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6. Seeing the Phenomenon: The Radical Disembodiment of *In Vitro* Human Reproduction

Dana S. Belu

Introduction

Human reproduction has become an integral part of the technosystem or the 'total organization of society around technologies and technical disciplines' (Feenberg, 2017, p. 119). Technological and non-sexual reproduction through IVF (*in vitro fertilization*) has become so popular that in 2021, the CDC reported a whopping 3% of children in the United States were born through IVF—the gateway form of assisted reproductive technology (ART). As of 2023, over ten million children have been born through IVF (Hart & Wijs, 2022). This procedure combines a human egg and sperm in a petri dish to form an embryo. It has enabled numerous derivative ARTs, notably preimplantation genetic testing, embryo selection, cytoplasmic transfer, and maternal spindle transfer, among many others. Most recently it has facilitated IVG (*in vitro gametogenesis*): a cutting-edge technique that promises to develop eggs and sperm from adult somatic cells. IVG renders a woman's reproductive body superfluous for conception, though gestational surrogates will still be needed to complete the pregnancy, at least until the availability of ectogenesis through the artificial womb.[1]

1 Ectogenesis—a term coined by scientist J. B. S. Haldane in 1924—describes conception outside the uterus as is now possible through IVG and then linking it up with an ecto-uterus: a gestating machine, an artificial womb. The development of the artificial womb is still in its experimental stages.

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In this chapter, I will combine feminist phenomenology with aspects of social constructivism to show how the use of IVF and some related ARTs, notably IVG, reveal the radical technologization of a woman's reproductive body. Following Martin Heidegger's technological theory of enframing I have coined the phrase reproductive enframingto describe this technological process. This radical technologization remains invisible if thought just phenomenologically or from the perspective of social constructivism. This is because social constructivism overemphasizes 'production' and a dialectical understanding of the exchange between nature and technology while Heidegger's phenomenological theory of technology understates the empirical exchange between nature and technology, including dominant social norms that ART reinforces. Bringing these two methods together into a flexible feminist phenomenology of technology allows me to show how the use of ART, especially IVF and IVG, frames women's bodies as neither subjects nor objects of technical action but as resources, inseparable from the technologies that absorb them.

IVG is a process whereby adult somatic cells, such as blood or skin cells from one or both parents, are reprogrammed into induced pluripotent stem cells (iPCS) and then differentiated into *in vitro* human gametes, i.e., eggs or sperm. Then, IVF picks up the process by combining the gametes in a petri dish to create an embryo for implantation and gestation. As of the writing of this chapter, scientists in Japan have already produced successful IVG in mice and have also successfully derived human gametes (Notini, Gyngell, & Savulescu, 2020, p. 123). Although it is still in its experimental stages, reproductive medicine and genetic engineering see IVG as the next frontier in scientific human reproduction meant to correct the shortcomings and contingencies of non-scientific human reproduction and to expand the limitations of some current ARTs. According to Dr Hugh Taylor, a reproductive health specialist at The Yale School of Medicine, 'it's not a matter of if this will be available for clinical practice but just a matter of when' (Stein, 2023, p. 1). Dr Peter Marks, a top Food and Drug Administration (FDA) official, states that the FDA considers IVG 'a very important technology that we are very interested to move along' (Stein, 2023, p. 3) Some notable capabilities of IVG include its therapeutic potential, its eugenic potential, its enabling same sex couples to reproduce genetically using genes from both partners, its enabling single individuals to reproduce (by) themselves and its enabling

multiplex genetic parentage. However, due to substantive ethical and legal considerations, Congress continues to prohibit the FDA from considering scientific proposals that involve the genetic manipulation of human embryos. Despite this restriction, private companies are joining the race to fast track IVG technology and begin producing babies from skin cells.

It may be premature to discuss the practice and popularity of IVG but given IVF's huge popularity and the much greater ease and flexibility of IVG, it is likely that IVG will become a game changer in the scientific-technological reproduction of humans. Since IVG dispenses with the often tricky and dangerous step of IVF—i.e., the superovulation of a woman and the extraction of her eggs—it can be expected that, if successful, IVG will amplify the popularity of IVF and of ART more generally. It will also enhance the predictability and control of human reproduction. While we can't predict with certainty the future of IVG, the media already touts that, like IVF before it, it is merely a tool, a value neutral means for attaining various ends. I challenge this phenomenologically naïve view by bringing together Heidegger's phenomenology of technology and Andrew Feenberg's social constructivist theory. Together, they help to reveal the ontological, historical, and social dimensions of technology, especially reproductive technology.

I

In 'The Question Concerning Technology' (1954), Heidegger identifies the ontological characteristic (*Grundzug*) of the technological age as a 'mode of revealing' (*aletheuein*, *Entbergen*) (Heidegger, 1977, p. 14) that humans did not create or produce. He describes this revealing as a 'challenging-forth', a historically (*geschichtlich*) unique attitude that starts to emerge in the seventeenth century and increasingly discloses nature and things as a heap of orderable, fungible raw materials.[2] These resources or

2 According to Iain Thomson this captures the second definition of essence (or the positive sense of essence) in his three fold account of Heidegger's *Gestell*. I am indebted to Thomson's insightful account as presented at *The Disentangling Heidegger on Technology Retreat*, Buchnerhof, Italy, June 2024, organizers, Mark Wrathall and Jonathan Krude. For more on this differentiation see Thomson's forthcoming manuscript *Heidegger on the Danger and Promise of Technology, or What is Called Thinking in the Age of Artificial Intelligence?*, pp. 43-46, New York and Cambridge: Cambridge University Press, 2025.

'standing reserve no longer stand over against us as object (*Gegenstand*)' (Heidegger, 1977, p. 17). Seen together, challenging forth and standing reserve define the phenomenon of enframing (*Gestell*), the technological revealing. This revealing stamps modern technology with the character of flexible orderability. Heidegger describes this character as:

> a setting-upon, in the sense of a challenging-forth. Such challenging happens in that the energy concealed in nature is unlocked, what is unlocked is transformed, what is transformed is stored up, what is stored up is in turn distributed, and what is distributed is switched about ever anew. Unlocking, transforming, storing, distributing, and switching about are ways of revealing. But the revealing never simply comes to an end. Neither does it run off into the indeterminate. The revealing reveals to itself its own manifoldly interlocking paths, through regulating their course. This regulating itself is, for its part, everywhere secured. Regulating and securing even become the chief characteristics of the revealing that challenges. (Heidegger, 1977, p. 16)

Thus, when the modern scientific-technological outlook challenges nature forth, it sets it up as a resource by 'eliminating self-movement and intrinsic potentiality. Nature is then meaningless and utterly dependent on the subject for which it serves as raw material' (Feenberg, 2023, p. 151). In this view, nature is no longer an object, and neither is technology.

According to Heidegger, the commonplace view that technology is a means to an end, an object for a subject, is phenomenologically naïve—it is 'correct but not true' (Heidegger, 1977, p. 6) because the instrumental explanation cannot account for itself, for the provenance of instrumentality, and for the hegemony of utility. Instrumentality describes a relationship of use between a subject and an object that often includes the wrongful objectification of persons and nature, usually for the sake of power and profit. But as we will see with IVF and even more so with IVG, objectification and utility do not quite capture the phenomena. While Heidegger's phenomenological questioning of technology can be used to reveal women's reproductive bodies as resources rather than objects, it is too formal and abstract to fill in and to concretize the revealing. The enframed attitude is said to reduce nature and people to raw materials and energy, i.e., fungible media. However, empirical support for this reduction is so lacking that the theory cannot differentiate between, say, the medicalization of maternal

labour, the standardization of education, the deskilling of work, mass deforestation, or the digitization of information. Thus, a concretization of enframing is needed so that it can make sense of the variety of our lived technological experiences. In earlier work I introduced the term *reproductive enframing* to refer to the challenging forth of women's bodies, their decontextualization and reduction to reproductive parts and potential (Belu, 2017).[3] *Reproductive enframing* sums up the manipulation of this potential by describing a fragmented approach to conception and gestation, one that frames the uterus as a collection of discrete and movable reproductive parts: ovaries, follicles, eggs, fallopian tubes, and hormones. These parts are managed as 'stock', potential reproductive energy challenged forth in the petri dish. There the 'energy' of the sperm and the egg is 'unlocked' to achieve fertilization and then frozen, 'stored-up' until the embryo is implanted in the uterus of the future mother or that of a 'carrier', a gestational surrogate.

By combining Heidegger's phenomenology of technology with aspects of the social constructivist theory of Feenberg, I concretize Heidegger's theory through a two-step instrumentalization process that, I show, sets up the woman's reproductive body as a resource. Thus, the woman as a feeling and rational subject is reduced to her malfunctioning reproduction which is then further reduced to a collection of parts to be assessed and optimized. Let us examine this reduction to a resource in more detail.

In his 1949 lecture 'Das Ge-Stell' Heidegger describes the resource or 'stock' as follows:

> What the [medical] machine produces, piece by piece, it places in the standing reserve of the orderable (*Bestellbaren*). The product is stock [...] The stock-piece (*Bestandstück*) is something different than the part. The part shares itself with other parts in the whole. It takes part in the whole, and belongs to it. (It completes the whole.) The piece, on the contrary, is separate and is as a piece closed off from other pieces. It never shares itself with these others in a whole. Nor does the resource piece share itself with others like it in standing reserve. On the contrary, the resource is made piece-meal for orderability. (Heidegger, 1994, p. 36, my translation)

3 This chapter contains revised material from chapter 3 in Belu (2017).

He highlights the fungible character of stock as follows:

> Stock pieces are piece by piece the same. Their stock character demands this uniformity. As the same, the pieces are in extreme competition with each other; in this way they raise and secure their stock character. The uniformity of the pieces guarantees (*verstattet*) that all pieces are interchangeable on the spot. A stock-piece is replaceable by another. The piece is, as a piece, put up for exchange. Stock-piece means that what is delimited as a piece is exchangeable in the ordering. (Heidegger, 1994, p. 36, my translation)

This fungible character of stock defines the treatment of women's reproductive bodies during IVF and, as we will see later, IVG. Because Heidegger's phenomenology of enframing is excessively formal and abstract, it cannot explain the details of this fungibility even though it is essential for framing the fungibility, making it visible. But reproductive enframing helps to bring out the resource status of women's reproductive bodies in IVF by coupling enframing with feminist and social constructivist analyses. I begin by applying key aspects of Feenberg's 'primary and secondary instrumentalization' to the use of ART.

In *Questioning Technology*, Feenberg develops a two-level instrumentalization theory that presents the 'functional constitution of technical objects and subjects' and describes their place in the lifeworld as the 'realization of the constituted objects and subjects in actual networks and devices' (Feenberg, 1999, p. 203). Applying elements of his theory to IVF helps to critically illuminate the 'functional reduction' and fungibility of the woman. Feenberg's theory criticizes the reductive understanding of technology that sees devices merely as *functional* things, tools that get things done. As a social constructivist, he insists that function depends on social context and thus is of contingent value only. For example, while Western industrialized countries value the function of technologies, other cultures place the emphasis elsewhere. He writes:

> What differentiates technology and tools in general from other types of objects is the fact that they appear always already split into 'primary' and 'secondary' qualities, i.e., functional qualities and all others. We do not have to make that distinction deliberately as we would in the case of a natural object since it belongs to the very form of the technical device.

> Thus, an *initial abstraction is built into our immediate perception of technologies*. That abstraction seems to set us on the path toward an understanding of the nature of technology as such. However, it is important to note that this is an assumption based on the form of objectivity of technology in our society. Function is not necessarily so privileged in other societies. The functional point of view may coexist peacefully with other points of view, religious, aesthetic, none of which are essentialized. (Feenberg, 1999, p. 211, my emphasis).

Feenberg's theory strives to avoid a poorly differentiated, reductive understanding of technology by foregrounding the connection between secondary instrumentalization (the cultural integration or world of new technologies) and primary instrumentalization (their function). His theory allows us to see how the socialization of IVF underscores the resource status of the woman and her eggs.

Feenberg analyzes primary instrumentalization into four component steps, which he calls 'reifying moments of technical practice' (Feenberg, 1999, p. 203). These are decontextualization, reductionism, autonomization, and positioning. I will focus on the first three. A phenomenological interpretation of conception through IVF shows that the lifeworld of the woman as a whole person and potential mother is concealed even *as* she is revealed (to the medical gaze and to herself) as a collection of malfunctioning reproductive parts that need to be fixed. Here is where Feenberg's decontextualization of the 'object' comes in. He writes: 'To reconstitute natural objects as technical objects, they must be "de-worlded", artificially separated from the context in which they are originally found so as to be integrated into a technical system. The isolation of the object exposes it to a utilitarian evaluation' (Feenberg, 1999, p. 203). The eggs are tested for their reproductive usefulness as well as the usefulness of the sperm. Their potential is technologically extracted so that it is more efficiently actualized. Once they are extracted from the uterus, the eggs 'reveal themselves as containing technical schemas, potentials in human action systems which are made available by decontextualization' (Feenberg, 1999, p. 203). This means that they are now made available for fertilization, freezing, or to be stored as embryos for future implantation or experimentation. Cryopreservation opens up possibilities for embryo research and experimentation often *unrelated* to reproduction and that may be unknown to the donor. Whether immediately fertilized and implanted or cryopreserved through

vitrification, the decontextualization of the eggs reveals the woman and the eggs as stock, fragmented into a collection of *interchangeable* reproductive parts. This is a significant step in the control and ordering of human (re)production and a steppingstone toward more advanced IVF-derived technologies, such as IVG.

Decontextualization is coupled with a second step, *reductionism,* in which the natural object, the egg, is reduced to its primary qualities, such as 'size, weight and shape' or anything else about the 'object that offers an affordance' (Feenberg, 1999, pp. 203–204). In the case of the eggs, doctors seek high-quality (functional) eggs that contain the proper chromosomes, are young enough and resilient enough to combine with sperm, and are energetic enough to divide and multiply after fertilization.[4] The eggs are reduced to these primary qualities because those seem most conducive to technical production: that is, embryo fertilization, growth, and implantation. Whatever the secondary characteristics of the eggs, they remain undiscovered. Feenberg notes: 'Secondary qualities are what remains, including those dimensions of the object, that may have been most significant in the course of its pretechnical history. The secondary qualities of the object contain its potential for self-development' (Feenberg, 1999, p. 204). Since the potential for self-development is denied, this aspect of the egg becomes irrelevant. Feenberg provides the example of a tree whose secondary quality as 'habitat' no longer nourishes and shelters numerous species of flora and fauna once it is reduced to its primary quality—that is, a cylinder of wood. It is unclear what the secondary qualities of these extracted eggs may be, but they might relate to the uterine 'habitat' or 'umwelt' to which the eggs belong: an environment that is especially disturbed by superovulation.

Finally, the reproductive enframing in IVF can be seen to be underscored by what Feenberg calls the process of autonomization. Autonomization refers to the interruption of *reflexivity* in technical action, its impact on the user, so that the subject can affect the object of technical production without being significantly affected in return (Feenberg, 1999, pp. 207–208). The autonomization of IVF becomes visible when the medical industry treats the women in an administrative

4 These standard features are widely available and can also be found online on the popular and sentimental site https://www.sharedjourney.com/

manner, i.e., without caring for their feelings, their hopes and fears. It either abandons women with unsuccessful cycles of IVF by not providing care for their mental distress and/or collapsed life project and empty pockets, or simply encourages them to 'try again'. By dismissing the patient's experience and distress, the medical industry promotes an administrative or 'purely functional', indifferent attitude toward its patients when they are especially vulnerable. This affords it a kind of immunity from the consequences of its actions and casts the women as disposable resources.

In addition to primary instrumentalization, all technical production involves what Feenberg calls secondary instrumentalization. The steps of decontextualization, reduction, and autonomization loosely correspond to moments in secondary instrumentalization—a process that refers to the lifeworld or the social realization of the technology—to be distinguished from its primary counterpart only analytically, since the two cannot exist separately. Secondary instrumentalization involves systematization, mediation, and vocation (Feenberg, 1999, pp. 205–206). According to Feenberg: 'to function as an actual device, isolated, decontextualized technical objects must be combined with each other and reembedded in the natural environment. Systematization is the process of making these combinations and connections [...] of "enrolling" objects in a network' (Feenberg, 1999, p. 205). In IVF, systematization refers to IVF's commercial and social recontextualization. This means that the fertilized egg, which now appears as a technical object, must be reintroduced into the living womb of a woman and the woman must be successfully integrated into a network of doctor's visits and regular administrative and medical protocols. Since many women who undergo IVF are older, sometimes well into their forties, the social recontextualization of an older pregnant woman challenges traditional values, especially ageist prejudices about conception and motherhood. All of this involves ethical mediation. Feenberg writes: 'Ethical and aesthetic mediations supply the simplified technical object with new secondary qualities that seamlessly embed it in its new social context [...] Recently, medical advances and environmental crises have inspired new interest in the ethical limitations of technical power' (Feenberg, 1999, p. 206).

Some of the ethical limitations consist of legally deceiving women about their chances of having a baby by inflating the success of IVF and, as mentioned above, administratively dismissing their hurt after failed IVF cycles. For instance, clinics still misrepresent their success rates by reporting in vitro fertilization success rates as successful *in vivo* implantation and/or live births, though the number of live births are typically much lower than successful implantations. Moreover, the 'IVF pregnancy rate is usually based on the chance of getting pregnant *after* undergoing egg retrieval' (Sherr, Davis, & Stoess, 1995, p. 64) and successful egg retrieval is often not possible. This manipulation of success rates[5] entails a manipulation of the participants, those women who opt for IVF on the basis of misleading statistics. When the woman's disappointment is not taken into account, her subjectivity is ignored and this puts her on the path to being treated as disposable, an interchangeable resource for the technology that she now serves, rather than being served by it. In this case, attention to the ethical mediation reveals a *lack* of care for the well-being of the *whole* woman. This lack is a consequence of the overidentification of technology with function, with efficient conception. But neglect by itself does not yet frame the woman as a resource—it merely points to a kind of wrongful objectification. However, when it is coupled with the woman's voluntary acceptance of this objectification and thus her self-objectification in the interest of a functional outcome, her status as a resource is sealed. Both the ethical dismissal and the self-objectification are consequences of a reductive and one-dimensional conflation of technology with function, i.e., with efficient conception.

Finally, as mentioned in the discussion of primary instrumentalization above, the autonomization process refers to a lack of reflexivity on the part of the doctors and the medical staff. Autonomization corresponds to what Feenberg calls *vocation* in his secondary instrumentalization theory. He characterizes vocation as follows:

> The technical subject appears autonomous only insofar as its actions are considered in isolation from its life process. Taken as a whole, the succession of its acts adds up to a craft, a vocation, a way of life. The

5 According to the most recent numbers from the CDC, live births from IVF had a 22% success rate (Centers for Disease Control, 2023).

> subject is just as deeply engaged as the object [...] The doer is transformed by its acts [...] The rifleman will become a hunter, the worker in wood becomes a carpenter. *Vocation* is the best term we have for this *reverse impact* of *tools on their users*. (Feenberg, 1999, p. 206, my emphasis)

So, from the point of view of the woman who uses IVF, vocation refers to the subjectification of this technology—its transformative power, whereby the technology is made her own through repeated use. That is, over time, this technological internalization shapes her identity as the user of the technology. But what is curious about the use of IVF is that recognition of this internalization is ultimately resisted. IVF continues to be widely solicited[6] and yet, when it is successful, its use and significance are downplayed. In other words, every effort appears to be made—by the media, the medical industry, and by the women themselves—to frame pregnancy by means of this invasive medical technology *as if* it had been achieved without the technology; as if the technology merely gave 'nature' a helping hand and had no lasting impact.[7] Downplaying the technology is a way of resisting identification with the technology, keeping it at a distance even as one relies on it. The popularity of 'mild IVF' is one evidence of this phenomenon. Women opt for a 'mild IVF cycle'—that is, a shorter cycle with fewer shots—because 'mild IVF' stays closer to 'mother nature' (Payne et al., 2012). This wild perception is interesting since even mild IVF relies on disembodied fertilization and acutely medicalizes conception, and so it is quite removed from whatever 'mother nature' might mean. Invoking 'mother nature' has the effect of undermining the role of the technology used for the precise purpose of suppressing 'mother nature'. When it is successful, parents and family members tend to avoid discussing their children's IVF origins—though, when it fails, women more openly discuss the 'ordeal' and debate with themselves whether to try again.

6 According to recent CDC statistics: in 2020, 2.3% of babies in the USA were born through IVF (Centers for Disease Control, 2023).

7 In Belu (2017, pp. 61–75), I discuss this common misperception of IVF merely giving nature a 'push' as being conceptually, however unwittingly, stuck between an Aristotelian understanding of *physis* as self-generation and a Heideggerian understanding of *physis* as being challenged forth into standing reserve.

II

According to Sarah Franklin's social constructivist analysis of ART in *Biological Relatives: IVF, Stem Cells and the Future of Kinship*, women still face enormous pressures to reproduce and this accounts for women trying IVF. Equally important is to 'be seen as trying IVF'. Both events provide women with a maternal identity and thus with a reprieve from societal pressures, at least for a while (Franklin, 2013, pp. 212–213). Because genetic parenthood is still considered a 'cultural gold standard' (Notini, Gyngell, & Savulescu, 2020, p. 132) for making a family, IVF is the most efficient route for women to meet the standard. Thus, even when they know that, with less than a 50% success rate, the procedure is likely to fail, women enrol in the process. Sometimes they enrol because they know that it will fail. 'Trying' masks their maternal ambivalence or disinterest.

Franklin mentions Heidegger briefly, mostly to use his phrase 'the question concerning technology' (Franklin, 2013, p. 196, p. 300) in order to point to her own thinking. Like Heidegger and Feenberg, Franklin does not see modern technologies as just value neutral tools but as mediations for our self-understandings and for pointing beyond themselves to the general culture they express. So, there is no such thing as IVF, although this view that appeals to the neutrality of IVF is still used in non-dialectical and non-phenomenological bioethical and social scientist commentaries on ART (e.g., Notini, Gyngell, & Savulescu, 2020; Suter, 2016). But this view is untenable because by situating the technology in a socio-scientific vacuum it also affirms, paradoxically, that it is useless.

But as Franklin's account of women's ambivalent IVF identity or their 'vocation' shows, the technology does not exist in a vacuum. Far from endorsing the view that technology is neutral, Franklin can be seen to echo Heidegger when she calls the age of IVF 'the age of biological control' (Franklin, 2013, p. 188). However, unlike Heidegger, she does not follow the question into its ontological ground—she does not look for the essence of (reproductive) technology. Rather, her analysis is dialectical as it emphasizes the mutual constitution of IVF and kinship, and various exchanges between biology and technology, technology and gender, and biology and values. She writes, 'IVF can be understood both

as a technologization of substance and a substantialization of technology' (Franklin, 2013, p. 258). Or, more specifically, 'IVF is a new model of reproductivity in which the birth of viable offspring both depends upon and changes the social conditions that activate reproductive substance' (Franklin, 2013, p. 308). Fundamentally, for Franklin (and for Feenberg), production is the ultimate reality and it underlies the dialectical relationship between ART and gender. She writes, 'reproduction, like gender and kinship, must also be produced; it is not simply there to be presumed as a self-acting force' (Franklin, 2013, p. 182).[8]

IVF is not only a reproductive technology but also a technology of gender, a cultural technology (Franklin, 2013, p. 241). As such, it 'renaturalizes the maternal goal' even as it intensifies the desire for women to do everything they can to make conception happen. Their IVF related hardships and sacrifices recast maternity, once it is attained, as a 'heroic' triumph (Franklin, 2013, p. 241) or, if it fails, a heroic defeat. But even women who 'fail' succeed at having tried and so perpetuate the enduring notion that genetic parenthood is the 'cultural gold standard' for making a family.

However, contra Franklin's interesting work on describing IVF-women's identities as warriors and heroes, I have found that after successful IVF, women tend to ignore the impact the use of IVF has had on their lives. They minimize it or delete it altogether. There are many sociological reasons for this behaviour. As Franklin notes, they include the real or imagined satisfaction that their marriage, incomplete without a biological child, has now been fulfilled, as well as the successful display of 'devotion to a spouse or partner' and the achievement of 'a greater sense of belonging to friendship networks' (Franklin, 2013, p. 233). Not surprisingly, successful results are reported to ameliorate the pain and stress of IVF so much so that some women report that they 'forgot' all about the stress of IVF, and this seems to include glossing over the use of IVF itself (Verhaak et al., 2007). Whatever the reasons may be, it is extremely rare to meet women or parents who will boast

8 But this recurring emphasis on production as somehow ontologically primary is anthropocentric and phenomenologically naïve. Seen through Heidegger's phenomenology of technology, production—as a dialectical process of making and remaking—only appears fundamental in a world that is already historically enframed, i.e., defined by a reduction, a remaking of people and things into fungible raw materials.

about their 'miracle' IVF children even though these very same people initially rejoiced at a successful IVF pregnancy. Since, paradoxically, the successful result with IVF too often results in the individual user's denial of her social identity (or her subjectification) and vocation as an IVF user, the identity is then standardized. It is supplied by contemporary, advanced, industrial societies as the mere consumer of an expensive medical service. This underscores the suppression of the user's subjective, technological identity or vocation.

This denial is likely to be bound up with a woman's experience of shame at her inability to 'fulfil' her primary social role of bearing children and thus to conform to dominant social norms. Shame expresses feelings of deficiency, failure, and humiliation before an authority figure. In *The Obsolescence of Man*, Günther Anders aptly sums it up as a 'self reflexive act, a reference to self that fails [...] an interference in processes of identification, a condition of being confused or distraught' (Anders, 1956, p. 63). He coins the term Promethean shame to capture the pervasive feeling of inferiority that late moderns experience before the machines that they made (Anders, 1956, p. 31, p. 51). Moreover, it is a hopeless longing to emulate those machines, to escape the fragile and perishable 'natural' human condition. In short, it is a longing to become dehumanized. While shame seems like a good explanation for women's rejection of an IVF identity, it is not quite Promethean shame because IVF is devalued rather than admired, and every effort is made to absorb the technology into a narrative that exalts nature and natural reproduction. There is no desire to identify with the technology. Thus, minimizing or deleting the role of successful IVF has the perceived effect of restoring a woman's sense of self and lessening her humiliation. She did, after all, bear a child and is not willing to share the laurels with the technology that helped her to do it. She can now enjoy her freedom from the social pity reserved for women who cannot conceive biologically, and freedom from the silent contempt reserved for women who put their careers ahead of their maternal role, missing out on their fertile years.[9]

In sum, in both the social constructivist work of Feenberg and Franklin, the subjectification of the IVF user plays an important role. In my application of Feenberg's two-step instrumentalization theory, I

9 Women who are not interested in motherhood rarely show up or speak up and so are not part of this conversation.

analyzed the reduction of a woman's reproductive body and applied his account of technological subjectivity or vocation to show how users of IVF deny this vocation. This leaves them in the role of technological resources. We can see Franklin's account of women's conflicted use of IVF as supporting Feenberg's appeal to technological subjectivity as women use IVF in their strive for a gendered, maternal identity. While I agree that this technologized striving animates women during their use of IVF, it does not seem to stick around after the live birth of their children. Motivated by feelings of shame, the technologization of their bodies is forgotten as they become absorbed in naturalizing their offspring and minimizing discussions about their IVF experiences. This acceptance and naturalization of extreme reproductive reordering appears to be itself an act of self-objectification, i.e., treating oneself as an object. When this act and its consequences are dismissed, the subject accrues no memory, identity, or vocation, and the subject is then effectively recast as a resource.

The resource status of IVF users is even more visible when IVF is pursued by *fertile* women for the sake of testing the fertility of the woman's male partner or simply for experimental reasons whose end goal is open ended. As Françoise Laborie remarks: 'The increasing use of IVF to treat (and diagnose) male infertility means that healthy fertile women are exposed to the dangers of repeated doses of hormones and drugs and major surgeries [...] Experiments have been made with what is called "cross fertilization", i.e., sperm given by different men are tested for their capacity to fertilize the eggs of a single woman' (Laborie, 1987, p. 51). This example reveals a couple of things. It reveals the fungibility of women's reproductive bodies now enlisted to serve the interests of men and it also illustrates the resource status of eggs, their energy held on call for what Heidegger describes as a 'further ordering' (Heidegger, 1977, p. 17).

This further ordering is clearly seen in derivative IVF procedures such as cytoplasmic transfer (CT). CT

> revitalizes old eggs by combining the nucleus of an older woman's egg (that is, the egg of the woman trying to become pregnant) with the cytoplasm of a younger woman's egg (that is, the donor). The resulting embryo is thought to be healthier and more likely to implant in the uterus, but it may also contain genetic material from both eggs because

> the mitochondria in the younger egg's cytoplasm also contain genetic material. (Harwood, 2007, p. 12)

This procedure reveals the fungibility of the women participating in this process, since each is reduced to her egg-bearing function and her eggs are now recast as 'extractable resources'.[10] The combination of two eggs has the unintended consequences of multiplying genetic motherhood without addressing the social burdens of motherhood. Because it enables fertilization in older women, CT ends up *de facto* reproducing classist social structures. Instead of liberating women, CT distracts attention from feminist concerns with racial and economic gender inequities, such as the lack of support for working mothers, the working poor, and the high demands of career life—inequities that often compel women to postpone pregnancy until well into their forties when they require IVF and CT.

While IVF enables reproduction with two living genetic mothers, as in cytoplasmic transfer procedures, it also enables the production of offspring with no living genetic mothers. This process results in biologically motherless babies, babies whose mothers were never persons: 'unborn mothers'—mere genetic reproductive stock. In this procedure, 'viable eggs [are] collected from the ovarian tissue of aborted foetuses for use in fertility treatments such as IVF. Success has been limited; by stimulating the tissue with hormones, researchers are able to develop primary and secondary egg follicles about halfway to the point of maturity' (Guenther, 2006, p. 156). We see how the potential reproductive energy contained in this fungible stock—that is, in the ovarian tissue of the dead foetus—is extracted (stolen?) and challenged forth so that, as Heidegger presciently remarked, 'the energy concealed in [its] nature is unlocked, what is unlocked is transformed, what is transformed is stored up, what is stored up is, in turn, distributed, and what is distributed is switched about ever anew' (Heidegger, 1977, p. 16). The procedure dispenses with the woman as subject and with the egg as object so that both 'disappear into the

10 See Thomas Sheehan's *Making Sense of Heidegger* (2015). He writes: 'But the "positing" and "imposition" that Heidegger has in mind with *Gestell* is the particular dispensation that is imposed on us today and that compels us to posit and treat nature and people in terms of *extractable resources*' (p. 258).

objectlessness of standing reserve' (Heidegger, 1977, p. 19).

In such cases, the thorny issue of informed medical consent is bypassed altogether since the content of the abortion automatically becomes the property of the medical institution and there is no woman to consult. The process dispenses with the need for the female person as biological mother, woman, and subject because the so called 'unborn mother' is nothing but 'a body part without a body, an egg donor but not a person' (Guenther, 2006, p. 156). In fact, there is no 'donor' at all and no activity of gift-giving. Rather, the phenomenon is one of extraction, or what Heidegger calls a 'plundering' (*Geraff*) (Heidegger, 1949). The medical production of 'unborn mothers' redefines the meaning of human stock or resource in terms that even Heidegger could not foresee. It introduces a kind of fungibility predicated on fragmentation that was merely implicit in the earlier and more innocuous forms of low-tech reproductive interventions, such as artificial insemination, that still presupposed the presence and cooperation of the woman as person and subject. Here, the subject-object relationship is 'sucked up into standing reserve' (Heidegger, 1974, p. 173). The woman as subject is now a body part, an object—that is, viable ovarian tissue, merely an egg *in potentia*: a storehouse of reproductive energy on call for future use. And this egg now becomes the future 'unborn mother', reordered as the new subject that is really just a fungible resource through and through.

A feminist phenomenology of technology allows us to see how the living woman plays an increasingly smaller role and begins to fade from view in IVF and its subsequent developments, such as the one described above. Yet, most IVF-based forms of ART still require the living body of a woman or, at the very least, female ovarian tissue. The invention of IVG, however, dispenses with this need, since—as I noted earlier—it can develop eggs by reprogramming and differentiating somatic cells. This flexibility further entrenches control and predictability over human reproduction.[11] There is no limit to the number of eggs it can produce (Sutter, 2016, p. 95) and fertilize, and so no limit to the number of human embryos that can be stored.

11 IVG is developed for therapeutic purposes and not just reproductive purposes.

III

IVG is still in its experimental stages and there is no guarantee it will become available for human reproduction (Notini, Gynggell, & Savulescu, 2020, p. 124). However, if it becomes medically available, it will be historically unprecedented as it will dispense with the need for both men's and women's reproductive bodies. Since the availability of sperm for ART has always been plentiful compared with the scarce availability of eggs, IVF often struggled with getting 'eggs' and getting 'good eggs'. IVG ends that struggle and erases that limitation. Moreover, IVG allows us to see how the living woman is not merely fungible but, for the first time in reproductive history, superfluous for motherhood. Since somatic cells can be collected from anyone—young or old, male or female—and then reprogrammed, even the recently dead can 'donate' cells. Although current research shows that it is more complex and dangerous to produce babies from somatic cells than from induced pluripotent stem cells extracted from embryos, the somatic cell is the new frontier for easy human reproduction.

It is easy to see how this totally disembodied form of human reproduction makes parenthood increasingly flexible and fungible. This is reflected in the already debated IVG phenomena of 'multiplex parenting'—when more than two people contribute genetic material to one child—and also 'solo parenting'—when one parent contributes all of the genetic material to the child (Sutter, 2016, p. 106). But, despite facing considerable medical, social, and legal concerns with the consequences of multiplex and especially solo parenting,[12] the race to (re)produce babies from skin cells is on.

Viewed through the lens of reproductive enframing, these advanced forms of ART—especially IVG—can be seen not as a 'new technology' but rather as the culmination of a prevailing way of thinking that appears to resemble instrumentality but is, in fact, substantially different. In 'The Question Concerning Technology', Heidegger insists that the commonplace view that sees technology as an instrument, a means to an end, or an object for a subject is 'correct but not true' (Heidegger, 1977, p. 6) because it cannot account for itself, for the provenance of

12 Solo IVG is especially prone to producing children with severe birth defects. For more on the bioethics of IVG, see Notini, Gyngell, & Savulescu (2020).

instrumentality, and for the hegemony of utility. Instrumentality describes a relationship of use between a subject and an object that often includes the wrongful objectification of persons and nature, usually for the sake of power and profit. But as can be clearly seen with IVG, objectification and utility do not quite capture the phenomenon. The goal is to dispense with the subject but without turning it into an object, something that is relatively fixed and stable. Rather, IVG achieves what IVF could not—the dissolution of the subject/object boundary and the articulation of the resource as an entity that lacks a fixed and stable form or purpose—and is thus fungible through and through.

In acts of self-objectification performed by women in IVF, relatively stable medical and social boundaries still exist, though they have grown more porous and flexible. Even when IVF works, it does so by challenging the woman's body forth, and the process can be obtrusive and painful. On the other hand, IVG promises to be painless and more efficient, easily dispensing with the obtrusiveness of IVF. This can be seen to concretize Heidegger's claim in 'What are Poets For?' that enframing works best when it is invisible. By challenging the body forth, now almost entirely from the ground up, IVG can be seen to more thoroughly deny the cell's intrinsic 'potentiality'—i.e., to become skin—and thus it produces a 'free space of exploitation' (Feenberg, 2023, p. 159) and manipulation that feels easy, natural, and scientifically progressive. Humans have never experienced such freedom from the toils and uncertainties of reproduction.

Collecting somatic cells is indeed easy and science is working hard to make the use of skin cells for IVG happen. The difficulty of treating the IVF patient with dignity and respect is no longer an issue since the interpersonal part of the IVG procedure is just a brief collection of skin cells. The future parent, the user of the technology, is fungible and gone after donating the cell sample, and the sample itself is completely fungible since it can be taken from almost any part of the body. No medical follow up or doctor is necessary since the lived body of the patient is not part of this process and so does not require treatment. The collected sample is worked on by scientists in labs to derive eggs and sperm in order to then fertilize them through IVF, again in a lab. The finished product, in principle, would be the live baby taken home who would not be seen as a scientific product, if attitudes toward IVF-produced children are

a good indicator, but as a piece of nature. Through IVG, eggs could in principle be produced *en masse* and stored for purposes that are yet to be determined, large supplies of human biotechnological stock standing reserve for medical experimentation and treatment. Products without a specific purpose.

In the conclusion to her book, Sarah Franklin asks, what comes after IVF? The question is not so much about subsequent IVF-based ART, such as pronuclear and maternal spindle transfer techniques (Franklin, 2013, p. 297) and now IVG, but more about identity as the continuous exchange flow between kinship and ART. She argues that new technologies have always been met with a strong dose of 'technological ambivalence' which she defines as 'the fear of degeneration in the wake of technological change, set against the more confident expectation of an improved, more fruitful, future' (Franklin, 2013, p. 300). This ambivalence can be seen to describe the long-standing tension between technophilia, a love and pursuit of technology, and technophilia, a fear of technology—a tension that has tended to resolve itself in favour of technophilia. Heidegger warns against subscribing to such binary, reactionary attitudes and instead urges us to question our relationship to technology, including our constant pursuit of more technology which he claims has run out of our control long ago and is now controlling us. Whether or not the pursuit of IVG[13] expresses this loss of control is perhaps the most urgent question concerning technology in our lifetime.

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13 It is worth exploring whether IVG illustrates aspects of Anders' theory of Promethean Shame as elaborated in *The Obsolescence of Man* (1956). For instance, the promise of IVG to *produce* the human almost from the ground could be seen as a response to Promethean Shame—an experience of the inadequacy of the human as a natural, non-produced entity in need of technological remaking.

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