



On Hostile and Oppressive Affective Technologies

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Abstract

4E approaches to affective technology tend to focus on how ‘users’ manage their situated affectivity, analogously to how they help themselves cognitively through epistemic actions or using artefacts and scaffolding. Here I focus on cases where the function of affective technology is to exploit or manipulate the agent engaging with it. My opening example is the cigarette, where technological refinements have harmfully transformed the affective process of consuming nicotine. I proceed to develop case studies of two very different but also harmful affective technologies. Casinos and electronic gambling machines deploy computationally intensive scaffolding to shape the onset and continuation of gambling episodes. High-heeled shoes affectively engineer wearers’ relationships to their own embodied capacities and are predominantly expected to be worn by women. I conclude with a discussion of the need for study of affective technology to focus other-directed applications, some of which will serve competing or antagonistic interests.

Keywords Affectivity · Technology · Hostility · Oppression

1 Introduction

More than four and a half trillion cigarettes have been consumed annually for over a decade (Reitsma et al. 2021; Dai et al. 2022). In the nineteenth century cigarettes were a low prestige product accounting for a tiny fraction of the revenues of companies processing and selling tobacco products. Usage grew spectacularly with improvement in mass production and has dominated tobacco consumption and corporate revenues since at least the 1930s (Brandt 2007). Most cigarette consumption is by regular smokers, who each get through an average of around a thousand a year. We know that nicotine occurs naturally, is addictive, and that some of the expansion in consumption is attributable to aggressive and innovative marketing, media manipulation and programmes of misinformation. Over the same period the properties of cigarettes themselves, and the processes of their manufacture, were modified and refined. Modern mass-produced cigarettes have high effective nicotine content, and, at least within brands, are utterly uniform, predictable

and repeatable. Most modern cigarettes won’t go out if left to sit, unlike pipes or cigars. They require less skill and time to light and use than pipes or cigars. Cigarette smoke is subjectively cooler, smoother and tastes sweeter and less unpleasant than plain tobacco. Cigarettes, uniformly packed with homogeneously cut tobacco in treated papers, also provide faster and finer control over inhaled nicotine than other delivery systems.

Ross makes an important general point about humans and addiction. Elephants and baboons get drunk when they find low-toxicity sources of alcohol, such as fermented fruit, but he notes that they “are at no risk of addiction [...] because they cannot cultivate sources of low-toxicity alcohol. Their parties are windfalls, the frequency of which they cannot influence” (Ross 2020, p. 6). Technological innovation, he argues, has enabled humans to ‘engineer addictive environments’, including by processing and stockpiling alcohol, nicotine, and other substances, and by constructing places, including bars and casinos, that facilitate addiction by allowing freer scheduling of consumption. The features of cigarettes reviewed above reduce barriers between the stockpiles (initially of raw tobacco) and efficient consumption of nicotine. They also engineer the consumer’s affective relationship to smoking. Specific, often patented, research and development work, along with occasional chance discoveries, explain the features noted in the previous

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paragraph and include increasing the amount of nicotine by selective breeding and genetic engineering, controlling the curing process and adding substances to the tobacco, paper and filters that amplify nicotine release, maintain smooth combustion, and modify flavour. Some of these transformations were attended with *increased* health harms (Rabinoff et al. 2007).

We should, I suggest, view the cigarette as a candidate for the most successful affective technology ever. This claim has two moving parts, and I'll start with affect. There are competing theories of affect, a broad and heterogeneous category, which we don't need to decide between here. While some of the theories make evaluation or motivation the key feature of emotion or affect, most others allow that they are *relevant* to how appraisal and selection operate (e.g. Kenny 1963 holding that emotions are evaluations, Arnold 1960 where appraisal leads to either attraction or aversion, Prinz 2004 for whom emotions are evaluative perceptions, Goldie 2002 who regarded them as evaluative feelings, or Scarantino 2014 who argues emotions are causes of action). The individual with an affective life has a contextual and embodied sensitivity to the costs and benefits of how things are and what options are available. I'll use 'affective' here inclusively to include emotions, moods and feelings both sustained and episodic. By focusing on *motivational* and *evaluative* states, I don't mean to exclude other approaches. Some motivational states are, furthermore, amenable to theorising as relatively cognitive, for example when desire is understood as a state representing a goal as valuable or good. Others are more paradigmatically affective, such as the pain that warns (or commands) against making some movements. I don't need to, and won't, insist that all motivational states are equally affective, merely that the affective broadly understood should include the motivational and evaluative.

I intend the reference to affect being embodied in the preceding paragraph seriously. Kukla has shown how it is useful to think about embodied readiness in terms of *stances*. In an engagement with Dennett's thinking about interpretive stances (e.g. Dennett 1987) they have argued that we should view stances "not as merely intellectual attitudes, but rather as collections of concrete strategies for coping with objects and coordinating with others". They go on to say that these "strategies will be embodied; we should take seriously the idea that a stance is, first and foremost, a way of holding your body and readying it for action and worldly engagement" (Kukla 2018, p. 4). Kukla writes from their own experience as a boxer, and in later work has developed the idea further in relation to the embodied demands of operating in various kinds of urban spaces (Kukla 2021). There they write that a stance will "shape what features of the world can be salient to us and how we can and cannot engage with it" (2021,

p. 30).¹ In Kukla's sense a stance incorporates a profile of available capabilities and a distribution of confidence and caution over various forms of action, based on learned sense of risk and opportunity.

Returning to cigarettes, and the second moving part (technology), the facts that the handling costs and skill demands have been made so low, the effect so dependable, nicotine levels so high, self-dosing so rapidly and finely controllable, and the immediate aversive effects so reduced, are not remotely accidental. They shape the evaluative situation, making one option distinctively reliable and quickly and easily accessible, so transforming a naturally occurring plant into a stunningly efficient vehicle of addiction. Smokers repeatedly access cigarettes to reliably achieve physiological and psychological states and perceive the effects as reliable, suggesting that they play the 'trust' role Colombetti and Krueger (2015) adopt from Sterelny (2010) to distinguish scaffolding – which makes some substantial contribution to our affective lives – from the mere environment, to which we might emotionally react. Trust, they say "refers to the agent's perception of the reliability of a certain environmental resource and of the agent's access to it" (2015, p. 1160). Lavalley (2023) has observed, although not specifically mentioning nicotine, that drugs in general are "particularly effective and flexible scaffolds", and cigarettes clearly meet Piredda's criterion of an affective artifact as something "with the capacity to alter the affective condition of the agent" (2020, p. 550).

Nobody is likely to deny that cigarettes are a technology, and a product of technology, but it will still be useful to say how I'm using the term. I'll follow Dusek in understanding technology as "the application of scientific or other knowledge to practical tasks by ordered systems that involve people and organizations, productive skills, living things, and machines" (Dusek 2006, p. 35). This is an inclusive approach that doesn't restrict technology to tools or hardware. That said, for reasons of space and because it is where the technological rubber meets the affective road, I'll focus primarily on the interaction between the *products* of technology and their human users or consumers. Technology in this sense can include artefacts, tools, niches and scaffolding. Pieces of technology have functions which are their intended or preferred effects. Heersmink (2021) distinguishes "proper" or intended functions from "improvised" ones such as using a butter knife as a screw-driver. I'll focus here on proper functions of technology, which I'll understand as explaining the effortful maintenance or retention of features of a product, even if found by luck. In the case of

¹ Kukla is fully aware that adopting some stances takes skill or practice and that what stances others accept or accommodate can be sensitive to the type of body attempting it, and how that body is radicalised, gendered, and otherwise positioned.

cigarettes, for example, flue-curing of tobacco with piped hot air was initially introduced to manage the risks and losses (barn burning and destroyed product) of curing over flames. It turned out that flue-curing of ‘bright’ tobacco variants made less alkaline, milder smoke that could be drawn into the lungs, where nicotine is more rapidly absorbed than in the mouth. “Nicotine addiction” says Brandt, “was born in the serendipitous marriage of bright tobacco and flue-curing” (2007: 24). The dominance of flue-curing despite its accidental discovery has the same proper function as the cigarettes the cured tobacco goes into: facilitating addiction. Putting things together, I’ll count as an ‘affective technology’ any technology that has an affective (proper) function.

The cigarette may be a surprising example of an affective technology because most illustrations of affective artefacts and scaffolding are straightforwardly beneficial to their ‘users’ who are able to occasion, access or sustain preferred moods or states in interaction with them (Colombetti and Krueger 2015; Piredda 2020; Koole and Veensra 2015). I don’t deny the beneficial cases or their significance, but I’ve opened by considering cigarettes to make the point that affective technology doesn’t always serve the interests of users, and that doing so isn’t always its *function*. Smokers’ *overall* interests are clearly not served by their habit, even if some of their (manipulated) desires are satisfied.

Arguments that cognition or affect can be extended, embodied, and so forth usually focus on the positive contribution external factors can make. Some commentators have regarded this as the expression of a dogma or presupposition of some kind. Aagaard (2020), for example, has alleged that thinking about 4E cognition involves a ‘dogma of harmony’ in which “all entities are presumed to cooperate and collaborate” (Aagaard 2020, p. 165), whereas Slaby (2016) has criticised the dominance of what he calls the ‘user/resource model’ where work on situated affectivity presuppose a user with well-defined goals, for whom situated factors provide a resource. Slaby speculates that the popularity of this scheme might explain “why proponents of situated approaches have by and large failed to acknowledge the potentially troublesome political issues that the situatedness perspective might make visible” (Slaby 2016, p. 5).

In contrast various recent researchers have been documenting exceptions to the optimistic tendency, and marking out the space of harmful, manipulative, exploitative and oppressive forms that situated, extended and embodied cognition can take. Besides Aagaard (2020) and Slaby (2016), both mentioned above, notable recent work here includes Liao & Huebner’s account of ‘Oppressive Things’ (2021), Krueger’s (2021) account of how some public spaces are selectively distressing and challenging for people with Autistic Spectrum Disorder, Lavalley’s (2023) account of how factors such as precarity, stress and poverty contribute

to vulnerability to addiction, Coninx’s (2023) treatment of how niche-construction can sometimes be maladaptive, especially with reference to health, and Glackin et al. (2021) argument for ‘psychiatric externalism’ about addiction.

This paper is in effect a manifesto for more work that begins by recognising that the function of technology, including affective ones, can be to harm, exploit, oppress or manipulate. I proceed by developing accounts of two highly contrasting technologies both of which aren’t for the benefit of those whose affective lives are most directly influenced by them. One is a computationally intensive digital technology in electronic gambling machines and casino management systems, that manipulate the motivational states of users in order to prolong their gambling episodes. The other is the superficially less sophisticated worn technology of the high-heeled shoe, that contributes to the oppression of many of those expected to wear them by constraining their embodied expression. In these cases, as with the cigarette, the affective functions serve the interests of other parties. This is a complication compared to standard accounts of function, which refer only to the object and its user. But expanding the picture to include other agents, whether customer, employee, friend, member of a social group, or corporation is one requirement of setting aside the user/resource model.

2 Scaffolding Gambling Addiction

Like the cigarette, the slot machine was originally a low-status and peripheral part of casino operations. Gambling machines became progressively more sophisticated and, as with advances in cigarette design and manufacture, they came to form the dominant source of casino revenue, reflected in a much larger number of machines being allocated the majority of casino floor space (Schüll 2012, pp. 4–6). With this, machine gambling addiction came to account for the majority cases of gambling addiction where it was available, with quicker onset than for other forms of gaming (Schüll 2012, pp. 14–21, 118; Breen and Zimmerman 2002). The machines, often supported by carefully curated casino environments, are highly effective at attracting human players and retaining their engagement for extended sessions. I argue here that contemporary gambling technology depends to a significant extent on engineering players’ affective states in ways that function to undermine their interests.

First, consider how gambling technology engineers affective states of people already in casinos. Potential players have to choose whether to gamble and if so where. Once playing they must choose when to stop. They may do this by recalling and acting on a prior decision about a budget limit in time or money, or by ongoing appraisal of how they

are feeling and of the attractiveness of alternatives to further gambling. It is these non-gambling interests, involving other allocations of their time and money, that are at stake in choosing whether to start and when to stop gambling.

One way these evaluations are engineered is through ambience and design, making transitions into dedicated gambling spaces imperceptible and difficult to avoid, exit routes obscure, and offering varied locations that vividly invite playing to players of different dispositions. Guided by detailed research, casinos manage light, temperature, sound, and odour around and within games to increase commencement rates, conceal the passage of time, and prolong gambling episodes (Schüll 2012, pp. 46–48). Casinos collect and analyse data about what machines are used by what kinds of people at what times and adjust the layout of the floor and the timing of other events in the casino in order to increase returns. Schüll describes a case where a casino floor analytics system detected a pattern of “female patrons under thirty years of age [...] moving from one side of a popular bank of slot machines to the other (or leaving altogether)” and being replaced by fewer men older than fifty. The analysis found that this was due to the men exiting a revue performance, and helped guide a redesign that prevented the disruption and improved revenue (Schüll 2012, pp. 149–151). These interventions engineer embodied appraisal and evaluation. When transition into gambling locations is imperceptible, neither appraisal nor evaluation may be cued until the portfolio of options is dominated by gambling, and routes away from play are obscure or uncertain. The design of gambling machines is similarly focused on physical comfort, and managing lighting, sound, colour and display as well as ergonomics to encourage and enable extended, uninterrupted play.

Once play has commenced an arsenal of technology is deployed to delay its end. Older gambling machines had to be fed cash or tokens, and running out of either was an obligatory interruption and so an opportunity for appraisal of whether to get more money or stop gambling. A key area of innovation in gambling provision has been removing impediments to accessing more money, partly by making cash obsolete. Cash-based play enabled players to engage in epistemic (Kirsh and Maglio 1994) or other self-management actions like entering the venue carrying only as much as they were willing to lose. Running out of notes and coins could then reliably cue recalling prior thinking about acceptable losses, perhaps leading to the end of play, or at least requiring leaving, and a delay, before further play. Since the late 1990s, where permitted, and sometimes when linked to ‘loyalty schemes’ casino kiosks combine ATM functionality with tools to bypass daily withdrawal limits, draw on multiple accounts, and increase or exceed credit limits. Cashless play with credits weakens the connection between play and

other personal budgetary allocations and allows casinos to deliver bonuses and virtual wins in the form of non-cashable credits. Some jurisdictions allow terminals that access bank cards to be mounted *on the slot machines themselves* (Schüll 2012, p. 72). Food and drink can be ordered from some machines and delivered to players, removing further sources of interruptions that might turn into the end of a session. Live sporting events can be displayed on supplementary screens, so that they are no longer mutually exclusive of further machine play. These interventions transform opportunity costs so that otherwise competing activities can be pursued in parallel, and hence further engineer the process of evaluation.²

Colombetti and Krueger (2015) recognise that gambling machines cultivate a kind of entrenchment, impacting on the corporal schema of players. Drawing on Schüll (2012) they note that the machines “induce an extreme state of absorption and isolation from the world and other people—commonly referred to by gamblers as ‘the zone’—in which the boundaries between subject and machine become blurred” (2015, p. 1165). The considerations reviewed above are part of the explanation for this: they reduce awareness of the passage of time and remove external sources of interruption and delays, including to accessing more money. Players can achieve disembodied absorption partly *because* casinos and machine designers work so hard in accommodating their bodies. But a larger contribution is made by how the flow of play itself is engineered. Anything slowing down the rate of play, including the old mechanical handles, has been replaced with faster, electronic controls. Many machines have adaptive displays and animations that adjust to the detected preference of an individual player for pace of play. High speed play is, furthermore, a recurring preference among addicted gamblers, and a common feature of descriptions of ‘the zone’.

Beyond engineering speed, the machines deliver seductive schedules of small wins, or losses disguised as wins, including wins in non-cashable credits, obscuring ongoing losses in real money. They present misleadingly frequent and motivating ‘near miss’ outcomes encouraging further play (Clark et al. 2009). Casinos also gather data on every moment of play and its outcomes, as well as player history, deploying sophisticated analytics to estimate upcoming quitting points and pre-empt them with rewards delivered directly to the machine. Casino management software promises to link together any harvestable information about

² Although I’m focusing on gambling in casinos here, it should be clear why online gambling on mobile devices that already have banking functionality is attracting so much industry attention. In some cases, mobile gambling is directly linked to casino play (Schüll 2012, p. 163). Flayelle et al. note how online gambling, especially sports betting, involve ‘round-the-clock availability’ and connect this ‘hyper-accessibility’ to increased gambling related harms (2023, p. 139).

players (linking what the casinos already have to social media and other sources) to tailor in-game rewards and experiences by linking bonuses to player history and the course of play, as well external world events including stock prices, the weather and the unfolding of live sports. As one company puts it, casinos “can optimize the gaming experience by changing the credit meter balance on any game, for any reason, at any time”, including to “send rewards in the midst of a losing streak to ensure long-term brand loyalty” all in service of the goal to “optimize each player experience for maximum profitability” (Acres Manufacturing, undated a). The bonuses and interactions can also be delivered to the mobile phones of gamblers, which “empowers casinos to influence players wherever they go” (Acres Manufacturing, undated b).

By these means potential players’ evaluations or appraisals of whether to start playing, and current players’ evaluation of whether to continue are managed and manipulated at many timescales. Schüll names one of her chapters after an exhortation from a representative of a gambling machine developer to think of what they do as “engineering experiences” (Schüll 2015: 53). These interventions are highly effective, which is why machine gambling now dominates casino floors and revenues. It is also why machine gambling addiction became the dominant form of gambling addiction wherever it was legal, though now being rivalled by on-line gambling (Binde 2011).

Consider, second, how this affective manipulation undermines the interests of players, which do not reliably coincide with those of the house. Casinos take pains to emphasise that gambling is a voluntary recreational activity, and to present themselves as part of a wider entertainment industry with venues including restaurants, theatres and cinemas. Some fraction of their customers doubtless finds the odds offered an acceptable price for an enjoyable activity. We can allow that such customers aren’t being harmed but are rather being provided with experiences they are happy to buy. But regular gamblers, including those with gambling problems, account for the majority of machine gambling revenue (Schüll 2015, p. 320, note 59). And almost every player has some budget limit in time or money or will eventually reach a point where further play has an opportunity cost in foregone or compromised activities including their work and relationships. Casinos gain at the expense of players when players go past their budget points and gamble more often and for longer than they should or can afford to. The *function* of the affective technology is to facilitate exactly this outcome, which is the business model of casinos.

One way to think about this affective engineering is in terms of Colombetti and Krueger’s useful remarks on affective scaffolding (2015). They argue that it is valuable to focus on three dimensions of affective scaffolding: trust,

individualisation and entrenchment.³ Trust depends on the agent’s sense of the reliability with which the external resource will have some effect. Individualisation is a relationship of adaptation as a result of which the agent-environment dynamics become less generic. And entrenchment, mentioned above, is a kind of embedding or dependence that can arise from prolonged trust and individualisation. Electronic gambling machines, especially when coupled to casino management systems, can exhibit all those features. Although the machines are generic in some senses, their arrangement in casino space is precisely aimed at providing a variety of locations so that any given customer will have a good chance of finding a machine situated in a way they find inviting. Once play starts, informed by casino analytics, subsequent experience (the rate of play, what external events drive the bonusing system, etc.) is highly individualised. Noting the challenge of “keeping players fulfilled and happy, even when Lady Luck isn’t in their corner” the same manufacturer quoted earlier claims to “leave a player feeling like the casino is reading their mind - in a good way.” (Acres Manufacturing, undated a)

That players can become so entrenched in machine gambling play, and trust the machines and their environments, is *prima facie* puzzling given that these technologies are so manipulative and exploitative. Both Sterelny (2010) and Colombetti and Krueger understand trust as involving “perception of the reliability of a certain environmental resource and the agent’s access to it” (Colombetti and Krueger 2015, p. 1160). Trusting an affective technology is not, as with cognitive ones, a matter of truth or accuracy, but of reliably occasioning, supporting or sustaining an affective state that an agent wants. (Regular smokers trust cigarettes in *that* sense.) Such objectives could come apart from, or conflict with other goals, and if the motivation to be in a state, such as what regular gamblers call ‘the zone’, is strong enough, lead to those other goals being compromised or sacrificed.⁴ The makers of gambling technology sometimes refer explicitly to managing trust. Schüll quotes a game designer talking about how players “need to be made to feel that they can trust” the hidden mathematical model, and that the “*machine needs to communicate that trust through its delivery of rewards*” (2012, p. 109, emphasis in

³ They don’t claim that this list is exhaustive, and there are other taxonomies aiming to be more comprehensive.

⁴ In the gambling case, as with the cigarette, the subject engaging with the technology is already faced with a intertemporal choice, trading off satisfaction now against future symptoms (cigarettes) or absorption now against future fatigue and financial losses (gambling). This is too big a topic to do more than gesture at here. That said, I doubt that all harmful affective technologies will share this feature (my next example doesn’t). Rather it is more likely that intertemporally tricky choice domains present opportunities for manipulators. Fasoli (2021) is a useful discussion of digital overuse.

original). The patent for the technology of virtual reel mapping, which displays misleadingly favourable odds by having fewer numbers of visible stops on slot machines than are relevant to play outcome, motivated the invention by saying that accurate looking machines with many stops “decreases the player acceptance of the gaming apparatus” and that “player’s attitude is quite important in marketability of the slot machines” (Telnaes 1984, p. 8).

A useful way to think of this collection of affective technologies is in terms of Sterelny’s notion of *hostility* (Sterelny 2003). He argues that the evolution of cognition will to a significant extent have been driven by the informational environments of living things being polluted by other living things variously camouflaged, impersonating or otherwise exploiting by how they appear and behave. In his sense, hostility refers to changes in the informational environment that made the world a less reliable guide to how to behave, in ways that served the interests of the agents making the changes. Timms and Spurrett (2023) develop this line of thinking into account of *hostile scaffolding*, which is external structure that scaffolds one agent in ways that harm its own interests and serve the interests of another agent who has a role in making or modifying the scaffolding. They develop a cognitively focused account of some of the same gambling technology reviewed above from an affective perspective. The casino and wider gaming industry benefit from the environments that scaffold casino visitors and players into gambling more and for longer than they should. Note that this use of the term ‘hostile’ doesn’t require intent to harm, and so is different from the way the term is standardly used in studies of emotion (e.g. Silva 2021 on whether anger is hostile).

The harms of gambling technology are not exhausted by their hostility. As noted, Lavalée (2023) argues for an externalist account of addiction, that recognises drugs as affective scaffolding. The argument applies to gambling technology too, but Lavalée’s emphasis is partly on how the affective scaffolding provided by drugs may be distinctively valuable to people who live precarious or stressed lives (including ones characterised by trauma) and who are poor or lacking in social resources. Lavalée consequently argues that treatment should not exclude attention to ‘psycho-socioeconomic conditions’. The factors contributing to vulnerability and possibly obstructing treatment to which Lavalée refers go beyond the hostile (casinos don’t cause all of the precarity and previous distress that makes some people vulnerable, any more than drug-dealers do), and so would be better understood in terms of injustice or oppression.

3 Oppressive Shoes

The oldest wearable technology is probably clothing, including slings, pouches and cords that transform the hands-free carrying capacity of the body.⁵ Despite this, discussion of wearable technology tends to focus on computational gadgets attached to the body, such as activity trackers, biometric monitors and other contraptions that get called ‘smart’ in their advertisements. This carries over into discussion of wearable technology from 4E and related perspectives, which are generally silent about clothing. So, for example, neither the 2021 edition of the *Stanford Encyclopedia of Philosophy* entry on ‘Embodied Cognition’ (Shapiro & Spaulding 2021), nor Tony Chemero’s *Radical Embodied Cognitive Science* (2009) mention clothing or wearing. Clark’s *Natural Born Cyborgs* (2003) mentions clothes, but mostly as something we could put technology (like sensors) into, rather than as a cognitively significant technology itself. (Though see Viola 2022 on sunglasses, and Colombetti and Krueger 2015 on handbags.) Here I focus on shoes, and specifically high-heeled shoes. The fact that such shoes are computationally inert, and lacking moving parts, doesn’t mean that they aren’t instances of sophisticated design. I will argue that they are a technology of embodied activity that is in some respects harmful, and significantly affective.

High-heeled shoes aren’t simple or unambiguous. They weren’t initially part of European women’s fashion but were adopted by aristocratic men in imitation in of shoes worn by cavalry soldiers, later becoming popular among both high-status men and women (DeMello 2009, p. 158f). Keeping feet in stirrups is useful for horseback riders and raised heels help. Equestrian shoes weren’t *intended* for sustained walking even though they could serve as an impractical status display. Physical height is often associated with rank and can have pragmatic benefits regarding what is visible or reachable, or how social interaction happens. Rigaud’s iconic 1701 portrait of the relatively short Louis XIV depicts the king wearing raised red heels. It is only in the twentieth century that high heels, first popularised in nineteenth century pornographic images, and in mid twentieth century pinup art and photography, became firmly associated with women’s fashion. Precisely because of their impracticality they can signal status and indifference to manual work, as well as confer sexualised attractiveness in some social and professional settings, subject to prevailing beauty norms. Widdows observes on this point that irrespective of a wearer’s motives for wearing high heels, they cannot “change the fact that heels are sexualising and carry a sexual message” (2018, p. 177) going on to quote Etcoff saying that high heels make women “throw back their shoulders and

⁵ The only plausible competitor to this claim is bodily adornment.

arch their backs, making their breast look bigger, their stomachs flatter, and their buttocks more rounded and thrust out” (1999, p. 195). None of what follows depends on denying that wearing high heels can confer benefits, including making a positive contribution to how the wearer feels about themselves.

For decades there has been strong and selective pressure for women to wear high heels in various contexts. Sometimes it is a condition of employment or participation, while in others it required to conform or be sartorially legible. Chambers notes, for example, how high heels are compulsory in the ‘figure’ sections of women’s body-building contests (2022: Chap. 1). Fashion magazines provide frequent advice and advertorial content relating to high heels (e.g. Bennett 2022). There is also a long history of feminist criticism of some gendered clothing norms, including high heels. In what follows I’ll examine high heels as a kind of wearable technology, showing how an embodied perspective on cognition and affect can accommodate some of these feminist insights. I’ll focus on some of the embodied effects of high heels given that a person is wearing them, rather than saying any more about the varied motivations they might have to do so.⁶ And I will argue that whatever else they might do, high heels transform movement, appearance and experience of women in *patriarchy congruent* ways, and that they achieve this to a large extent by being an affective technology.

Partly because high heels are implicated in many injuries and health complaints, there is ample medical and biokinetic evidence on their effects. Wearers are less balanced, take smaller and slower steps, have less efficient gait and braking, and have inhibited upper body movement. Human anatomy is adapted for a ‘toe-off, heel-strike’ gait, which high heels inhibit. The shoes literally and directly transform the embodied stances available to and convenient for those wearing them. The ways high-heeled shoes distort posture, prevent securely grounding the heel, and the fact that they have smaller, and usually smooth, areas contacting the ground are contributors to several of these effects. Wearers also suffer pain, injuries, and other kinds of physical damage especially after prolonged use. The pains and damage extend beyond the feet because transformed forces there influence joint position and loading all the way up to the neck (Barnish and Barnish 2016; Cowley et al. 2009; Cronin et al. 2012; Cronin 2014; Ebbeling et al. 1994; Weidemeijer and Otten 2018). Expert evidence on these effects, understood as bearing on occupational health and safety,

sometimes motivates bans on mandatory heels in workplaces (e.g. WorkSafeBC Evidence-Based Practice Group and Martin 2017).

Although regular regular wearers can become practiced and accomplished at moving in high heels, they do not recover the efficiency or comfort of flat shoe wearers, and pay a learning burden not falling on flat shoe wearers. Some iconic representations of physical efficacy wearing high heels are, furthermore, fabricated. The high-heeled platform shoes in the ‘Wonder Woman’ movie were added by CGI in post-production, after the actress, Gal Gadot, had been filmed performing in decorated sneakers (Donnelly 2017). Similarly in the fight scene in ‘No Time to Die,’ where Ana de Armas appears to deliver effective high and flying kicks while wearing high heels, “[d]igital limbs and stilettos were used to replace padding and trainers” (Charlie Noble, visual effects supervisor for the movie, quoted in Hogg 2021).

By saying that some of the changes brought about by high heels are ‘patriarchy congruent’, I mean that the slower moving, less balanced, less physically capable and less physically efficient subject they help shape is consistent with patriarchal stereotypes of the greater physical strength and competence of men, and also of the entitlement of men to hold expansive stances and move assertively, while women are expected to comport themselves modestly and with restraint. Feminists have drawn attention to this repeatedly: Dworkin, for example, notes an analogy between the function of high heels and the practice of footbinding, which she says “*did not emphasize the differences between men and women – it created them*” (1974: 103, emphasis in original). Even if we think there are some average differences to start with, including in physical strength and its relative distribution in the body, high-heeled shoes specifically inhibit and limit balance and embodied agency. The shoes make some stances, including any requiring grounded heels, unavailable, and some ways of moving less accessible or more risky, and shape embodied readiness in — given the norms about who wears them — highly gendered ways. These changes can be aggravated by other fashion norms. As Widdows puts it “[t]ight clothing and high heels, literally make us vulnerable. Unable to stride, stomp, or run away, we totter” (2018, p. 245, see also 177, 232). Even avowed shoe fetishist William Rossi is clear that the “high heel makes no practical sense whatever. It has no functional or utilitarian value. It’s an unnatural fixture on a shoe. It makes standing and walking precarious and tiring. It’s a safety hazard. It’s blamed for a host of pedic and bodily ills” (1989, p. 119).

This patriarchy-congruent difference-creating technology is, furthermore, largely *affective* in its operation. That is not to say, I emphasise, that it is *exclusively* affective. High-heeled shoes would compromise a bipedal walking robot with suitably human-like anatomy, degrees of freedom, and

⁶ Spurrett & Brancazio (2023) consider high-heeled shoes, skirts and pockets as ‘affordance transforming technologies’. My treatment here draws on that analysis, but does not make use of the Gibsonian or ecological framework.

a toe-off, heel-strike gait. My point here is rather than these mechanical features have significantly affective consequences. The most obvious route through the aversive experiences of pain, accidents and injuries. Again, Dworkin is a useful guide. She included high heels along with other tools and practices forming a “technology of beauty” (Dworkin 1974, p. 114) that functioned both to transform appearance and to hurt and discipline. These, she said, “describe in precise terms the relationship that an individual will have to her own body. They prescribe her mobility, spontaneity, posture, gait, the uses to which she can put her body. *They define precisely the dimensions of her physical freedom.*” (Dworkin 1974, p.113, emphasis in original.) Experienced pain and injury, or near injury are in turn sources of fear of future pain and damage, and further motivate avoiding risky movements. They collectively drive a learned transformation in the levels of confidence associated with taking large or quick steps and making expansive movements.

It will help to distinguish two different claims about high heels and affect here, in order to think about the shoes’ *function*. One is that the effects are changes in embodied agency, and that the pain, fear, etc., are – along with the non-affective biomechanical effects – means to that end. Dworkin and Widdows both make that claim. Another claim, compatible with the first, and clearly made by Dworkin is that the suffering *itself* is an end to which the shoes are a means. Here, I’m focusing on the first claim. Clinical and other evidence tells us a great deal about what high-heeled shoes do to embodied agency, and available stances. Feminists maintain that these very transformations are patriarchy congruent, and that expecting or requiring women to wear high-heeled shoes has a patriarchal function. And I’m arguing that part of how the shoes do this is by being a kind of affective technology. The affective consequences are both means and end. Feeling unsteady in heels is aversive (means) and promotes taking smaller steps, leading to more restrained movement (end). If we count as an affective technology anything where affect is a means, we might end up with the category being very large. This is, of course, a special case of something arising for claims about scaffolding, extended cognition, and extended minds. One response is to impose additional criteria such as regular and reliable access (which high-heeled shoes clearly satisfy). My point here is that if we restrict affective technology to cases where the end is affective, high-heeled shoes would still be included.

We can fill out our picture of the function of high heels by drawing on Colombetti and Krueger’s (2015) discussion of how relationships can scaffold affect. Drawing on Husserl and Merleau-Ponty, they note how people exhibit a “bodily-affective style” which is “their overall characteristic manner of comportment, including distinctive ways of speaking, gesturing, and moving” (2015, p. 1169). They go

on to note that these styles, similar to Kukla’s stances, are not fixed, and can be expressed in niche-specific ways. The high-heeled shoe is a technology that shapes bodily affective style. If we see it that way, we can accommodate the feminist claims that this is what the shoes are for, and that this is a patriarchal function. The bodily affective styles high heels encourage, involving slower, less efficient, less physically capable and more risky and painful embodied activity, are not *neutral*. And the styles they block or discourage are those to which men are presumed to be more entitled.

These ways of thinking about the effects of high-heeled shoes are compatible with, and potentially complementary to, phenomenological analyses like Young’s “Throwing Like a Girl” (1980). Young draws attention to an already documented tendency of girls, when throwing, to make less use of ‘lateral space’, which she generalises to a frequent “failure to make full use of the body’s spatial and lateral potentialities” (1980, p. 142). Among other factors Young identifies as contributing to this are a lack of *trust* by women in their own bodies (1980, p. 143) and greater fear of injury (1980, p. 144), but also crucially to a tendency for a woman to “experience her body as a *thing* at the same time that she experiences it as a capacity” (1980, p. 145) leading to inhibited embodied intentionality. “By repressing or withholding its own motile energy, feminine bodily existence frequently projects an ‘I can’ and an ‘I cannot’ with respect to the very same end” (1980, p. 147). The technology of high heels selectively amplifies precisely these effects, by generating an additional ‘I cannot’ for some stances and forms of action, in this case by means of the biomechanical and affectively mediated effects described above.

Young’s reflections help highlight something significant about trust here. As already noted earlier in this paper, Colombetti and Kruger (2015), in a move widely agreed in the literature, use ‘trust’ as a criterion to distinguish affective scaffolding from the mere environment. Trust here is generally glossed as a view about the *reliability* with which something occasions or sustains a desired affective state. As I’ve described them, high-heeled shoes are if anything a *trust reducing* technology, that undermines wearers’ confidence in their own embodied capability. I haven’t explicitly insisted that high-heeled shoes are scaffolding, but I *am* committed to them being a wearable affective technology of some kind. In a way, furthermore, they are exemplary candidates for being counted as a negative kind of scaffolding. Canonical examples of the idea of supports in the ‘zone of proximal development’ found in the work of Vygotsky and his contemporaries, which came to be called scaffolding, include the use of furniture as a transitional support for infants not yet able to walk unsupported. So, technologies shaping locomotion are among the paradigm examples of cognitive scaffolding. It looks as though something has to

give here: either we need to relax or qualify the thought that trust distinguishes scaffolding from the mere environment or accept that whatever kind of affective technology high-heeled shoes are, they aren't scaffolding.

One version of the first option might be to require more specificity about what is and isn't trusted, and what aspects of it are trusted to do what. The experienced machine gambler might trust the machines to help them get into 'the zone', indeed, to be the only thing that can. They needn't trust the machines to lead them to winning lots of money. Perhaps the wearers of high-heeled shoes, at least the experienced one, trust them to bring their social, aesthetic and other benefits, even as they trust their own embodied capacities less. They might even trust the shoes to hurt. If this doesn't feel entirely satisfying, I suggest that it is partly because Slaby is correct to complain that much thinking about extended cognitive and affective technology tends up assume what he calls a 'user/resource model' that presumes that technology serves the interest of an individual user with well-defined goals. If that is your starting point, it may seem as though the only key players in any discussion of an affective technology are the user, and the technological resource itself. If you also agree that trust is among the criteria useful for distinguishing scaffolding from the wider environment, then it will seem as though wearers of high-heeled shoes need to trust the shoes in a general way for the shoes to be a kind of scaffolding. To think clearly about harmful and exploitative cases, we need to consider actors besides the users and the products. I'll defer further discussion of this this issue, which cuts across high-heeled shoes, gambling technology and the cigarette, to the following and final section.

In case of high-heeled shoes, unlike that of gambling technology, note that it doesn't seem plausible to count the harms as instances of *hostility*. Scaffolding, or signalling, is hostile when one agent gains directly at the expense of another. The chains of harms and benefit, and the networks that maintain them are less direct with gendered clothing, and embedded in larger systems of injustice. The features of high-heeled shoes I have emphasised, I suggest, make them an example of an *oppressive* technology. Again, following Young, we can say that "in the most general sense, all oppressed people suffer some inhibition of their ability to develop and exercise their capacities and express their needs, thoughts, and feelings" (Young 1990: 40). Liao and Huebner quote Young on the way to developing an account of oppressive things that is useful here (2021). They say that a physical object can be oppressive when it is biased in the same direction as an existing oppressive system, causally embedded in it, where the causal connections are bidirectional. High-heeled shoes satisfy all three conditions, being selectively imposed on women, and having patriarchy congruent effects.

4 Scaffolding Mind Invasion

I referred above to Slaby's (2016) contention that thinking about situated affectivity tends to adopt a 'user/resource model' and so have its attention channelled away from 'problematic' cases. That thought provides my starting point here. Set affect aside for a moment, and consider an exemplary instance of distributed *cognition*, the 'epistemic action'. These are actions which have primarily cognitive functions, as distinct from 'pragmatic' actions which advance towards an already determined goal. Kirsh and Maglio introduce epistemic actions by saying that they are "used to change the world in order to simplify the problem-solving task" (1994, p. 513). Soon after that they gloss them as "physical actions that make mental computation easier, faster, or more reliable" and specify that they are "*external actions* that an agent performs to change his or her own computational state" (1994, pp. 513–514). While the first more compressed formulation is agnostic about whose cognitive demands are changed, the second specifies that actions are epistemic, and beneficially so, *for the agent performing them*. Kirsh and Maglio don't give a *reason* for insisting that an epistemic action can only be cognitively beneficial for the agent performing it. As far as I can tell the restriction has been adopted without comment.

There are, though, good reasons *not* to insist that epistemic actions are always self-directed. Paradigmatic examples of scaffolding, as noted above, include the interventions of a care-giver or an instructor while learning a task. Holding the hand of a toddler, for example, can scaffold their learning to walk unaided. More generally, the interventions of an instructor can — among other things — help organise the attention, and support the memory of the novice. I once had a fencing coach who would whack my lead knee with a foil when it was out of position. That helped me learn to get my stance right, which is to say that his actions had epistemic benefits to me. More generally, some actions by instructors beneficially transform the learning problem for others, and it makes sense to regard them as *other-directed* epistemic actions. We could, then, say that epistemic actions are external actions undertaken to change *someone's* cognitive state, leaving open whether they are self or other-directed.

This point is not restricted to cognition. Being hit across the knee with a foil was pretty *affective* too. And we already recognise the existence of other-directed affective actions, even if we don't call them that, such as actions of comforting and reassurance. We embrace an upset child or friend precisely to try to make them feel differently, by acting towards their body. The literature on situated affectivity already recognises this, by including other people among the range of environmental supports for our affective lives. Colombetti and Krueger, for example, suggest that the fact

that people smile much more rarely when alone “supports the view that smiles are not simply individual responses to a positively evaluated situation, but social signals aimed at having an effect on the audience” (2015:1067). We could put this by saying that smiling, like embracing, is an other-directed affective action. Walter and Stephan (2023) explicitly argue for the possibility of beneficial other-directed affective activity under the heading of ‘mind-shaping’ (in contrast both to Slaby’s ‘mind-invasion’ and the ‘user/resource model’).

The range of goals another agent might have are not *exhausted* by helping us either cognitively or affectively. Others might be enemies, competitors, or seeking to exploit us. Such agent’s other-directed actions might aim to compromise or misdirect cognition or affect for their gain. These malign actions, furthermore, need not be directed at us directly, but can instead focus on our affective scaffolding and artefacts. An angry child, for example, might hide the comfort blanket of a sibling, seeking thereby to prolong their later distress. As Slaby has argued, an exploitative employer might cultivate an affective workplace culture where fitting in might go “discernibly against” someone’s “prior orientations”. He proposes to call these episodes of ‘hacking’ cases of “mind invasion” when they are “in the long run detrimental to [the] personal flourishing” of those subjected to it (Slaby 2016, p. 2). Slaby’s focus is on affective modes of interaction in, and sustained by, institutions, especially corporate employers. The cigarette and high-heeled shoe show how harmful affective influence might operate independently of a ‘wraparound’ workplace culture, complementing Slaby’s thinking. The important general point I take from Slaby here is allowing that affective contexts and technology might serve the interests of agents other than those most directly affected. Seeing those relationships requires considering actors and interests other than the subject whose affective life is most directly scaffolded or situated. In closing, I return to each of my three case studies.

The cigarette is perhaps the purest case of a harmful affective technology that is wholly independent of affective culture, situation or location, and can ‘work’ almost anywhere. In the heyday of widespread smoking this was supported by manipulated images of *who* smoked, which was pretty much everyone adult, including Santa Claus as represented in advertisements, *where* they smoked, which was pretty much everywhere whether workplace, home or in public, and by widespread provision of smoking infrastructure like ashtrays in cars, trains, aeroplanes, restaurants and cinema seats, and cigarette lighters in cars. But the affective rubber met the road in the smoker’s reliable relationship to the cigarettes themselves, mediated by the affective engineering described above. Smoking is clearly “in the long run detrimental to [the] personal flourishing” of smokers,

and so as well as being hostile (in serving the interests of another) Slaby might be willing to count cigarettes as an affective technology of mind-invasion.

The high-heeled shoe is an intermediate case. On the one hand the shoes themselves share something of the situation-independence of cigarettes and are similarly reliant on learning and accommodation by the user. They will have their mechanical effects wherever they are worn. On the other, sustaining the norms and consequences of wearing them, or failing to wear them, in certain contexts is highly socially distributed, and sometimes institutionalised. When wearing them is required by a workplace dress-code, or a uniform, they could be a technological part of a system of affective ‘hacking’ just like Slaby describes. Whether high heeled shoes are “detrimental to flourishing” is potentially contentious. They are clearly medically harmful, but many rhapsodise about the shoes themselves, or the personal and interpersonal effects of wearing them. Some may sincerely feel that the benefits outweigh the costs or be correct that they overall come out ahead. I don’t, though, need to insist that high-heeled shoes are unambiguously bad *overall*. It is enough to point out that if you are persuaded that it is unjust that women are disproportionately expected to wear them, or for approval of women to be conditional on presenting as a members of “a sex of lesser accomplishment” (Dworkin 1974, p. 116), then high-heeled shoes can be understood as being, in part, an affective technology the effects of which are congruent with that injustice.

Machine gambling in casinos, finally, perhaps fits most closely with Slaby’s framework, and he makes passing reference to “commercial enterprises” including shopping malls and resorts that “generate consumption-friendly atmospheres” (2016, p. 2). The efforts of casinos include, but go far beyond engineering atmospheres, of course. Also, unlike employers they don’t seek to impose a uniform ‘house style’ on all participants, but rather — as explained above — to provide a variety of situations in which to gamble, to accommodate players from a range of demographics. The environment and the flow of interaction with the machines themselves are managed in detail and over many timescales to encourage the commencement of play, and to prolong it. In a workplace, mind invasion might seek to shape people to pursue a variety of goals, and to deploy a whole repertoire of skills. Casinos mostly want customers to do one thing for as long as possible. Schüll quotes an industry consultant saying that the “key is duration of play [...] I want to keep you there *as long as humanly possible*—that’s the whole trick, that’s what makes you lose,” and a designer saying that their work is “basically a matter of getting [customers] into the seat and keeping them there” (Schüll 2012, p. 58). The highly scaffolded regular gambler exemplifies mind invasion.

I don't claim to have exhausted, or even outlined, the *types* of harmful affective technology here. Hostility, where one agent gains at the expense of another (Timms & Spurrett 2023) is one important kind. Oppressive technologies, that are both produced by and contribute to injustice (Liao and Huebner 2021) are another. Unintended consequences of niche-construction activities that end up being maladaptive (Coninx 2023) is likely another, which needn't always be either hostile or oppressive. As noted in the introduction above, some harms are likely by-products of systems optimised for something else (e.g. Krueger 2021, Lavallee 2023). Given that I've not nearly exhausted the types, I cannot claim a representative survey of the examples. Rather, I've hoped to provide a striking mixture of more or less computationally intensive, more or less portable, more or less embodied, cases, thereby to gesture at the size of the space. As I said near the beginning, this paper is intended as a kind of manifesto and call for further work. Going forward, as we attempt to make sense of the variety of affective technologies, we shouldn't presume that technology is only 'for' users, or that users are the only agents who need to be in the picture. And some of our attention should go to filling out our catalogue of cases where users are harmed, and developing theory to organise what we find.

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