

Artificial economics

PAUL SMART

Artificial prosumers

“ I DO HOPE YOU’RE SATISFIED with our product,” remarks Luv, just before her boot descends to destroy Joi’s emanator. Luv is looking at Joi when she says this, but it is unclear whether her statement is intended for Joi or for K. Given the direction of her gaze, we are naturally inclined to think that Luv is addressing Joi and referring to K. But her statement could easily have been directed at K, for both Joi and K are manufactured by Wallace Corporation, and they thus both qualify as products.

The inherent ambiguity of Luv’s statement, coupled with the direction of her gaze, is important for a number of reasons. Note, for example, that Luv is a representative of Wallace Corporation. Presumably, then, Luv is in a position to know about the functional profile of the products produced by Wallace Corporation. (Indeed, we learn that Luv is involved in sales and marketing, a role that typically requires familiarity with a company’s product portfolio.) This looks to be important when we consider the fact that Luv is looking at Joi. Inasmuch as her statement is addressed to Joi, then it seems likely that Luv believes Joi is the sort of thing that could be satisfied with something. In other words, the direction of Luv’s gaze suggests that Joi might be capable of experiencing satisfaction. This speaks to one of the issues raised in chapter 7, namely, the issue of whether or not Joi ought to be regarded as a sentient being.

The scene of Joi's demise is also important in drawing our attention to some of the economic peculiarities of the *Blade Runner* universe. Note, for example, that Luv is herself a replicant who "works" for Wallace Corporation. In this sense, she is no less a product than is Joi or K. What distinguishes her from Joi and K, at least from an economic perspective, is the fact that she has not been sold to someone else. Unlike Joi and K, Luv has been retained to service the interests of Wallace Corporation ("I'm here for Mr. Wallace"). She is, as such, an in-house product.

As noted above, Luv's wry remark ("I do hope you're satisfied with our product") is ambiguous, and this ambiguity reminds us of the status of Joi and K as products. From a cinematic perspective, however, it is not just the ambiguous nature of Luv's statement that is important in this scene. The direction of Luv's gaze also plays a crucial role in directing our attention to matters of an economic nature. To help us see this, let us imagine that Luv had been looking at K when she said, "I do hope you're satisfied with our product." In this case, we would have assumed that she was addressing K and referring to Joi, and the economic import of her statement would probably have gone unnoticed. We already know, for example, that Joi is a product of Wallace Corporation and K has purchased Joi; thus, the counterfactual case (Luv looking at K) merely speaks to what we already know. By looking at Joi, however, Luv's statement serves as an important cognitive trigger: it reminds us that K is a product of Wallace Corporation and that K's relationship with Joi is just as much an economic relationship as it is a romantic one. (No surprise, then, that the relationship is so easily shattered by the dutiful servant of a capitalist overlord!)

In surveying the web of economic relations in *Blade Runner 2049*, something important is revealed. It is possible to regard the products of Wallace Corporation (e.g. Luv and K) as economically active agents, in the sense that they are the providers and/or the producers of economic goods and services.¹ In some cases, however, they also appear to play the role of economic consumers. This duality is most clearly evidenced by K. On the production side of things, K is a NEXUS 9 replicant who provides a service to his employer, the Los Angeles Police Department (LAPD). Although we are not told that K was specifically engineered to operate as a blade runner, it looks likely that his design is consistent with this sort of role. In one sense, then, K is a manufactured entity (a product) that is designed to provide a service that other economically

active agents (namely, the LAPD) will pay for. It is this that underwrites K's status as an economic producer: Courtesy of his capacity to track down and retire rogue replicants, K is able to do something of economic value—he provides a service to his employers and perhaps even provides them with goods in the form of neatly packaged body parts (yuck!).

As the movie progresses, it becomes clear that K is more than just a producer of economic goods and services; he is also a consumer of goods and services. This is made clear by Luv, when she learns that K possesses an emanator:

LUV: I see you're also a customer.

LUV: Are you satisfied with our product? [Referring to Joi]

K: She's very realistic. Thank you.

It isn't entirely clear whether K receives a monthly paycheck from the LAPD; what is clear, however, is that he is entitled to certain forms of economic recompense for his blade-runner services. In the aftermath of his first baseline check, for example, we learn that K receives a "bonus"—a reward for his efforts in retiring Sapper Morton:

INTERVIEWER: We're done.

INTERVIEWER: Constant K.

INTERVIEWER: You can pick up your bonus.

K: Thank you, sir.

Given the standard definition of a bonus as a sum of money added to a person's wages for good performance, it seems reasonable to assume that K is employed by the LAPD and receives financial remuneration for his services. This is supported by what we see when K returns to his apartment following the successful completion of his first baseline test. We learn that K lives in an apartment, which he shares with Joi. K has presumably decided to purchase Joi, since we know that Joi is, herself, a product of Wallace Corporation. It is in this sense that K is an economic consumer: K is using the economic returns from his labour to purchase products that (in this particular case, at least) originate from the very same company that is responsible for his own manufacture. K is thus both a producer and a consumer of economic goods and services; he is, to use the phraseology adopted by behavioural scientists, an economic

prosumer (Ritzer et al., 2012)—an entity involved in both the production and consumption of economic goods and services.

Why should any of this be of any economic or philosophical interest beyond the fictional realms of the *Blade Runner* universe? The reason, I suggest, is that *Blade Runner 2049* provides us with an interesting (and, as far as I can tell, novel) characterisation of the economic significance of Artificial Intelligence (AI). There is, to be sure, a profound difference between the sort of AI systems that we encounter in *Blade Runner 2049* (i.e., replicants² and holograms) and those we encounter in contemporary society. Nevertheless, the status of replicants as economic prosumers is important, for it reveals a different way of thinking about the economic impact of AI systems—one that potentially alters the nature of contemporary economic and social policy debates. In particular, *Blade Runner 2049* captures the idea of what I will call *artificial economics*—the idea that AI systems work to service the demand for economic growth and capital accumulation, and that they do so courtesy of their status as economic prosumers. In essence, artificial economics yields a vision of AI systems operating as the deliberately engineered components of an economic system, one whose functional goals (e.g. economic growth and capital accumulation) are perhaps no longer adequately served by traditional (i.e., human) forms of production and consumption. AI systems are, if you like, a technological response—a specific form of economically oriented technological fix—that seeks to address the problems, constraints, and limitations associated with traditional (human-centred) forms of economic commerce.

We are all familiar with the idea of AI systems working to expand the scale, scope, and efficiency of traditional forms of production (consider the widespread use of industrial robots on factory assembly lines); what the notion of artificial economics adds to this familiar (and accepted) image is the idea of AI systems working to expand the scale, scope, and efficiency of traditional (human-centred) forms of consumption. As a result of this consumerist capacity, AI systems are apt to strike a balance between production and consumption, helping to ensure that changes in an economic system's capacity to *produce* are met with a corresponding shift in its capacity to *consume*.

There is nothing about the notion of artificial economics that requires us to see artificial prosumption as a technological fix for the “problems” associated with existing economic systems—the idea is,

at root, a claim about the mechanistic realisation of economic phenomena (more on which below). It is, nevertheless, possible that artificial prosumption may operate in this sort of way, helping to liberate economic systems from the constraints imposed by human-based forms of production and consumption. Human prosumers, it should be clear, can only produce and consume so much, and they can only do so at a certain rate. This poses a potential threat to capitalism's expansionist ambitions, impeding its capacity to, in effect, reach for the stars (see below). Artificial prosumers may help to resolve this impasse. This is not just because artificial prosumers are apt to be better (e.g. more efficient) at prosumption than their human counterparts (although that may be the case); it is also because of the way that artificial prosumers are themselves produced. Human prosumers are born, not "made," and the conventional reproductive process is one that comes with an all-too-familiar set of temporal and economic costs, many of which are tied to our basic biological nature. Artificial prosumers, however, are not subject to these cost overheads. Just like K, artificial prosumers are products, and they can be replicated at will. This does not mean that there are no costs associated with the production of artificial prosumers; but such costs are presumably open to optimisation, including the forms of optimisation provided by advances in AI and robotics. As with other forms of manufacture, there is no reason why AI systems should not be "employed" to improve the efficiency of this particular productive process.

There is much here that is no doubt contentious, and I have to confess that, due to limitations in my own expertise, I am not in a position to evaluate the economic feasibility of the ideas on offer—that is a matter I am content to leave to others. My suspicion is that this is one case where issues of economic feasibility are tied to issues of technological feasibility. For the claim is not that artificial prosumers are working in some radically different way to conventional (i.e., human) prosumers. Rather, the claim is that artificial prosumers are performing more or less the same functional role as their human counterparts. Crucially, the introduction of artificial prosumers need not entail some radical shift in the functional profile of an economic system. A capitalist economy, for example, may still continue to function in more or less the same way as before, with the exception that it is perhaps better placed to serve as an engine of economic growth. All that the notion of artificial economics involves is a commitment to the idea that economic processes are

realised by a material fabric (a mechanism) whose constituent elements (e.g. humans) are subject to functional replication. The guiding vision is thus one of artificial prosumers working as the constituent elements of economic mechanisms in more or less the same manner as their biological (i.e., human) counterparts.

To my mind, then, the feasibility of artificial economics hinges on the extent to which the economically relevant functional properties of human prosumers (i.e., those properties that are relevant to the realisation of economic phenomena) can be instantiated by a materially distinct economic agent, namely, an AI system that functions as an artificial prosumer. This, however, is not a matter of *economic* feasibility, for no one (I assume) disputes the fact that existing forms of economic commerce are tied to the functional properties of human economic agents.³

Finally, it is worth remembering that the notion of artificial economics, as it is presented here, owes its existence to *Blade Runner 2049*. In other words, part of the credit for the ideas on offer have to be attributed to *Blade Runner 2049*. This, I suggest, reveals a new mode of operation for the cinematic medium when it comes to philosophical efforts. In attempting to characterise the philosophical significance of the cinematic medium, philosophers have identified a number of ways that films might be “capable of doing philosophy” (Wartenberg, 2009: 556). Perhaps the most popular of these “modes” is what we might call the *illustrative mode*. “A film that illustrates a philosophical theory,” Wartenberg (2009: 556) suggests, “can be doing philosophy in a similar way to a journal article: it can make the theory seem more plausible to its audience.” There is no doubt something right about this. But it is unclear whether this sort of idea really captures the nature of the relationship between *Blade Runner 2049* and the philosophical/economic claims canvassed above. There is, to be sure, a certain sense in which *Blade Runner 2049* might be said to illustrate the notion of artificial economics. Relative to the notion of artificial economics, however, there is no sense in which the movie could be said to illustrate an existing philosophical theory or even, perhaps, make such a theory “seem more plausible to its audience.” A better way of conceptualizing the philosophical significance of *Blade Runner 2049* (at least in regard to the notion of artificial economics) is to see it as operating in a creative or generative mode—as a source of new ideas and insights. When it comes to the notion of artificial economics, *Blade Runner 2049* is not so

much a resource that captures or embodies an existing idea as it is a resource that helps to limn the path to previously unexplored (or, at any rate, under-explored) regions of the philosophical (and, in this case, economic) terrain.

Owning the stars

The main beneficiary of economic relations in the *Blade Runner* universe is, of course, the industrialist, Niander Wallace. Wallace is a curious character. He is clearly depicted as some sort of being, but it is not obvious that he is any sort of being that we, as humans, can relate to. On the one hand, he is the saviour of humanity, using his mastery of synthetic farming to avert a humanitarian crisis. On the other hand, however, he shows a complete lack of humanity. His callous gutting of a female replicant suggests a complete lack of concern or empathy for his “children.” (Even Luv, a replicant, shows a distinct emotional response to Wallace’s sanguineous actions in this scene.) The upshot is a paradox: How can someone who is seemingly bereft of humanity also work in such a way as to sustain humanity? For the sake of convenience, let us refer to this as the *saviour paradox*.

The sense of mystery surrounding Wallace is only deepened by his empyrean half-monologues. It is clear that Wallace has some sort of agenda, but the logic of that agenda is highly questionable. Wallace seeks the child of Rachael and Deckard so that he can unlock the door to replicant reproduction. But why would Wallace, as someone whose business model depends on the fact that replicants are manufactured, wish to do this? The answer, it seems, is one that resonates with a capitalist ethos: *expansionism*.

WALLACE: We make angels ... in the service of civilization.

WALLACE: Yes, there were bad angels once. I make good angels now. That is how I took us to nine new worlds.

WALLACE: Nine. A child can count to nine on fingers. *We should own the stars* [emphasis added].

At this point, Wallace’s true nature starts to come into sharper focus. The key to understanding Wallace, I suggest, is not to view him merely as a particular kind of being, e.g. a posthuman god, a human, a replicant,

a cyborg, and so on. Instead of asking who or what Wallace is, we ought to ask ourselves what it is that Wallace represents. The answer to that question, I propose, is simple: Wallace is the onscreen personification of the values, precepts, and modes of operation that characterise contemporary forms of capitalist ideology. This is what I will call the *personification hypothesis*:

Personification hypothesis

We ought not to think of Niander Wallace as merely a particular kind of being (e.g. a cyborg). Rather, we ought to regard him as the personification of capitalism. This is the best way of making sense of what Wallace says and does.

This is, to be sure, a controversial claim, and its acceptability ought to hinge on more than the fact that Wallace's ambitions are compatible with an expansionist agenda. In what follows, I will attempt to highlight the value of the personification hypothesis with respect to our capacity to (1) resolve the aforementioned saviour paradox, (2) make sense of Wallace's utterances, and (3) better understand Wallace's interest in replicant birth. Before we go any further, however, it is worth taking a closer look at Wallace's expansionist rhetoric. In particular, note the specific nature of Wallace's aspirations in the above quotation. Wallace's vision is not one of humanity embarking on a voyage of discovery. Instead, Wallace's view is refracted through the prism of capitalism. For him, the goal is simple: it all comes down to *ownership* ("We should own the stars"). Crucially, Wallace's vision is one in which every aspect of the natural world, including the stars above, are conceived of as a form of private property. No one, I suspect, looks up at the night sky and sees the elements of the firmament as a fitting target for capitalist expansion. But if the spirit of capitalism were to be incarnated as a flesh and blood being on the surface of the Earth, isn't that precisely the way it would regard the heavens?

The saviour paradox is easily resolved by the personification hypothesis. According to the personification hypothesis, we ought not to think of Wallace merely as a particular kind of being; instead, we ought to think of Wallace as something akin to a dispassionate, self-interested machine that works only in its own interests. As the personification of capitalism, Wallace is the purveyor of all manner of technological fixes, and some of

those fixes (e.g. synthetic farming) appear to benefit humanity. But the value of a technological fix, at least from the standpoint of capitalism, does not inhere in its humanitarian potential; instead, it is deployed so as to sustain its own operation. This is, in fact, the only form of “sustainability” that capitalism cares about. Capitalism does not care about the sustainability of natural resources, issues of biodiversity, pollution control, or even the fate of humanity itself. It is simply a system of beliefs and values that seeks to ensure its own survival. Capitalism is, to be sure, a prodigious source of technological innovations, and perhaps it is ideally placed, as an economic system, to deliver such innovations. For the most part, however, the “merits” of such innovations are judged according to capitalism’s own internal logic. If some form of technological fix fails to yield a profit, then it is deemed “economically unviable,” which is to say it is untenable relative to the constraints imposed by capitalism’s economic framework.

All of this, I suggest, informs our understanding of Wallace. Inasmuch as we see Wallace as the emblem of capitalism, there is nothing paradoxical about him. Wallace operates in the manner of a dispassionate machine. He is apt to countenance any technological fix, providing such a fix does not destabilise his hegemonic grip on the global economic order. Wallace is, in short, a reminder of the various vices and virtues that are inherent to capitalism, including its capacity to turn an ecological crisis into an economic opportunity.

Next, let us turn our attention to Wallace’s utterances. Much of what Wallace says in the movie is, to my mind at least, perplexing. In his confrontation with Deckard, for example, Wallace refers to Deckard as a “wonder” (“You are a wonder to me, Mr. Deckard.”). He also contemplates the possibility that Deckard may have been designed to fall in love with Rachael, which, if true, would appear to confirm Deckard’s status as a replicant:

WALLACE: Is it the same ... now, as then ... the moment you met her? All these years you looked back on that day ... drunk on the memory of its perfection. How shiny her lips. How instant your connection. Did it never occur to you that’s why you were summoned in the first place? Designed to do nothing short of fall for her right then and there. All to make that single perfect specimen. That is, if you were designed.

As with much of what Wallace has to say in his confrontation with Deckard, this particular exchange is apt to be the source of some confusion. How could Wallace not know whether or not Deckard is a replicant? Can't he just cut him open and check for a serial number? This, recall, was how Rachael's replicant status was confirmed by her skeletal remains. Interpreted as a sign of epistemic uncertainty, Wallace's musings appear to make little sense.

But Wallace's dialogue makes much more sense, I think, if we examine it from the standpoint of the personification hypothesis. Why is Deckard a source of wonder for Wallace? Because Deckard epitomises everything that is at odds with capitalism. Deckard has sacrificed his own interests for the sake of someone else's (i.e., his daughter's). And what did such sacrifice entail? Wallace has the answer:

WALLACE: It was very clever to keep yourself empty of information ... and all it cost you was everything [emphasis added].

As the onscreen embodiment of capitalism's heart and soul, it is no surprise that Deckard would be a source of wonder for Wallace. Deckard is a man who, in the manner of the nineteenth-century transcendentalist, Henry David Thoreau, has retreated to the "wilderness." Deckard spends his time looking after bees—one of the last vestiges of the natural world. He dreams of cheese, but his wishes and wants go unfulfilled. Deckard is a man whose life is characterised by restraint and self-denial, as opposed to self-indulgence and the pursuit of profit (although temperance is evidently not one of Deckard's virtues!). Given all this, is it any wonder that Deckard should be a source of wonder for Wallace?

The personification hypothesis also helps us understand why Wallace is preoccupied with the nature of Deckard's desire, that is, whether or not Deckard was designed to fall in love with Rachael. The key insight here centres on the relationship between capitalism and consumerism—in particular, the way in which capitalism is sometimes seen to shape consumer demand. Take, for example, K's status as an artificial prosumer. K was manufactured by Wallace Corporation, and he is thus a product of Wallace Corporation. But K is also a customer of Wallace Corporation—he purchases the hologram, Joi, who is also manufactured by Wallace Corporation. At this point, it seems appropriate to raise an issue that we failed to consider in the earlier discussion of artificial prosumption: "Why

does K purchase Joi?" That is an easy one, I hear you say: "K purchases Joi because he was lonely, and we know that Joi is a solution for this particular problem; Joi tells us that herself!" (see below). This answer is undoubtedly correct, but it risks missing an important point. This can be illustrated by asking a follow-up question: "Why didn't Wallace simply design K in such a way that he would be immune to loneliness?" Clearly, this a much more difficult question to answer. Perhaps an immunity to loneliness is not something that lies within the scope of Wallace's expertise. That is one possibility, I suppose. But there is a second possibility: Perhaps K was specifically engineered in such a way that he would feel loneliness and thus be inclined to spend his disposable income on Joi. Similarly, perhaps Joi was designed in such a way as to solicit the purchase of gifts from her owner (emanators and the like) and purchase gifts (replicant prostitutes?) in return. The claim is, of course, tenuous, since we are given no concrete evidence in the movie to suggest that K was designed in such a way as to desire Wallace's commercial offerings. Nevertheless, the claim is broadly consistent with the idea that Wallace serves as the personification of capitalism. In particular, the claim dovetails with an oft-mentioned critique of capitalism that centres on its capacity to shape, support, and sustain consumerist tendencies. As consumers, of course, our economic behaviour is dictated by our desires. But what is the basis of those desires? Is it possible that our desires are, in some sense, "programmed" into us by the economic systems in which we live—that we are, in effect, socially engineered consumers whose "needs," wants, and wishes have been carefully shaped to serve the interests of an economic system that is upheld by the mutually supportive pillars of consumption, craving, and (last, but certainly not least) credit?!

It is, to be sure, an ingenious trick. Inasmuch as Wallace has some control over the emotional propensities of his replicant creations, he could have designed K in such a way as to not feel a need for romantic love. That would have made a lot of sense, given K's role as a cold-blooded killer of rogue replicants. But why respect the logic of optimal design, when a carefully crafted "flaw" promises to create (or, more plausibly, widen) a gap in the market? From this perspective, Wallace's preoccupation with the nature of Deckard's desire makes perfect sense. Wallace is not, in fact, concerned with Deckard's status as a replicant; he is more concerned with the cultivation of desire—the way in which capitalist economies till the psychosocial terrain so as to inculcate the

needs, wants, and wishes that are the motivational mainstay of economic profligacy.

What, finally, of the issue of replicant birth? Wallace is clearly driven to unlock the secret of replicant reproduction, but it is far from clear that Wallace has anything to gain by discovering this secret. Given his mastery of synthetic farming, it is likely that Wallace's business interests extend to more than just the manufacture of replicant models. But why would Wallace be prepared to cede control over the means of (replicant) production for the sake of expanding the replicant population? There are two reasons why this makes no sense, at least from an economic standpoint:

- (1) First, if replicants can reproduce, then Wallace is no longer in a position to profit from the sale of replicants.
- (2) Second, inasmuch as replicant reproduction blurs the distinction between humans and replicants, this undermines the extent to which replicants can be regarded as slaves. As stated by Freysa, "I knew that baby meant we are more than just slaves. If a baby can come from one of us ... we are our own masters."

As the head of a corporation that trades in replicant slaves, neither of these outcomes is particularly favourable for Wallace, and it is thus unclear why he would support the possibility of replicant birth. From the standpoint of the personification hypothesis, however, Wallace's ambitions make perfect sense. From an economic standpoint, replicant birth is simply a means of reducing the costs associated with the manufacture of a commercial product. This deals with the first of the issues mentioned above: Replicant birth is not a problem for Wallace, for it amounts to little more than a form of outsourcing—a way of reducing the costs associated with a given productive (or, in this case, reproductive) process.

What about the second issue—the issue relating to the distinction between humans and replicants? For humans, the sterility of replicants is important, for it helps to preserve the distinction between humans and replicants, and it thereby enables the latter to be treated as slaves. The apparent "impossibility" of replicant birth is thus one of the foundation stones for a "wall" that, according to Lt. Joshi, separates replicants from humankind:

- LT. JOSHI: That's not possible.
 LT. JOSHI: She was a Replicant. Pregnant.
 LT. JOSHI: The world is built on a wall. It separates kind. Tell either side there's no wall, you bought a war. Or a slaughter. So, what you saw ... didn't happen.

The question to ask here is why Joshi's wall would be of any interest to Wallace (at least, from the standpoint of the personification hypothesis). This is, after all, a world where both humans and replicants appear to be in the service of capitalism. Crucially, Joshi's wall is not a wall that separates the human *free* from the replicant *slave*; it is merely a line drawn between two forms of economic subjugation. Replicant rebellion undoubtedly poses a threat to Wallace as the head of a major corporation. But as the cinematic embodiment of capitalism, it is far from clear that Wallace has anything to lose if replicants should be indistinguishable from humans. For this is not a world where either humans or replicants are free; it is, instead, a world where capital is king.

Touching the void

Wallace's power is sustained, at least in part, by the deployment of technological fixes. One such fix is synthetic farming. We learn that Wallace's mastery of synthetic farming helped to avert famine following the collapse of ecosystems in the 2020s. Synthetic farming is thus an example of an environmentally oriented technological fix: a fix that is intended to deal with a problem that afflicts the wider biotic environment of humanity.

Environmental fixes, however, are not the only sort of technological fix we see in *Blade Runner 2049*. It is possible that another kind of fix comes in the form of K's hologrammatic companion, Joi. In contrast to synthetic farming, I suggest Joi functions as a technological fix for problems of the social kind. She is, as such, a socially oriented technological fix. Despite the fact that Joi addresses a problem of a somewhat different kind than does synthetic farming, she is nevertheless indicative of a form of ecological collapse. In particular, Joi reminds us that the human ecological niche is one that straddles multiple kinds of ecosystems. Joi is, in short, a reminder that something has gone very wrong with society several decades into the twenty-first century—that the decay and degradation

of the wider biotic environment is echoed by a similar deterioration in the structure of social relationships.

If Joi is a technological fix, then what sort of problem is she supposed to solve? Undoubtedly, given her state of undress in a number of advertising hoardings, there is a sexual component to Joi's functionality. This, however, is unlikely to be the only sort of "fix" she provides for her consumer base, since she is clearly capable of functioning in a more romantic manner, and sexual gratification is evidently not the basis of her relationship with K. In any case, her hologrammatic status precludes the possibility of physical contact, and this looks to be a particular disadvantage given the more substantive forms of carnal indulgence on offer at Bibi's bar. At the very least, the availability of replicant prostitutes raises a question about Joi's market competitiveness: sexual titillation is hardly a unique selling point for Joi, and I very much doubt it is the most alluring aspect of her service portfolio.

Joi's true purpose, I suggest, is revealed once we direct our attention to K. His problem is one of loneliness, social isolation, and a lack of intimacy, and this is precisely the sort of problem that Joi is intended to solve. In essence, I propose that Joi is a technological fix for an all-too-familiar feature of the human condition—one that undoubtedly stems from our status as social animals: she is a fix for the problem of loneliness, or, more generically, the problems of social connection and interpersonal attachment.

There can be little doubt that social connection is important to K, for it serves as one of the recurring elements of his baseline test:

INTERVIEWER: What's it like to hold the hand of someone you love? Interlinked.

K: Interlinked.

INTERVIEWER: Did they teach you how to feel finger to finger? Interlinked.

K: Interlinked.

INTERVIEWER: Do you long for having your heart interlinked? Interlinked.

K: Interlinked.

Social connection also serves as one of the major thematic elements of *Blade Runner 2049*. When it comes to the matter of replicant birth, for

example, what seems to matter most is not the fact that replicant birth represents some sort of technological breakthrough; rather, it is the fact that birth typically entails a default form of social connectivity—that, as a result of being born, one typically gets to enjoy some form of emotionally significant connection with another social being:

JOI: I always knew you were special. Maybe this is how. A child. Of woman born. Pushed into the world. Wanted. Loved.

Finally, consider that Joi, herself, comments on her ability to tackle the problem of loneliness. Towards the end of the movie, K confronts one of Joi's large, pink, hologrammatic adverts. Note how this particular version of Joi (Pink Joi) advertises her wares:

PINK JOI: Hello, handsome.

PINK JOI: What a day, hmm? You look lonely. *I can fix that* [emphasis added].

There are a number of reasons why Joi's status as a technological fix is important. First, Joi illuminates the adaptive capabilities of capitalism—the ability of capitalism to sustain itself even in the face of impending bio- and socio-ecological doom. It does so, not by addressing the cause of some problem, because that risks drawing attention to its own role in perpetrating whatever problems need to be fixed. Instead, capitalism does something quite remarkable: it transforms a crisis into a profit-making exercise, yielding fixes that provide new opportunities for capital accumulation. Joi is an example of precisely this sort of fix.

A second point of interest concerns Joi's status as a virtual slave. Joi is an intelligent agent who was manufactured to service the romantic, social, and sexual interests of those who purchase her. She is, in this sense, no different than a replicant pleasure model, such as Pris in the original *Blade Runner* movie. If replicants are slaves, courtesy of the fact that they are born to serve, then why should we regard Joi any differently?

Finally, Joi's status as a socially oriented technological fix resonates with our current interest in resolving social problems via technological means. Of particular interest is Joi's apparent capacity to resolve problems of social connection. Loneliness is widely recognised as a problem for contemporary societies, and the advent of new communications

technology (e.g. the Internet) seems to have done little to address this (see Turkle, 2011). In this respect, Joi serves as an example of the sort of fix that might be required to tackle the problem of social connection and curtail its social, psychological, and physiological sequelae (see Cacioppo & Patrick, 2008). Despite her fictional status, Joi arguably epitomises the ambitions of a number of increasingly prominent lines of research, including those associated with the development of artificial companions (e.g. Wilks, 2010), virtual romantic partners (e.g. Pettman, 2009), and, of course, sex robots (e.g. Levy, 2009).

As a means of bringing these various points together, let us consider the extent to which Joi qualifies as a benign technological fix, by which I mean a technological fix that causes little in the way of further problems. This issue is important, for technological fixes are seldom seen as a panacea for humanity's problems. More often than not, a technological solution to a problem creates a series of further problems that then require a further set of fixes. In the worst case, a technological fix can yield problems that are sufficiently severe as to pose an existential threat to humanity. Let us refer to these technological fixes as malign fixes. A malign technological fix is thus one that raises the spectre of an existential threat, while a benign technological fix does not.

So, what kind of fix is Joi? Relative to the way she is presented in *Blade Runner 2049*, there are a number of reasons to think that Joi is a relatively benign form of technological fix. For a start, Joi is one of the few characters in the movie who shows no sign of violence or malice. K, for example, kills Sapper Morton; Freysa, the leader of the replicant rebellion, instructs K to kill Deckard; Lt. Joshi orders K to kill the offspring of Rachael; Luv kills Lt. Joshi and Coco; and Niander Wallace brutally dispenses with a newly created (and thus entirely innocent) female replicant. Even Deckard shows something of a violent streak, as he relentlessly bludgeons K in a casino bar. Joi is different. Her primary concern is K's well-being, and we see no evidence of any sort of malign intent.

Joi's virtuality is also relevant to her benignant status. As a hologram, Joi is incapable of interacting with physical objects, and it is thus unclear to what extent she could pose a physical threat to others. In this respect, Joi is unlike the forms of AI that are the typical sources of our existential angst. She is, to be sure, a form of AI, but she is unlike the forms of AI that we see depicted in movies such as *The Terminator* (James Cameron,

1984), *The Matrix* (The Wachowski Brothers, 1999), and *Ex Machina* (Alex Garland, 2015). Perhaps, then, this is one case where technological virtuality goes hand in hand with humanitarian virtue. Courtesy of her hologrammatic status, Joi has limited abilities to effect changes in her physical environment, and this undermines the extent to which she could be seen to pose any sort of threat to humanity.

We thus have a number of reasons to think that Joi ought to be located in the category of benign technological fixes. That doesn't mean there are no negative consequences to her introduction, but it seems relatively clear that she poses little in the way of an existential threat to humanity. She is, to be sure, nothing like the forms of AI that both reflect and feed our fears about the existential impact of Matrix-style supercomputers and Terminator-like killing machines.

Threats, however, are curious things. Just like AI systems, they come in all manner of shapes and sizes. Joi appears both beautiful and benign. But let us not forget that even the most powerful of beasts can be slain by beauty, and, all too often, innocuity is the faithful servant of insidiousness. In fact, the rough outline of a more general worry about artificial companions is evident in the nature of K's relationship with Joi. Whatever else we might think about this relationship, such as whether Joi's love counts as authentic, or whether Joi herself ought to count as "real," it is clear that K is emotionally attached to her. Joi is real for K, even if others (e.g. Mariette) doubt her status as a "real girl."

It is here that we begin to confront a worry raised by Joi (and her technological ilk). For note that while intimacy appears important to K, there are a number of times in the movie where K appears to shun the advances made by other female characters. These include the advances made by Luv (in the memory vault), Mariette (outside Bibi's bar), and Lt. Joshi (in his own apartment). Admittedly, these may not be the sort of advances that K is looking for—the advances by Lt. Joshi and Mariette are of an overtly sexual nature, and the one by Luv is, to say the least, cumbersome. Nevertheless, the fact remains that K declines the opportunity to be "physically" interlinked, and he does so presumably because of his existing emotional connection to Joi. In the context of the movie, of course, K's fidelity (which, in an economic sense, amounts to a form of customer loyalty) is of little consequence; presumably K is an infertile replicant, so he was never going to be the father of lots of little "k's." In the real world, however, K's devotion raises the spectre of a fertility

problem: In a world where artificial companions make perfect partners, why should we assume that humans will continue to participate in biologically basic forms of reproduction? Given the availability of romantic companions who are (to paraphrase Joi's advertising slogan) "whoever we want them to be," is there any reason to think that we won't end up like K: emotionally smitten, yet reproductively sterile?

The fertility problem is seldom at the forefront of debates about the ethical implications of AI technology. To my mind, however, the existential risk posed by Joi-like artificial companions is no less real. It may be that the path to artificial companions is littered by a greater number of technological obstacles than that associated with, let's say, the implementation of a Skynet-like supercomputer. But perhaps it is also the case that it is easier (or at least more enjoyable) to be loved out of existence than it is to succumb to a war of attrition.

Joi is thus a potent reminder of the problems associated with technological fixes. She reflects humanity's prodigious capacity for technological innovation and, in that sense, she is a cause for optimism. At the same time, however, Joi is a cause for despair, reminding us that even the most brilliant and seemingly benign of (socio-) ecological interventions can, on occasion, sow the seeds of our own destruction.

Perhaps, however, I am being overly pessimistic. Before we consign ourselves to the conclusion that all roads lead to wrack and ruin, it is worth noting that some of the philosophical issues raised by Joi hint at a potential solution to the fertility problem. To help us appreciate this solution, it is worth asking ourselves what it is that underwrites Joi's effectiveness as a technological fix. The answer to that question, I suggest, is not so much that she is a form of *artificial* intelligence as it is that she is a form of *advanced* intelligence. The thing that makes Joi *real* for K is thus the nature of her behavioural responses—that she is behaviourally (and thus, perhaps, psychologically) isomorphic to a "real girl." At this point, however, a philosophical (and, more specifically, an ethical) tension starts to emerge. The thing that makes Joi an effective technological fix for loneliness (among other things) is the nature of her intelligence—the fact that she is so advanced as to be the sort of being that a typical human might be inclined to fall in love with. But aren't these precisely the sort of features that make us wonder about the status of Joi as a virtual person (or virtual human)? In the same way that *Blade Runner* encourages us to reflect on issues of personhood and

thus question the moral legitimacy of replicant enslavement, so *Blade Runner 2049* encourages us to ask more or less the same questions about artificial (in this case, hologrammatic) companions. And, if we accept the idea that Joi counts as a virtual person, then she is surely entitled to some form of moral recognition. If so, then why should we condemn her to a life of romantic/sexual servitude? If we find the notion of replicant slavery morally repugnant, then shouldn't our moral sensibilities be similarly inflamed by the prospect of artificial companions? Do these two cases not count as a form of slavery, and is there a reason why one form of slavery is more acceptable than the other?

It is here that we begin to see the approximate shape of a philosophical argument that is intended to counter the existential threat posed by the fertility problem. Artificial companions are a threat inasmuch as they provide an alternative to conventional human-to-human relationships. But beyond a certain level of behavioural and cognitive sophistication, issues of moral standing start to come to the fore. The result is that technological progress in this area is likely to be self-limiting: We want our artificial companions to be real, but perhaps not so real as to raise concerns about their status as artificial persons and thus romantic/sexual slaves. The prophylactic efficacy of this philosophical fix to the fertility problem no doubt turns on the extent to which the criterial determinants of personhood can themselves be resolved. It is also possible, I suppose, that humanity will simply opt to ignore the ethical issues. Or perhaps the means by which something is produced (born vs. made) will be seen as the ultimate arbiter of moral entitlement. Perhaps, for example, issues of natality will be used to revivify the Aristotelian notion of a natural slave, with liberty reserved only for those who are pushed (as opposed to pulled) into the world. If so, then perhaps being loved out of existence is not the worst fate that might befall humanity. It is, perhaps, no more than we deserve: a perfectly appropriate (and suitably ironic) form of artificial justice.

Notes

- 1 As noted by Timothy Shanahan (personal communication), it is relatively easy to see how K qualifies as the provider of an economic service, but it is much harder to see how he qualifies as the producer of an economic good. This is relevant to K's ostensible status as an artificial prosumer, since the

term “prosumption” is an amalgam of “production” and “consumption (as opposed to “provision” and “consumption”). Perhaps, then, K ought not to be regarded as a prosumer on the grounds that he fails to produce anything in the way of a tangible economic good, and he thus fails to qualify as an economic producer. There is, no doubt, much that could be said about this issue. In the interests of brevity, however, I suggest that an agent’s status as a provider or producer has no bearing on their status as a prosumer. In essence, I suggest that all forms of economic activity (i.e., activity that generates an income) ought to be regarded as productive, in the sense that such activities produce something of economic value. This applies as much to the work of, let’s say, a dentist (who provides a service) as it does to the work of a dental technician (who manufactures a dental prosthetic). Clearly, the dentist and the dental technician are involved in the production of different things, but is there any reason to regard the labour of the dentist as any less productive than the labour of the dental technician? True, dental technicians produce a tangible good as a result of their labour (e.g. a denture), while the dentist provides something that more closely resembles a service (e.g. the restoration of dental functionality). But does this mean that the dental technician is involved in productive labour, while the dentist is not? Similarly, is it only the dental technician who ought to be regarded as an economic producer? To my mind, both the dentist and the dental technician qualify as economic producers, and they do so because they are both involved in some form of productive labour. What it means to be an economic producer, I suggest, is to be an agent who produces something as a result of some form of activity. Whether that activity culminates in something tangible (or intangible) is of no material consequence to an agent’s status as an economic producer and, thus, their candidacy as an economic prosumer.

- 2 We could, of course, dispute the idea that replicants ought to be characterised as a form of AI. Given that replicants are described as “bioengineered humans,” it might be thought that their intelligence is no more artificial (or, perhaps, no less natural) than is the intelligence of conventional human beings. I am grateful to Timothy Shanahan for raising this particular issue.
- 3 This way of defending the notion of artificial economics provides a clue as to its philosophical pedigree. In short, artificial economics appeals to concepts that are spread across a number of fields of philosophical enquiry. This includes work relating to functionalism (Polger, 2009), multiple realisability (Aizawa & Gillett, 2009), and mechanistic realisation (e.g. Wilson & Craver, 2007). The defence is also one that appeals to the role of economic mechanisms in realizing economic phenomena (e.g. economic processes). This speaks to a growing interest in the philosophical study of mechanisms (Glennan, 2017), including economic mechanisms (Marchionni, 2018).

References

- Aizawa, K., & Gillett, C. (2009). The (Multiple) Realization of Psychological and Other Properties in the Sciences. *Mind & Language* 24(2), 181–208.
- Cacioppo, J. T., & Patrick, W. (2008). *Loneliness: Human Nature and the Need for Social Connection*. New York: W.W. Norton.
- Glennan, S. (2017). *The New Mechanical Philosophy*. Oxford: Oxford University Press.
- Levy, D. (2009). *Love and Sex with Robots: The Evolution of Human–Robot Relationships*. New York: HarperCollins.
- Marchionni, C. (2018). Mechanisms in Economics. In S. Glennan & P. M. Illari (Eds.), *The Routledge Handbook of Mechanisms and Mechanical Philosophy* (pp. 423–434). New York: Routledge.
- Pettman, D. (2009). Love in the Time of Tamagotchi. *Theory, Culture & Society* 26(2–3), 189–208.
- Polger, T. W. (2009). Computational Functionalism. In J. Symons & P. Calvo (Eds.), *The Routledge Companion to Philosophy of Psychology* (pp. 148–163). New York: Routledge.
- Ritzer, G., Dean, P., & Jurgenson, N. (2012). The Coming of Age of the Prosumer. *American Behavioral Scientist* 56(4), 379–398.
- Turkle, S. (2011). *Alone Together: Why We Expect More from Technology and Less from Each Other*. New York: Basic Books.
- Wartenberg, T. E. (2009). Film as Philosophy. In P. Livingstone & C. Plantinga (Eds.), *The Routledge Companion to Philosophy and Film* (pp. 549–559). Abingdon, UK: Routledge.
- Wilks, Y. (Ed.). (2010). *Close Engagements with Artificial Companions: Key Social, Psychological, Ethical and Design Issues*. Amsterdam: John Benjamins Publishing Company.
- Wilson, R. A., & Craver, C. F. (2007). Realization: Metaphysical and Scientific Perspectives. In P. Thagard (Ed.), *Philosophy of Psychology and Cognitive Science* (pp. 81–104). Oxford: North-Holland.