Department of Science and Technology Studies, Cornell University), Carolyn Acker, Susan Bell, Monica Casper, and Peter Taylor for detailed comments. The Rockefeller Archives provided access to important data for related projects (Clarke 1985/1995).
2. A most provocative discussion of "control" is offered by Vanderwater (1992); see also Dixon-Mueller (1993) on reproductive rights in developing countries.
3. Ginsberg and Rapp (1991) provide an important overview of recent work on the demographic transition which argues that it is not universal, and that there are a variety of transitions locally determined by economic as well as cultural and historical phenomena. See also Horn (1991).
4. This is from a Progress Report to the Board of Trustees in support of his program for sponsoring scientific research (Kohler, 1976:291).
5. Quoted in Kimmelman (1983:68); from Weaver's paper on "The Science of Man," 29 November 1933, RF 3.915.1.6. Max Mason of the Rockefeller Foundation went on to note that much of sex research had real social applications and could be effectively coupled with work done in sociology. Mason was also quoted in Kimmelman (1983:68): from Max Mason's diary, 2 September 1929, RF 1.1.216.8.103.
6. Certainly up to World War II, and in many areas after it, the Rockefeller Foundation was the primary funding source for such scientific research—including the psychology of sex (Aberle and Corner, 1953; Abir-Am, 1982; Hall, 1977, 1974; Kay 1993; Kohler, 1976, 1978). A strong focus of the Rockefeller and other foundations was from the outset on the applicability of research to solving human problems (Kohler, 1991) which Kay (1993) interprets as seeking science-based mechanisms for social control.
7. Crowe (1993) presented an excellent analysis of premodern, modern and postmodern framings of infertility in terms of rhetorics about the individuals, who is construed as the patient, and so on.
8. We might argue that AI was not "appreciated" as the radically socially transformative technology it now is understood to be. Note the lateness of policy debates about it in Sweden and England, for example (Liljestrand 1990; Mulkay, 1993).
9. The term "boutique medicine" was used by Uwe Reinhardt (Eakins 1987).
10. Thanks to Sandy Stone for this point, and to Alex Pang for its generalizability.
11. Casper (1993) provoked my thoughts on this wonderfully.
12. In contrast, Martin (1992:121), focusing on bodies, asserts the end of one kind of body and the beginning of another. I plan to discuss the premodern approaches in subsequent work.
13. This discussion is in the much longer version of this paper; see footnote 1.
14. I thank Peter Taylor for this insight.

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