7 A Pill for Every Ill – Drugs and Supplements

Contemporary self-help practices in DIY biology are commercialized enterprises: At their core are the new class of experts of the soma – the lifestyle coaches, self-made hacker gurus and start-up companies – which have played a big role in constructing new digitalized "economies of vitality" around the self-directed optimization of the human body. Foundational for these strategies is not just the monetarization of information and access but also a very much material thing: Pills, supplements, powders, superfoods. Dave Asprey's *Bulletproof*, for example, sells signature supplements with such telling names as "Brain Octane," "NeuroMaster" ® or "Unfair Advantage" – names that already imply power, control and the famous 'edge' over the competition.[1] These pills and capsules are marketed as tools to help individuals reach optimum performance and increase their overall well-being. Supplements, however, are of course nothing new, but rather an old, consumer-friendly practice of self-treatment and self-optimization: daily regimes of vitamins, natural remedies and herbs are a natural part of day-to-day life for many Americans.[2] In this chapter, however, I want to move away from simple vitamin supplements towards applications like Lee's, who also thematizes the use of drugs and biochemical compounds to 'hack' the human body and brain. I will look at the possibilities to use drugs and supplements as DIY technologies: Drugs and supplements are probably some of the oldest forms of self-medication, but today can be seen as inhabiting an ambiguous position between treatment and enhancement while at the same time being wholly incorporated into the ideology of the patient-consumer.

1 What hides behind these names are extracts from the Arabica coffee fruit (NeuroMaster®) proclaimed to help memory and cognition; a medium chain triglyceride – a type of fatty acid – distilled from coconut oil (Brain Octane) said to improve gut and brain function; and a combination of Active PQQ™, Coenzyme Q10 and Brain Octane oil (Unfair Advantage) marketed as boosting mitochondrial efficiency to give you more energy (Bulletproof Executive).

2 A widely available but highly controversial supplement that has saturated the American TV market with its commercials in the past 10 years is *Prevagen*, advertised as boosting memory function and preventing memory loss associated with aging. In the past years, government authorities have started to proceed against the manufacturer for fraudulent and deceptive advertisement. The clinical evidence for Prevagen's safety and effectiveness that was presented and marketed by the manufacturer is inconclusive at best, cf. Maggie Fox.

Many researchers have come to the same conclusions: medications, pharmaceuticals, 'drugs' are omnipresent in contemporary American culture.[3] Some of them are readily available in the aisles of pharmacies and department stores whereas others have to be prescribed by a doctor and collected from a pharmacist. What both prescription and non-prescription drugs point to is a normalization of pharmaceutical interventions: Today, there is *a pill for every ill*. This impression is reinforced by the prevalence of direct-to-consumer advertising. The US is one of the few countries in which not just non-prescription drugs but also prescription drugs can be marketed directly to the consumer. Especially early psychopharmacological drugs like *Pacil*, *Xanax*, or *Prozac* were marketed aggressively to the public, with similar marketing campaigns for today's attention deficit hyperactivity disorder (ADHD) drugs *Ritalin* and *Adderall* in the 1960s and 70s. Controlled by the Federal Food and Drug Administration (FDA), these types of advertisements necessarily have to fulfill strict criteria. Nonetheless, they also represent a distinct form of public communication with and empowerment of individual patients to take control of their medical decision making. As such they take up and perpetuate the ideology of active patienthood and informed choice. Today, many doctors commonly find themselves confronted with patients who actively request a drug they have seen in an advertisement. While this has contributed to a reversal of power roles in the medical encounter, these advertisements cannot only have pronounced effects on the cultural perception of disease and treatment but also be misleading in their claims.

Pills, today, are not just used as treatments: More and more, every function of the human body we perceive to be somehow deficient can be alleviated with some form of a drug, so that also healthy bodies are subjected to pharmacological interventions to better conform to our desired lifestyles. Such *lifestyle drugs*, like the rebranding of the contraceptive pill in the 1990s, often occupy a space of ambivalence between their marketing and their medical value.[4] Psychopharmaceuticals are an example of this ambivalence, being marketed as forms of lifestyle drugs but also used to treat very much real conditions with a high degree of suffering. In the 1960s *Prozac*, a tranquilizer drug used to control anxiety, was sold as a drug that would help patients adjust to the new pace of American society: In descriptions of patients, *Prozac* became a positive force, a drug that allowed them to remake themselves and take on a new personality as a person without depression (Stevens 281-85). Psychopharmaceuticals, in such cases, are positioned as means to "become our true selves" – the drugs and chemicals themselves

3 Joseph Dumit's *Drugs for Life* (2012) and Emily Martin's "The Pharmaceutical Person" (2006) are good sources that also look at the omnipresence of drugs in American culture. A very timely example is the opioid crisis captivating the US at present: Since 1999, illegal and prescription opioids – prescription pain killers, heroin and synthetic opioids – have caused a high rate of abuse, addiction and overdose deaths in the US, so much so that in 2017 a national emergency was declared.

4 The pill, of course, was originally intended as an answer to a common medical need of women: to control their menstrual cycle and fertility. By doing so, it had widespread cultural effects. The drug, heavily marketed by the pharmaceutical industry, has given women more control over their biology, their family planning and thus their life, permitting greater sexual and social freedom (Stevens 280-81). But especially since the 1990s, the contraceptive pill has also been marketed as a 'fix' for more or less cosmetic problems: acne, menstrual bleeding, premenstrual syndrome (PMS), mood imbalances – essentially being turned into a lifestyle product, cf. Watkins.

becoming "part of our very identity" (Stevens 290). Here he takes up an argument made by Emily Martin in 2006: Even though discourses around drugs are often permeated by ambivalence and contradictory feelings, she argues, Americans are more and more becoming "pharmaceutical persons" that not just simply consume drugs in unprecedented numbers but also increasingly incorporate these drugs into their sense of self, their personality ("Pharmaceutical Person"). As people define their dis/abilities more and more in biochemical terms, also drugs become incorporated into their view of the self. In the US, Martin contextualizes, this trend is also facilitated by the cultural and social environment of free markets and little social security: In such a setting where individuals are responsible for their own success or failure, drugs and other forms of enhancing mental capacities can easily become necessary means to look after the self ("Pharmaceutical Person" 274). Often, the image is that a pill will make the consumer "a better person, an enhanced person or, more precisely, more like the person they really are" (Martin, "Pharmaceutical Person" 275-76). This is enabled also by commercial narratives of psychopharmaceutical drugs which often propagate the restoration of the (former) self through drugs: What is sold to the patient is a dream of control, of modulating your biochemistry to feel like yourself again and get your life back (Rose, *Politics of Life* 214; 100-01). Psychopharmaceuticals can thus also be regarded as a "technique of the self," a means to change and shape the self according to one's own ideal (M. Butler, "Spiel" 88). Through their framing as lifestyle products, drugs to enhance or control normal parts of human biology have become an ordinary part of everyday life. As such, Stevens argues, drugs are not just treatments but biotechnologies that play an important role in "determining who we are, what we want, and how we live" (290). They have effects on how we negotiate the capabilities of the human body and its plasticity and are imbricated in how societies valorize the interests of society versus individual freedoms to optimize. Pills have become a means to change who we are as humans, with material, social, and cultural effects.

Drugs are products of society and culture as well as science and technology, and as such are implicated in definitions of disease, commercialization, bodily control, and the re/designing of life: in terms of disease, they help define what is normal and disordered and thus help create the disease they treat; as products they are part of the consumer market for the sick and the healthy; they give us a powerful tool with which to manipulate and control the body and biological functions according to ideals of physical plasticity; and the ability to use them to control our bodies according to our desires means we can also use them to redesign our lives, to choose a lifestyle and actualize it through the use of drugs (Stevens 286-90). But they also are implicated in questions of access, distribution and justice: On local and global levels, access to drugs often is differentially distributed in and between societies and nations with severe consequences for the health and life chances of individuals. Drugs thus are more than their material form. They help shape culture and our notion of the self, with implications not just for the individual but also on a collective level. What we should never forget is that drugs are *not* just lifestyle enhancers and molecular playthings: They can also be lifesavers, needed and necessary treatments, whose availability can be highly restricted.

The case studies under consideration here look at drugs and pharmaceuticals in the context of DIY biology and medicine in different ways: Case Study III examines the rise

of stimulant use by healthy individuals to reach personal goals through the lens of a 2018 *Netflix* original documentary, *Take Your Pills*. Case Study IV contrasts this commercialized form of DIY with a more political, maker-based approach in its consideration of the *EpiPencil* (2016) hack by the *Four Thieves Vinegar* collective. This juxtaposition shows two different modes that DIY is taking with regard to drugs: first, consumer decisions to take drugs to modulate their life and bodily performance according to their liking and second, a creative intervention (or DIY solution) to make drugs cheaper and available for everyone, to raise awareness about rising costs and socioeconomic barriers of access. Indeed, my analysis has revealed agency and access as overlapping preoccupations: Who is allowed to use what types of drugs for which purposes? Whose use is culturally sanctioned and whose is not? Who can afford drugs and when is access hindered? These questions, also in the case studies under consideration here, are to a certain degree of course intersecting with considerations of class: in the third case study a certain level of income is needed for this type of drug use, in the fourth case study some people are excluded for economic reasons. The former can lead to new forms of stratification, while the latter could provide answers not to the questions posed by the former but to medical segregation, globally and in insurance markets like the US.

Case Study III: Take Your Pills, Become Limitless – The Stimulant 'Epidemic'

The drug "Soma" in Aldous Huxley's *Brave New World* (1932) is probably one of the most cited examples that demonstrates, in literature, the fascination humans have with pharmaceutical modulations of the body. In Huxley's dystopian imaginary, Soma is used to calm, sedate and distract the population from the flawed system they live in. Such dystopian examples stand in marked contrast to seemingly utopian, contemporary fantasies of the 'brain pill,' that has been part of the cultural imagination, not least since the blockbuster *Limitless* (2011).[5] Such elusive brain pills typically allow the user to utilize their mind 'to its full potential.' It is a form of instant and easy optimization, whose incorporation into the cultural imaginary reflects both current biological possibilities and cultural trends of performance, efficiency, and optimization. In reality, of course, until today no such magical brain pill exists. But the culturally entrenched human fascination with brain modulation has led to 'real world' applications of biotechnology in the use of nootropic, meaning cognitive function improving, substances and the widespread ab/use of stimulants used to treat medical conditions such as ADHD, most famously *Ritalin* and *Adderall* – "the drug of our time" (1:23:39), as Dr. Wendy Brown puts it in *Netflix*' documentary *Take Your Pills* (Klayman).[6]

5 In Burger's film, the use of a new nootropic drug turns the protagonist from an unsuccessful writer into the complete opposite: a successful investor and broker. The drug, it is claimed, allows him to use the full potential of his brain and turns him into a perfectly functioning capitalist. This movie is one of the best-known examples of nootropic drugs in science fiction and certainly has spurred on the fantasy of brain enhancement.

6 The title for the documentary is inspired by one of the cases it portrays: Jasper, a college student who was diagnosed with ADHD in third grade and has since then been "on" Adderall, is using his ambivalent, critical relationship with the drug as input for his art. He has started to use the phrase "take your pills" in many of his art works, inspired by the many times his mother asked him whether

Directed by Alison Klayman and released in 2018, this documentary details the use and abuse of stimulants like *Adderall* and *Ritalin* on college campuses and in the work force. *Take Your Pills* shines a light on the rise in stimulant consumption in the US: It looks at these pharmaceuticals from the perspective of those diagnosed and those ab/using the drug with or without a prescription. But is also manages to set the current uses into context both by including historical perspectives on the manufacturing, marketing and prescription of the drugs in the past and by including contemporary DIY alternatives such as nootropics and micro-dosing. Underscoring this multifaceted view, the documentary is not told by a narrator but by individual people – experts in the field, researchers, current and former users – and cultural representations, such as clippings from newspaper articles, books, or old advertisements.[7] College students, people in the work force – especially the technology industry and finance world – but also competitive athletes are chosen as exemplary users. From children to adults, students to high professionals, it is emphasized, the widespread use of stimulants is common. Throughout this amalgamation of voices, the documentary tries to balance positive and negative ones – different 'truths' are allowed to be heard. *Take Your Pills* demonstrates not just the historical continuity of self-enhancement techniques but also underscores the biosocial community in which it takes place, putting emphasis on the social and cultural reasons behind currents trends to hack the self. Self-optimization – also through use of pharmaceuticals – is portrayed as a (perceived) requirement to remain competitive, while distinctions between treatments and enhancements are further blurred and interventions normalized.

In the documentary, pills have clearly become a lifestyle product: They are used to maintain or achieve a desired lifestyle. This is emphasized already at the very beginning. In one of the first frames, the viewer is introduced to the topic with yellow writing on a black background: "Word hard, play hard" (02:32). This phrase has often been connected to new forms of work especially in the tech industry. The perfect motto for a competitive and hedonistic culture, it shows how the lifestyle these drugs make possible is culturally sanctioned, even required. Their use, thus, is in line with the demands of a competitive market place, a fast paced, image-based culture and society. This social context is also reflected in the overall aesthetics of the documentary: game-like motion-graphics reminiscent of Pac-Man (here a skull eating pills) illustrate the competitive nature; shaky, blurry and colorful images in rapid sequences highlight the speed of contemporary life and give the documentary a pop-art-like, almost psychedelic aesthetic. Visually *Take Your Pills* serves as a perfect illustration of the increasing, everyday use of pharmaceuticals in the US. Pills, in the documentary, are everywhere: motion graphics of mountains

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or not he had taken his pills. Taken over as the title for the documentary, "take your pills" retains some of this critical stance but combines it with a culturally-entrenched appeal – take your pills and all will be well.

7 The documentary also makes use of a lot of pop-cultural references including *The Simpsons* ("Brother's Little Helper," 1999), *Charlie Bartlett* (2007), *The Bling Ring* (2013), and *Silicon Valley* (2014-current). Also *Limitless* is referenced in *Take Your Pills* as the first example that brought cognitive enhancement widespread social recognition (Klayman). Already the references chosen for the documentary show how the hyper-availability of Adderall in the US has long made it into the cultural imaginary as a (comic) point of reference.

of pills, pills dropping through the frame, pills as players in popular computer games are used to visualize what interviewees are describing, inserting the pill into the documentary both as material object and iconic representation.

Pills, the documentary makes clear, are today *incorporated*, literally, into the sense of self. Some of the users discuss the repercussions their consumption of stimulants had for ideas of the self and personality. Often one of two cases is true: Either the drugs become incorporated into the self – adhering to the narrative of revealing or creating the 'true you' – or they are rejected because the user feels they cloud their true self. One college girl, for example, explains that she would not and cannot think about herself as herself without being on *Adderall* (02:20): She has integrated the drug into her sense of self and personality, creating if not chemical but psychological dependency. A motion graphic of humanized pills – often an iconic pill with googly eyes – and body parts serve as visual illustrations of this process: The humanized pill is afforded a personality, one that can more easily become part of the user's own. Both the incorporation into the body shown in these motion graphics and the personalization of the pill underline the close but sometimes ambivalent relationship with the user. As a pop-cultural representation, thus, *Take Your Pills* perfectly illustrates how people become "*pharmaceutical persons*" (E. Martin): The sense of self is closely connected to the use of the stimulant, ideas of success and personality are entangled in this web of intimate connections.[8] The ambivalence of these relations becomes clearer in the cases of other users, who explain that they have started to doubt the drug and experienced some sort of identity crisis: For example, their use of *Adderall* to perform makes them feel like it was not them but they *and Adderall* that are responsible for their success. For them, being on and off *Adderall* is like being two different people. Their sense of self is in conflict with the notion of being dependent on a drug to perform in the way they deem necessary. The pill is not seamlessly integrated but used solely as a tool with a specific purpose.

This view of pills as tools to achieve certain ends also illustrates how stimulant use can be considered as a technique of DIY biology and medicine. Of course, in cases in which children or adults were diagnosed with ADHD the medical treatment of their condition is not a form of DIY. However, in its essence, *Take Your Pills* wants to draw attention to a different type of use, one that is much more self-directed, either by illegally buying a drug (here 'hacking' takes on its shady, illicit connotation), getting a prescription to enhance their performance (this type draws heavily on notions of the patient-consumer and DIY patient), or using other cognitive self-enhancement techniques (relying both on consumption in the new economies of vitality and self-experimentation). The primary idea is that the self is responsible for its own situation and decision making. The role of DIY, arguably, becomes clearer later on in the documentary when the narrative draws a connection to supplementation and micro-dosing as related practices.

8 Interestingly, it is mentioned in the documentary that first data from initial studies show no significant difference in the results on a variety of cognitive tests between a placebo group and an Adderall-taking test group, except for the answers to one question, as cognitive neuroscientist Dr. Martha Farah explains: "Do you feel the pill you took today enhanced your cognition?" (1:05:30-1:05:50). Stimulants, it seems, primarily boost self-confidence and motivation, demonstrating how intimately self-perception is tied to the use of the drug not necessarily its effects (Klayman).

The term hacking is first mentioned when the documentary turns to "brainhacking" as part of the wider "biohacking" movement. This type of hacking is characterized, as the previous chapter has shown, by a high degree of self-directedness but also self-experimentation. The use of prescription drugs like *Adderall* is portrayed as an entry point to other forms of cognitive enhancement. Jesse Lawler, host of the podcast *Smart Drugs Smarts*, describes brainhacking as a "subset of the larger biohacking sphere" (1:04:00) and draws on the cultural imaginary created by films such as *Limitless* or *The Matrix* to explain the appeal of "smart drugs" or nootropics.[9] Cognitive enhancement in the area of brainhacking does not necessarily make use of drugs but also other (natural) compounds. The documentary shows a company called *AlternaScript* which provides its customers with over-the-counter alternatives to prescription drugs, those that you can get "without having to pretend you have ADHD," as Matthew explains (1:07:38).[10] Interviews with Lucas and Matthew, the co-founders, give the viewer insights into the scene of cognitive enhancements. Both argue that companies like theirs aim to "help healthy people achieve their purpose," to help to turn themselves into the "optimal and ultimate" version of themselves, that, as Matthew claims, everyone is looking for (1:18:15-1:18:31). "Smart Drugs" such as their *OptiMind* are tools on this road of optimization. People are already taking steps to get to the next level, as Lucas emphasizes, which is why cognitive enhancement is "inevitable" for him: "cognitive enhancement is not going away, it's the future of the human species" (1:09:41).[11] These steps people are taking are not just nootropics but also forms of "micro-dosing."

Micro-dosing, the documentary shows by including snippets from news coverage, is a practice common especially among those in the tech industries in the Bay Area and Silicon Valley. "Lily," a start-up publicist who wants to remain anonymous, micro-doses every four days with magic mushrooms.[12] In college she used *Adderall* from other kids and now feels like LSD and mushrooms are an alternative to reliance on big pharma. She also says that the mentality and culture in Silicon Valley encourages both the use of pharmaceutical stimulants and micro-dosing of drugs. Micro-dosing, for her, is no different than the old-school supplements. Dr. James Fadiman, the second micro-dosing

9 Derived from the Greek *noos* 'mind' and *trope*, 'turning,' the term nootropic is used for substances that (are said to) increase memory or cognitive function. Among them are common drugs from the class of amphetamines and racetams, substances like caffeine and nicotine that work on the central nervous system, as well as dietary supplements (such as Omega 3 fatty acids) or natural herbs such as Ginseng or Gingko extracts, for both of which effectivity is not proven (Berry). As of 2019, the FDA has become stricter in their warnings about deceptive marketing and false product declaration, warning manufacturers and consumers about possible marketing scams, advertising fraud and lack of approval, cf. press release by the Federal Trade Commission on the warning letters sent to some companies, Feb, 11 2019.

10 *AlternaScript*, thus, is another example of commercialized biohacking along the lines of those described in the Chapter 6.

11 Here we can also discern transhumanist overtones in the statements of the co-founders, a belief in self-directed evolution as the next step for humanity.

12 Microdosing has also reached popular culture. For example, the Canadian TV sitcom (CBC Television) "Workin' Moms", available on *Netflix*, mentions the practice of microdosing when one of its protagonists starts working in a PR start-up – where some employees routinely microdose with mushrooms (at work) to boost their creativity (Reitman).

interviewee, psychedelic researcher and author of a book that brought micro-dosing its current notoriety, explains micro-dosing as using 1/10th to 1/20th of the conventional dose of psychedelic substances, with "zero psychedelic effects" (1:11:12). Instead, micro-dosing is said to increase creativity and focus, help combat symptoms of depression, give users more energy and enhance their social skills. This type of self-optimization – being illegal or at least situated in a grey zone – is another form in which individuals 'hack' their bodies themselves.

This type of pharmaceutical and supplemental hacking of the body takes place on a molecular level. As Emily Martin says, the "complexity and technical prowess" of pills and drugs "exists at the molecular level." Following this molecularized, reductionist logic, doctors and patients see pills as "precision instruments," molecules engineered for specificity, to work, for example, only on specific receptors, target precisely one specific flaw ("Pharmaceutical Person" 279-81). Like small, highly targeted machines, they are expected to work on and modify biochemical pathways, in the end adjusting the whole system of the body. This discourse of molecularization and molecular modulation necessarily also invokes a certain form of plasticity of the body and brain, an ability to be changed through biochemical pathways and interventions. *Take Your Pills* illustrates this through a sequence on the molecular explanation of how those stimulants work on the body (21:00-23:00). This stylistically highly interesting sequence explains and visualizes the structures and differences of the substances and the pathways they work on in the brain on a bio-chemical level. The motion graphic that shows how they work on the body imagines the brain as a machine, complete with cogwheels. This is suggestive of a molecularized but also old mechanistic view of the body. Here the documentary draws on and perpetuates common cultural assumptions – a common (visual) language – about the workings of the body, possibly in order to make those more relatable and understandable for the audience. That this type of molecular intervention has material effects on the body is emphasized already in the opening sequence: The first impressions are of users recounting what they experience when taking their pills, their physical symptoms and changes. Some describe how their heart beats rapidly, their handwriting gets neater, they feel a "warm glow" and their mind and body feel like they "come alive" (00:40-00:45). These immediate material consequences, of course, translate into broader effects, such as higher levels of concentration and success in their tasks, and of course also have social repercussions.

For one, *Take Your Pills* perfectly illustrates how the distinction between treatment and enhancement becomes almost impossible to keep up, as most forms of medico-biological intervention can be used as both. Stimulants used as treatment for ADHD are shown as justified, in some cases even necessary. The documentary emphasizes that ADHD is real and that some form of intervention has to happen, either through medication or other forms of therapy. Ariana, a college sophomore diagnosed with ADHD, accentuates this point when she rejects the phrase "everybody has a little ADHD" – often used to authorize the use of stimulants – as untrue, even hurtful in that it delegitimizes the power the disorder has over a person's life (39:12-39:20). Not everybody, she claims, has a brain like someone with ADHD and can thus justifiably take corresponding medications. When people without clinically evidenced ADHD are being prescribed stimulants, this might lead to stigma for people who actually need the drugs and disvalues

their experience of the disease. One of the problems with *Take Your Pills,* however – and one that has caused a mild wave of public backlash – is that the viewer leaves with the impression that some of those (young) adults taking *Adderall* with a 'diagnosis' do not really need it to treat a medical condition but rather use their diagnosis for easy access to a controlled substance for their own enhancement.

While the boundary between treatment and enhancement might be fluid, more time is spent on the idea of stimulants as a form of enhancement. Even though many of those interviewed have a prescription, it is implied that getting this prescription might be too easy. For the college students, stimulants are a way to become the perfect student with an active, "Instagramable" social life and perfect grades (21:41). On college campuses around the US "everyone takes it" (03:47). It is a means to get an edge, to become your "best, smartest, fastest self" (6:30), especially in times of desperation. Stimulants become means to optimize performance in the competition around SAT scores and college placements, grades and class rank. This ab/use for enhancement continues in the work force. Adults, the documentary stresses, are now the fastest growing segment of the ADHD drug market (26:54): All the adult users who are interviewed for the documentary acknowledge that stimulants are used to optimize and maximize performance, often in hyper-competitive fields. Nathanael, a software engineer, for example, acknowledges that *Adderall* is a performance enhancer and that there is "nothing wrong with that" (17:11). For him *Adderall* is his "jet fuel" (1:03:29) that turns big problems into stimulating challenges. "Peter," a finance worker who wants to remain anonymous, acknowledges that in a work culture such as his, the demand to be a perfect employee encourages stimulant ab/use – but if everyone takes *Adderall*, you need to take it too to keep up with the competition (54:40-55:00).

For these professionals, taking stimulants is a means to maximize their performance and get an edge over people, to satisfy the demands the job market places on them.[13] One of the researchers interviewed for the documentary, Alan Schwarz, author of the book *ADHD Nation* (2016), says that what is developing is not just a dynamic of people using a potentially dangerous drug, but also an "arms race" where people will be coerced to take stimulants if all of their competition does so (1:21:22). This leads to another interesting question, taken up by college student Delaney: She says that for someone like her, who had to work in high school because she is not from a wealthy background, taking *Adderall* is a form of "leveling out the playing field" but if you are one of "those kids then you are just giving yourself more of a leg-up" (28:12).[14] It is not just the question of treatment versus enhancement that is interesting here but also that of access: Should drugs be consider a rightful means to reduce differences? Who does and who should have access to them?

The use of pharmaceuticals for enhancement has been termed "cosmetic pharmacology" by Peter Kramer in his 1993 book *Listening to Prozac*. He applies this term to describe

13 As such, it is, again, close to what Micki McGee diagnosed for self-help books: a tool to improve the self to fulfill the demands of an ever-competitive and unsecure job market.

14 The 2019 college admissions scandal investigated as "Operation Varsity Blues" could be read as yet another example of parents, especially those who already are well-off, trying to get that 'leg up' for their children.

the use of pharmaceuticals not to treat a condition but to move people into another, socially more desired or rewarded state: Healthy individuals use psychopharmaceuticals not in a therapeutic but in a *cosmetic* sense. On this basis, Arjan Chatterjee – who was also interviewed for *Take Your Pills* – coined the term "cosmetic neurology" in 2004 to denote the use of pharmaceuticals for enhancement purposes. Chatterjee develops an interesting idea in his consideration of "cosmetic neurology," namely that physicians might in the future work as "gatekeepers" to the patient's pursuit of happiness (973). More than a decade ago, Chatterjee predicts a future in which patients come to their doctors insisting on using cosmetic neurology as means to pursue their own happiness (92). In this scenario, neurologists and psychiatrists could become "quality of life consultants" whose role is to offer a range of possibilities, set into context likely outcomes and risks, but leave the decision and responsibility to patients because clinical disease markers can no longer guide their care (Chatterjee 972). As the examples in *Take Your Pills* show, in some social circles this type of "cosmetic neurology" is already common. Doctors become intermediaries in a bureaucratic process of prescription, long after the decision has already been made by the patient-consumer that taking a stimulant in the pursuit of their own happiness is the right and responsible decision. This, as the documentary acknowledges, is also connected to social status and class: Having the resources and knowledge to maneuver the insurance and healthcare market makes this type of self-enhancement considerably easier for the individual. Moreover, as Martin has illustrated, pharmaceuticals are also commodities and as such come with a price tag that determines who can buy and use them, especially in the American insurance market ("Pharmaceutical Person" 276).

Fittingly, one of the core messages of *Take Your Pills* is continuously reinforced: That this stimulant 'epidemic,' in fact, is not an individual problem but a social and cultural one. Many of the scholars, scientists and doctors interviewed for the documentary focus on the cultural premises that enable stimulant ab/use but also the social problems that might arise from it. More than a mere problem of the "medicalizing of everyday life" (46:37), as Dr. Lawrence Diller acknowledges it to be, stimulant ab/use is also framed as a symptom of larger cultural issues. Alan Schwarz says that every generation has found a way to enhance their performance, in this case through ADHD drugs. This type of performance enhancement also on college campuses is not new but rather part of a universal desire to succeed (10:00).[15] So when the documentary goes into the history of amphetamines and stimulants, a large factor in the equation are the cultural circumstances, the connection of pharmaceutical use to American notions of the self and success. Dr. Nicolas Rasmussen, author of *On Speed*, recounts the history of "pep pills" citing cultural reasons for their huge popularity during the mid-20th century: "Pep is what Americans want," he says, "it's about drive, ambition, being productive and hard-working and making the sell and getting the job done" (11:05). Getting an edge, being productive and ambitious, for him, is part of an American notion of the self that makes self-enhancements highly appealing.

15 Schwarz recounts that the first article about amphetamine abuse – "pep pills" as they were called – on college campuses appeared in 1937 in *Time Magazine* (11:00).

Similarly, Dr. Wendy Brown, a political theorist, argues that contemporary norms tell us to "perform at the highest capacity that you possibly can" for as long as it takes. The problem in her view is that Americans live in a "hyper-competitive order" where "competition is never ending," so that everyone is required to think of themselves as "a little bit of human capital" that can and should be enhanced (05:23-07:20). The anxiety over our human capital value, Brown claims, makes enhancements almost inevitable. Stimulant abuse thus perfectly aligns with contemporary cultural values of effectivity, competition, productivity, excellence and constant availability. By some, the "Adderall epidemic" is described as equaling the Opioid epidemic, the widespread abuse, addiction to and overdose on prescription and illegal pain medications and synthetic variants of them (Klayman). While the Opioid epidemic was acknowledged as a national crisis by the current political administration, stimulant abuse is often less scrutinized exactly because of this connection to desired qualities such as success, achievement, and performance. Even though it is not an immediate threat to life (like opioids are), the underlying ideology nonetheless can become detrimental to the wellbeing of individuals. Anjan Chatterjee, towards the end of the documentary, is pictured as saying that:

> …the use or abuse, depending on how people feel about this, is symptomatic of something broader. This highly competitive environment in which people feel compelled to compete beyond their capabilities to get ahead, this kind of focus on material progress and productivity. What's the cost of that and is it a cost we're willing to live with? (1:21:46-1:22:20)

For him, the ultimate question is if this cultural environment and the self-enhancement techniques it bears fruition to have a cost that America as a society might not be willing to live with. Similarly, the question Dr. Brown poses at the end is what is lost in a stimulant-dominated world. For her, this might be the experience of being human with all its ups and downs. The documentary, by allowing that voice to be heard and strategically positioning it at the end of the narrative, thus implies that the ab/use of such pharmaceuticals with its material and social effects has the ability to fundamentally alter what is means – and feels like – to be human.

What can we infer from this discussion for other forms of DIY biology and medicine? For one, the example of stimulant ab/use as it is happening and represented is a clear continuation of a historical trend: Not just the optimization of one's own chances in life and the desire to succeed but also the trend towards more patient participation and the staggering normalization of pharmaceutical drugs has empowered individuals to become active consumers instead of passive patients. As Chatterjee predicted, increasingly patients are the ones who request a certain type of treatment or who find loopholes in cases where their doctors do not cooperate with their wishes. The widespread use of *Adderall* and *Ritalin* for enhancement purposes by healthy individuals is a good exemplification of that, while 'brainhacking' or 'neurohacking' are continuations of the underlying desire into a sphere of unregulated, self-imposed experimentation. In a similar vein, it shows the example of an 'old' treatment now being used by people looking to optimize the self: *Adderall* and *Ritalin* have been used for decades as medical treatments, but their use today has taken on a new quality. This new quality in part is due to the increasingly blurry distinction between treatment

and enhancement and the flexible boundaries of disease. However, this new use of an old 'technology' also shows how the *use* of a biotechnology decides about its social and cultural valuation and, vice versa, how social and cultural factors influence how biotechnologies are used. Especially the comparison to other, illicit drugs that belong the same class of controlled substances (such as Meth or Speed) shows how the evaluation of a drug is often a balancing act, a question of perception tied to the users and their context. Especially for other forms of 'commercialized' DIY, such as genetic or molecular direct-to-consumer testing – the topic of the next chapter – the lessons from this case study might be interesting. The overarching message of *Take Your Pills* is that while the ab/use of stimulants is nothing new, contemporary cultural influences are what is responsible for the current epidemic. *Take your Pills* rightly concludes that a cultural debate about performance enhancers as well as the underlying reasons for their use is needed, a debate that the documentary as pop-cultural artefact contributes to.

Case Study IV: Make Your Own Medicine – The Example of the DIY EpiPencil

In contrast to the previous case study, where the individual as consumer on their own pursuit of happiness and wellbeing was at the center of the DIY activities, this case study brings us closer to a maker-influenced definition of hacking and DIY. Though the consumer market does play a crucial role for the context of the DIY EpiPencil hack, the focus is on cheap, accessible and make-shift solutions. In 2016 the *Four Thieves Vinegar* collective revealed to the public their latest hack: A DIY solution to create an *EpiPen*, a staple item in households of allergy sufferers and one of the 'victims' of excessive price increases in the pharmaceutical industry. This hack brought them widespread news media coverage in 2016 and 2017. In this case study I will look at the *Four Thieves Vinegar* website, their introduction of the EpiPencil and the resulting media coverage to delineate how this endeavor was presented to and discussed in the public sphere. The self-description of the *Four Thieves Vinegar* collective's hack can be considered not just as an instance of self-marketing, but, as we will see, also a political statement, while the media coverage brought their efforts to a wider audience and thus contributed to the proliferation of 'pharmaceutical hacking' in the public imagination. Their 'hack' is presented and perceived as an intervention into a flawed system and demonstration that things could be done differently.

But first, let me go into a bit more detail on the individuals behind the hack: Michael Laufer, the chief spokesperson, and the *Four Thieves Vinegar Collective*. *Four Thieves Vinegar* could be considered a "DIY pharmaceutical company:" They operate around open access principles and individual choices, while their focus seems to be on distributive justice and access to medicine (Delfanti, *Biohackers* 38). The collective sees themselves as providing alternatives to the "disenfranchised" in the (global) medical market and as creating access to "tools" and knowledge needed to save lives. In their mission statement they state their goal as "Free Medicine for Everyone." This, for *Four Thieves Vinegar*, entails giving people tools to manufacture chemical drugs themselves everywhere around the globe, working against high prices for drugs, and thus giving all humans

access to life-saving medications (Four Thieves Vinegar Collective, "Our Mission").[16] So while the DIY EpiPencil hack brought them the most media coverage in 2016, their main project is an Apothecary MicroLab that they claim could be used to manufacture small batches of medicines. Fittingly, the most prominent line on their homepage is "Make Your Own Medicine" (Four Thieves Vinegar Collective, "Home"). The focus of their MicroLab is on treatments for conditions like HIV, hepatitis, or toxoplasmosis and on reproductive freedom and abortion medications. Laufer presented the first prototype – including DIY manufactured drugs – at the biennial hacker conference *Hackers on Planet Earth* (HOPE) in New York City in 2016 (cf. Oberhaus). *Four Thieves Vinegar*, we can summarize, represents a hacker ethos, open access and open-source ideologies and DIY approaches so common in many DIY biology and medicine projects. The goal is self-sufficiency facilitated by access to knowledge and tools.

Fittingly, their hacks and DIY medical technologies are inspired by social debates and ethical considerations. The reason why their EpiPencil hit such a nerve and let to news outlets and magazines taking up the story at the time of its publication in 2016, was that they provided an answer to a widely discussed problem. In September of 2015 Martin Shkreli, hedge fund manager and CEO of various pharmaceutical companies, had publicly been heavily criticized for raising the price for Daraprim – a drug used to treat toxoplasmosis, amongst others in patients with HIV – from $13,50 to $750 per pill, sparking a public debate around rising prices for prescription medicine.[17] Once a widespread debate about prices for medications was started, it is no surprise that also the price raise for EpiPens by producer Mylan in September 2016 sparked a public backlash. From 2009 to 2016, prices for brand-name EpiPens increased from $100 to $600 for a 2-pack of autoinjectors (Lyon). This considerable rise in prices for a single-use, life-saving item did not only have many people question the integrity of 'Big Pharma' but also left some families dependent on epinephrine injectors without access. Even when their health insurance covered the costs, many families rely on multiple pens for easy access and safety. While generic injectors are available for less, 2016 was definitely a year of widespread debate about access to and costs for medications. This, of course, is partly due to the American insurance system where not all costs for medications might be covered or people might not have access to insurance, providing fertile ground for a form of medical segregation in which the well-off have access to medications and medical treatment while those further down on the social ladder do not. This is not just the

16 Thieves, criminals, outsiders, apparently, were also the inspiration for the name and the logo of the *Four Thieves Vinegar Collective*. Depicting a stylized plague-doctor or plague-mask, the story behind the logo comes from thieves who saved many lives through their ingenuity. As Piller describes it: "Instead, Four Thieves found inspiration and its logo from a bubonic plague episode in the Middle Ages. As Laufer tells the possibly apocryphal tale, thieves who made a habit of looting plague-ridden areas protected themselves from infection by using masks containing vinegar and herbs with antimicrobial properties. Eventually, they were captured, then freed after agreeing to reveal their formula — which was made public, saving many lives. The story perfectly illustrates Laufer's model: 'an emancipation of knowledge.'" (Piller and STAT) Laufer and the collective seem to see themselves in this tradition of saving lives, possibly also with illicit means.

17 Shkreli was later arrested for fraud in relation to his work for another fund, Retrophin LLC, in 2015 and found guilty in 2017, sentenced to seven years in prison and a monetary fine in 2018.

general background and incentive for the projects of the *Four Thieves Vinegar Collective*, but it was also one the reason why the EpiPencil hack could reach a wider audience than just the 'typical' DIY hacker sphere.

The DIY EpiPencil, as the name already tells, is a self-made version of the expensive brand name epinephrine autoinjector built from off-the-shelf-parts and easily assembled for "just over 30 dollars." In short, it is built by combining an auto-injector meant for diabetics with a syringe and fairly large needle. While these three components are easily available online or in a pharmacy, the epinephrine that has to be manually drawn into the syringe has to either be sourced from a prescription or other creative sources. To complete the EpiPencil, *Four Thieves Vinegar* also provides a sticker with their Logo and instructions for its use. In a blogpost from Sept 29, 2016, the *Four Thieves Vinegar Collective* introduced the EpiPencil on their homepage. Apart from a short introduction to the parts needed for the EpiPencil, this introduction also resembles a political statement. They write:

> WHEREAS The pharmaceutical industry continues to put profits above human life, and WHEREAS Autoinjectors and epinephrine are technology which belongs to the world, and WHEREAS EpiPens save lives every day, but only for those who can afford them, and SINCE The Four Thieves Vinegar Collective is dedicated to providing access to everyone WE HAVE developed the EpiPencil, an epinephrine autoinjector which can be built entirely using off-the-shelf parts, for just over $30 US. Sources for the three items you require are linked below, followed by a video which details how to assemble them. Stay healthy, —The Four Thieves Vinegar Collective (Four Thieves Vinegar Collective, "Introducing", my italics)

Following their mission statement, the main motivation for the EpiPencil hack, they claim, came from their desire to give access to medical technology to everyone, not just those who can afford it. The overt critique of the pharmaceutical industry – their first point, you may note – is in line with their stance against profiteering from innovations and technologies by a few companies. This introduction positions the DIY EpiPencil not just as a creative, easy and cheap solution to a medical problem but also turns it into a social and political statement: DIY in the sense advocated by the *Four Thieves Vinegar Collective* is inherently political, an answer to the contested issues of its time.

The access they promise, then, is promptly given: A list of links guides the DIYer to the right sources for the required components and a video gives them a practical manual on how to put the parts together safely. Seemingly shot with a webcam, this 5.48 min video features Dr. Michael Laufer in a home-like environment: Laufer sits on a chair facing the camera and demonstrates how to assemble the DIY EpiPencil. People, he opens the video, have asked them to do something about the EpiPen scandal and *Four Thieves* has delivered. What follows is a brief tutorial, that apart from some fiddling with the needle to make it fit into the autoinjector properly can be easily followed in minutes. The result, Laufer says, is an epinephrine autoinjector that "functions just like an EpiPen" and can be used "with no special training" (Four Thieves Vinegar Collective, *Epi Pencil*). The aesthetics of the video underlines the DIY, home-made, work-around approach proposed by the hack. Instead of producing a high-quality one, this video is focused on what it tries to carry across: how easy and fast you can assemble

a potentially life-saving medical device. To highlight the functionality of the EpiPencil, Laufer includes a scene in which he uses it to inject himself with saline solution, representing the self-experimentation ethic so common in biohacking. Roughly a year later, in 2017, the media coverage of their hack prompted the *Four Thieves Vinegar Collective* to publish another video update for the EpiPencil that contains answers to the most frequently asked questions. It goes into detail on sources for epinephrine other than a prescription, the EpiPencil shelf-life, sterility, syringes, dosage for children, the lack of options as substitutes for epinephrine, other brands and generic injectors as cheaper alternatives to the brand-name EpiPen, as well as the legality, reliability and regulation of (DIY) medical devices (Four Thieves Vinegar Collective, *Epi Pencil Update*).

The DIY approach espoused by the DIY EpiPencil follows the sharing and hacking ethos so fundamental to the maker movement as well as the focus on individual choices proposed by personalized medicine: Adhering to an open source ideology, plans and instructions for the EpiPencil and the MicroLab can be freely downloaded or accessed by everyone; the solutions they propose are, as their name already implies, the result of collective and collaborative work; their political messages show a marked distrust of pharmaceutical institutions; and their hacks are innovative and creative combinations of current technologies and make-shift solutions. This hacker approach is also part of the press coverage of the EpiPencil. The media representations under consideration here – five articles published between September 2016 and July 2018 – all include some form of reference to the biohacker or DIY bio-movement into their discussion. In the earliest one Jamie Condliffe, for the *MIT Review*, describes Laufer and *Four Thieves Vinegar* as "DIY enthusiast" and "biohackers," who build "home-brew" versions of medical devices (n.p.). Interestingly, this word choice does not only position them in the biohacker and domesticated biology movement but also close to the famous hacker, hobbyist and DIY computer club, the 'Home-Brew Computer Club' in Silicon Valley (1975-1986). In an article for *Vice*-daughter *Motherboard*, journalist Daniel Oberhaus describes the workarounds and creative solutions that the collective has found for the manufacturing of their drugs. "T[t]hese sorts of unorthodox approaches to healthcare," he writes, "are the name of the game in pharma hacking, where the goal is to help people at any cost" (n.p.). As is the goal of DIY biology, the result of such "unorthodox approaches" are cheaper, easy to use solutions. The hacker ethos visible in the DIY EpiPencil makes it a good example of science and medicine, or here pharmacology, as a bottom-up process.[18] Of course, such approaches 'from below' also generate a lot of controversy exactly because they do not come from professionals or institutions. In the case of medicine and pharmaceuticals, such approaches become even more disputed because they are not concerned with harmlessly 'playing' or 'tinkering' with biological materials but moving into the sphere of actual cures – DIY copies of commercial medications used to treat the sick – where questions of regulation, safety, testing, errors and potential harm are particularly important.

18 Another example is the Open Insulin Project, a Bay Area biohacker team that works on creating a new protocol for insulin production, undermining intellectual property to create "newer, simpler, less expensive ways to make insulin." Their aim is to make insulin freely accessible for everyone by creating an open protocol for its production, cf. Open Insulin Project.

In 2017, *Scientific American* ran one of the more in-depth stories on Laufer and the DIY EpiPencil, in which the author Charles Piller describes Laufer as a "fixture in the growing biohacker movement" (Piller and STAT, n.p.). But more than that, this article seems to have set the stage for one of the most notorious labels used for the *Four Thieves Vinegar Collective* to date: Anarchists. "An Anarchist," according to their title, is "teaching patients to make their own medications" with the goal of building "a DIY movement to undercut high drug prices," as the subheading suggests (n.p.). This label is taken up by Daniel Oberhaus in 2018, when he invites the reader to "Meet the Anarchists Making Their Own Medicine" (heading) and describes the *Four Thieves Vinegar Collective* as "a network of tech-fueled anarchists taking on Big Pharma with DIY medicines" (n.p.). Sanctioned by Laufer himself, this label tells us a lot about both his own and the public's perception: Rarely valued positively, anarchists are known for standing against an established order and rebelling against authority – hacker ideals par excellence. Anarchism can mean both a chance at fundamental change in an unjust system and a descent into chaos. It is this ambivalence that Laufer and the media seem to play with. On the first glance negative, they are nevertheless also branded as a disruptive force working against the system to achieve higher moral ideals. In Daniel Oberhaus' report for *Motherboard/Vice* from 2018 the anarchism is acknowledged as part of the Collective's agenda as well: Outsiders stir up a market dominated by expertism, elitism and corporations. In fact, rebelling against the system, in Oberhaus' article, seems to be a good, praiseworthy quality: "By freely distributing plans for medical devices and pharmaceuticals, a loose collective of anarchists and hackers is threatening to pull the rug out from under one of the most regulated and profitable industries in the world. And they're just getting started" (n.p.). The narrative Oberhaus creates reads more like an epic 'David and Goliath' tale where the underdogs fight for the good cause.

This preoccupation with anarchy demonstrates that here hacking to a certain degree also takes on some its illegal, shady connotations: The devices and technologies proposed by *Four Thieves Vinegar* are moving in the grey zones of the law, are unregulated and unruly, positioned against the authority of government bodies and pharmaceutical companies. In their update video (2017), Laufer goes into detail about the regulation of medical devices, saying that ideally the infrastructure is such that you do not need to revert to DIY solutions, but in the current situation, in the end "[i]t is a personal choice, and that is where we think the choice should lie, with the individual so they can manage their own health" (Four Thieves Vinegar Collective, *Epi Pencil Update*). Not just for Laufer and the Collective but also for some media representations the central question is the freedom to choose. D´Adesky, for example, claims that this question is at the heart not just of many debates in medicine but also of the right to use DIY EpiPencils: "Should we be free, as individuals, to make and take our own medicine at home? Who's responsible if we get hurt or die? Do we have to [sic!] right to do what we wish with our bodies in the interests of survival, healing and self-care?" (n.p.) That she raises these questions points to central pillars of American cultural identity: individualism, autonomy, self-sufficiency. Laufer would answer all the questions of above in the clear affirmative. Oberhaus takes up the idea of autonomy: "For Laufer, Four Thieves is as much about medicine as it is about the right to the free flow of information and personal autonomy. As far as he's concerned, one cannot exist without the other" (n.p.)

This right to information and knowledge, the question of access, for Laufer is intimately tied to the right to use that information. In fact, Oberhaus ends the article on a quote by Laufer: "'Pursuing science is a human right,' Laufer said. 'In fact, it's the human right from which all other rights flow. You have to be able to do whatever you want to your body and to think the way you want'" (n.p.) Here, Laufer argues not just for open access to scientific knowledge but also for complete autonomy over an individual's own body as a human right.

Complete autonomy, however, also raises questions of regulation and safety: Should individuals be allowed to use such hacks, even if they might harm themselves? Or should they be regulated or prohibited? "Home Pharma Hacks Raise Safety Questions" writes D´Adesky. In her report doing it at home or in your kitchen is automatically assumed to be more dangerous because of the lack of standardization and quality checks (n.p.). Critics, she writes, believe hacks are dangerous and pose safety risks exactly because they are not tested. But she also acknowledges that these safety concerns are on Laufer's and the Collective's radar: While controls for drugs and devices marketed to consumers are deemed necessary also by Laufer, security concerns for him are only a "first-order reaction" that ideologically will always come behind "more access to more information" (D´Adesky, n.p.). Similarly, Oberhaus includes voices and opinions of MIT researchers to underline the fact that safeguards and quality controls are needed to make pharmaceuticals and their DIY equivalents safe for patients. *Four Thieves*, he writes, "walks a fine line when it comes to the legality of their enterprise" (n.p.). But, again, he acknowledges that they are conscious of the pitfalls as well as the chances. They are, he says, not "naïve" about the risks. Because they realize that instructions can be followed incorrectly – with possibly toxic or deadly results – they are actively working on reducing "the likelihood of this happening:" one of their "most significant contributions to DIY medicine" he writes "is prioritizing harm reduction in its research and development" (Oberhaus).

These basic ideals of American culture – choice, autonomy, self-reliance – that are reflected in the DIY EpiPencil hack and its media representation point to their deep embeddedness in their time and place. Oberhaus, for example, tries to expose the many cultural and social factors that contribute to the appeal of hacked solutions and DIY approaches. The hacks are portrayed as reactions to high costs and shortage of EpiPens or the scrupulous raises in prices for pharmaceuticals by Big Pharma (Oberhaus). Cultural factors, as well as the political situation, are shown as responsible for why people not just decide to join the collective but also why their solutions have a certain appeal also for critics. In an insurance and medical market like the US even the sharpest critics cannot "dismiss Laufer outright" (Piller, n.p.). In the article, Dr. Vinay Prasad argues that Laufer is a "symptom" of the disease of drug pricing, a "symptom" and reaction to larger, as of now unsolved, issues. Laufer, even a critical reporter like Piller has to acknowledge, has a point to what he does, he can work as a conversation starter for larger public debates.

In the media accounts under consideration here, the DIY projects and activities proposed by the *Four Thieves Vinegar Collective*, are framed as a form of creative intervention into problematic systems of power and dependence. Condliffe for the *MIT Review*, for example, advices caution but sees hacking as a valid way to prove a concept and/or show

alternatives. In this case, the EpiPencil is a persuasive demonstration that it is possible to manufacture much cheaper devices, which confirms the industries' profiteering (n.p.). Even though Oberhaus' article also cautions about safety issues, he nonetheless also describes Laufer's activities as "a valuable form of social activism that points the way to a promising future" (n.p.). Likewise, Josiah Zayner, known biohacker and CEO of *The Odin*, interviewed by Piller for his article, claims that Laufer's work is a "symbolic force" (n.p.) The DIY EpiPencil becomes a symbolic act, an example that you *can* do it otherwise. It is, as also *Four Thieves Vinegar* acknowledges, not an approach suitable for everyone, or one that should be necessary, but a (political) demonstration meant to address a pressing issue as much as a project for more adventurous hackers and tinkerers. The media representations seem to value that such an intervention – even if never needed or used – highlights the point of the debate: the actual costs for parts and production versus the price asked by the pharmaceutical companies. Creative hacks for them can be used as illustrations that contribute to a public debate. By doing so, they also validate the political impact of the hacker ethos and DIY approaches as a form of protest and creative intervention. In fact, as Matthew Donovan writes in his analysis of the biohacker activism in resistance to the 2016 EpiPen price crisis, *Four Thieves Vinegar* has inspired other makers and hackers to create alternative solutions to this problem as well. Even if they will never be used by the masses, their existence and the debate around their use, ethics or value is starting conversations, in this case around how health care should be structured, who should have access and at what cost. Against the social and political backdrop of their development, hacks such as the DIY EpiPencil become instances of "critical making" (Richterich 160). Oberhaus claims that Laufer has "turned subversion of the medical industry into an artform" (n.p.). Maybe this statement, here, should be taken more literally: The EpiPencil and the MicroLab are then seen as examples of the ingenuity and creativity of the hacker-maker-DIY movement, while also, and crucially, retaining their political power.

To Summarize

What then, the attentive reader might ask, does this form of DIY as creative, political intervention have in common with the commercialized use of stimulants for self-enhancement? Both topics, of course, go into completely different directions: What connects them superficially is their focus on individual choice (and all the consequences that could entail) and questions of access to and regulation of medications and knowledge. But, on a broader scale, the much more important connection is their foundation in highly related social and cultural issues: In case study III, the culture of constant competition, performance and success in neoliberal capitalism invites (cognitive) enhancements to 'get an edge' over the competition. But more than that, as *Take Your Pills* also thematizes, the use of these types of drugs is also connected to socioeconomic factors: Individuals do not only need money to afford such types of self-enhancement but also access to and the ability to negotiate the health care sector. Both, according to Chatterjee in the documentary, are a matter of privilege (31:05). The "disenfranchised," in Laufer's words, are not part of this equation. In case study IV, structural factors in the U.S. health care and insurance system but also globally in the unequal distribution

of resources and access are what makes 'alternative,' self-made options necessary. DIY, here, becomes not a matter of privilege but a solution. Both practices thus in one way or the other also address some of the most pressing cultural dilemmas of our time. DIY, in both studies, provides a form of self-empowerment: on the one hand, to gain access and potentially save a life, on the other, to better allow individuals to cope with and navigate a potentially structurally flawed system of global capitalism. Could, in a potential future, the DIY technologies proposed by Laufer not just be used to grant access to medications but also to allow people to manufacture their own enhancement cocktails? Such questions do not only highlight the urgent need for public discussions about what types of societies we as humans want to live in, but they also illustrate once more that treatment and enhancement are often just a question of use – and those uses need to be discussed as well.