4 With my Own two Hands – Tracing DIY from Individualism to Maker Culture

> "As makers of today and shapers for tomorrow, we Americans seem to share an inborn understanding of how to go about making the things we want." *(Banes and Hoag, American Maker, 2:40-2:50)*

Most of the developments in the field of DIY are not entirely new shifts but slow developments in multiple social, cultural and technical areas. The idea of "emergence" can be a useful tool here: Rose uses "emergent" or "emergence" loosely to "refer to something new, which arises not from a single event of discovery, but often unexpectedly and contingently at the intersection of multiple pathways" ("Genomic Susceptibility" 141). DIY, as practiced today, is the result of a sociocultural, political and indeed material context in which different ideals, rationales, discourses, but also technologies and practices blended: concepts of the individual as responsible, self-reliant, and self-managing; discourses of continuous progress and the perfectibility of life; ideas of bodies as in need of enhancement to achieve authenticity, wholeness and social status; a renewed focus on the material environment; the conceptualization of all aspects of life as a platform to be 'hacked'; the development of tools and techniques that allowed more people to participate in material projects of their own and to share and collaborate via open communication technologies; the privileging of participation, access and bottom-up transformations. In this chapter I try to bring together these multiple, sometimes seemingly disparate, pathways.

The purpose of this chapter is to demonstrate the continuity of DIY, so that in the end I can show which facets of 'older' DIY practices can be carried over into 'newer' ones, especially in terms of critical positions but also regarding positive developments and tendencies. A historical reflection can illuminate where to look for parallels and problems as well as provide background for contemporary debates. This is particularly useful because considerations of older forms of modification or practices of do-it-yourself takes place with a certain degree of hindsight that can prove to be a valuable guide for present concerns. I will first ground the DIY techniques in American cultural values and ideologies, including but not restricted to individualism, a belief in progress, enhance-

ment, and perfection. I then trace the rise of do-it-yourself as cultural practice and imperative, looking at its characteristics, historical contingencies, cultural purchase, and to some degree, transformative potential. I focus on the *culture of DIY* that has shaped the last century of American life – with varying intensity – and how its basic principles have spun much further, intersecting with and transforming other contexts such as science and the medical market. What is the reason for the proliferation of DIY also in areas unrelated to its 'home domain'? What are the repercussions of the empowerment and responsibilization of the individual perpetuated through the DIY ethos? What is the cultural and social significance of access to knowledge, of openness and transparency? These are but some of the questions that guide my discussion.

4.1 From American Individualism to the Promise of Perfection

Christina Lake, in her discussion of biotechnology and posthumanism in science fiction, identifies "largely unchallenged and invisible cultural assumptions" in advanced technological societies such as the US that propel biotechnology forward: She writes, "…what we have in contemporary America is a society of individuals who think that their bodies are essentially plastic, who think of their lives as a project, who look to technology to solve their problems, who value individual autonomy above most other things, and who are enculturated to believe that money can buy happiness (18)." Similarly, Peter Conrad claims that the "wellspring of biomedical enhancement is embedded in the very fabric of [American] society," among them a cultural belief in self-improvement, individual desires to outshine the competition, faith in technological solutions, and health care as a market economy (*Medicalization* 96). Some of these – plasticity, the body as project, scientism and technological determinism – I have mentioned in previous chapters. This subchapter now turns towards cultural ideals and concepts that shape both the trend towards 'doing-it-yourself' but also towards bodily modification and self-improvement more generally. The focus is on individualism and self-sufficiency, the Protestant work ethic and American Dream, ideals of progress and perfection, consumerism and health as a value.

While the cultural beliefs and values of white Europeans formed the template for current American (mainstream) culture (Hall 7), unique American experiences such as the frontier cemented some of these early values into the cultural consciousness and public memory. Even though American culture has transformed since then, some values and beliefs are still present today, such as individualism, competition, the Protestant work ethic, status and power, an emphasis on the scientific method, a belief in continuous improvement and progress (Hall 7,16).[1] These are also foundational for the prevalent

1 This discussion, as I need to acknowledge, is rather simplified and generalized. Its aim is to sketch some of the core ideals and values that shape American culture on a collective level and that can be considered as foundational for the high cultural purchase of DIY practices and self-reliance. Individual values, of course, might differ greatly from those sketched here and there are two things that will be left out, primarily due to spatial considerations. First, the narrative sketched here often neglects minority cultures, their experience, struggles and influences on majority cultures. Second, its gendered dimensions only play a minor role: The story of the 'self-made man' is a pri-

'do-it-yourself' ethos in American culture. 'Do-It-yourself,' thus, can be considered as quintessentially American, founded on some of its core values and ideals.

"God Helps Those Who Help Themselves"

The first value complex I want to consider is individualism, self-reliance and self-improvement. In the US, these three go back to the country's Christian heritage, beginning with the first settlers. It is at that time that ideas of the self and individual became central. The Protestant revolution, according to Rose, gave rise to a new "culture of the self" and systems of self-direction, in which individuals bear the responsibility for their own thoughts, choices, actions and failings, giving rise to new "technologies of the self" based on self-inspection, such as the Puritan practices of confessional, daily diary writing (*Governing* 224-26). Rose's account in *Governing the Soul* traces the move from external pressures to internalized norms of conduct and behavior, a self-government (of the soul or the body) that the self does herself out of her own free volition. Similarly, Irvin Wyllie and Richard Huber, in their 1954 and 1971 examinations of the self-made man and success in America, respectively, contend that the ideal of success – often in the form of accumulation of wealth – is tied to America's Christian heritage. Self-improvement's origins, according to Huber, are closely associated with a prevalent character ethic of moral purity and Christian values. Wyllie also highlights the early Christian origins of self-help so key to the myth of the self-made man. The belief in continuous improvement and progress is deeply engrained in the Protestant work ethic: the belief in hard work as an opportunity to achieve success and personal fulfillment (Hall 7, 16, 229-32). The narrative formula used in Horatio Alger's famous tales of morality – young boys escaping poverty, overcoming obstacles in their rise to economic success through hard work or good character to then lead lives of middle-class security and comfort – exemplifies this connection between (moral) purity, (economic) success and self-improvement as ideals of American life.

In her examination of self-help culture in the US Sandra Dolby writes that Americans have from the beginning felt a need to scrutinize and improve the self: "God expects us to seek to better ourselves, or so the roots of Puritanism would have us believe" (20-21). The self-examination central to Puritan notions of the self, thus, can be seen as the very basis of ideals of self-improvement,[2] while their focus on individual choice is one of the first cultural instances in which individuals are responsibilized for their own (spiritual) wellbeing. Self-responsibility for one's position in life and choices about available lifestyles are therefore some of the early values in the history of the new nation. According to Sacvan Bercovitch, this Puritan legacy is foundational for the very rhetoric of an American identity based on individualism, autonomy, and choice (ix). The expression "God helps those who help themselves," used by Benjamin Franklin in his *Poor Richard's*

marily male narrative, especially in the historical context that I line out. Intersectional considerations would probably reveal a wealth of new material and critique points, they would however unfortunately also go beyond the scope of this short excursion into the background of DIY.

2 Note that this form of self-improvement is egalitarian in its very foundation – everyone could do it.

Almanack, fittingly summarizes those ideas of self-initiative and agency.[3] They are also the basis for some of the foundational myths and stories of American culture, such as the 'Horatio Alger'-type stories of success, and 'bootstrap' ideologies like the American Dream.

Ideals such as autonomy, personal choice and control of one's fate – basic tenets of this early settler mentality – are also foundational for the preoccupation with individualism as another "American prerogative" (Hall 23).[4] One of the (linguistic and cultural) core manifestations is the idea of 'rugged individualism.'[5] This phrase, though older, gained widespread cultural currency during the Great Depression: US President Herbert Hoover (1929-1933) employed it to convey the idea that individuals should be able to help themselves and can succeed on their own, thereby justifying less involvement of the government in the economic life of the people. Hoover in his Oct. 22, 1928 speech in Madison Square Garden, New York, NY claims that the American system of "rugged individualism" is better for progress, economic prosperity, initiative and enterprise – issues that for him reach into the "very roots of American life," connected to American ideals of self-government, liberty, freedom and opportunity. Individual initiative and individual enterprise for him are necessary for economic advancement, while increased government interference would halt the American march of progress and diminish the progressive spirit of the American people.[6] This evocation of *self-sufficiency and self-government* as American core principles of course echoes earlier phases in American history, and are in fact uttered at a time when another ideal of American life was publicly addressed as foundational for American culture and character: the frontier.[7]

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3 Franklin is often, wrongly, credited with the first English rendering of this phrase, which originated in Greek philosophies, fables and tragedies. It is nonetheless his use that gave it widespread currency in the US, turning it into an often-quoted phrase which many people seem to misperceive as written in the Bible.

4 Bercovitch, similarly, identifies self-examination and personal choice as central elements of Puritan conceptions of the self that further the early development of Western individualism (1-34).

5 According to Dolby, Alexis de Tocqueville's treatise on *Democracy in America* (1835) is one of the earliest works that addresses this idea of rugged individualism. In his study of American culture, de Tocqueville describes his perception of individualism as a distinctly American personality trait that has attained dominance over ideas of community (Tocqueville and J. P. Mayer). Dolby writes that, indeed, Americans have embraced this individualism and self-reliance since the foundation of the Republic and until now often value their individualism higher than the community (20-21). Fittingly, also Ralph Waldo Emerson in his "Self-Reliance" (1841) argues for spending more time reflecting on the self – in solitude away from the community and social obligations (Emerson, "Self-Reliance"). Robert Putnam's *Bowling Alone* (2000) is one of the seminal academic explorations into this duality of (increasing) individualism and (declining) sense of community.

6 What needs to be recognized, following this historical trajectory, is that more liberal political campaigns, such as Franklin D. Roosevelt's "New Deal" (1933-1938) or Lyndon B. Johnson's "Great Society" (1964-1969), might point to a shift in values towards community orientation and social security. However, even though these 'liberal' decades have changed the political landscape of the US, and gave birth to state-guided social security measures in place until today, overall – as Cowie and Salvatore argue – the New Deal could not fundamentally transform the individualistic (political) culture and society towards a welfare state.

7 cf. for example Paul O'Neil in *The End and the Myth* (1979).

From the early settlers until the 'closing' of the frontier towards the 20th century, it had occupied a special place in the image or imagination of America at home and abroad. The vast land invited its new inhabitants to explore and claim uncharted territory in search of individual success and economic well-being.[8] In America, the legend went, you can shape your own destiny, build a new life, take control, reach wealth and success, you can search for a better life. This foundational myth of American culture is also emblematic of American ideals of progress. According to Paul O'Neil, in *The End and the Myth*, self-reliance and inventiveness are some of the foundational outcomes of the frontier that have shaped American character and culture. Perpetuated again and again in the cultural imaginary, this 'unique' and shaping experience became part of American collective memory.

Individualism, self-responsibility and self-reliance are thus some of the foundational ideals of American life. There is a pervasive notion that people are self-made; it is a culture that promises individuals limitless possibilities of self-realization (cf. Fluck 29). The self can be changed, but it should be in a self-directed manner, stressing independence and personal responsibility for one's life choices (cf. Hall 23-32). This core American myth of the 'self-made' man – whose epitome Alger's protagonists were and whose roots have so thoroughly been studied in American history (cf. Wyllie, Weiss) – is visible until this day in discourses of self-awareness, self-confidence, self-control, self-discovery, self-fulfillment, self-determination, self-help, self-improvement, self-optimization, and other "self"-compounds, as M. Butler finds ("Spiel" 78-80).

Progress, Perfection, Enhancement

This discussion of foundational American values and myths also points to the utopian core of American culture and society. Paul Auster, in *City of Glass*, puts the following words into the thoughts of his protagonist: "From the very beginning, according to Stillman, the discovery of the New World was the quickening impulse of utopian thought, the spark that gave hope to the perfectibility of human life…" (71). From its beginning, America was built on the idea that a better life is possible if you are willing to work and sacrifice for it. Or, as Herbert Croly wrote in his 1909 treatise on *The Promise of American Life*, in the imagination of its citizens America is the "Land of Promise:" "From the beginning Americans have been anticipating and projecting a better future. From the beginning the Land of Democracy has been figured as the Land of Promise." Since its early days America was connected to an idea of progress, the promise of a better future, individually and collectively, but this promise is not just an anticipation but also a responsibility: "It becomes in that case a responsibility, which requires for its fulfillment a certain kind of behavior on the part of himself and his fellow-Americans. And when we attempt to define the Promise of American life, we are obliged, also, to describe the kind of behavior which the fulfillment of the Promise demands." (Croly 3-4) As with the

8 Of course, the highly problematic nature of this type of conquest needs to be acknowledge. European settler's intrusion on Native American lands was not only often fatal for Native Americans but also took away their innate claims to the land, resulting in centuries-long violence, oppression and discrimination.

Hoover speech above, mentioning this ideal is not meant to start a discussion of the political debates and actions such ideas sparked but rather to show how deeply embedded such ideas are in the American collective memory and imaginary. Perfection and enhancement flow naturally from the basic ideals of individualism, autonomy, self-reliance, unwavering progress so ingrained in American culture.

Another (literary) example of the deep embeddedness of such ideals of perfection and (body) modification is Nathaniel Hawthorne's short story "The Birthmark" (1843). Full of almost magical scientific experiments, Hawthorne tells the story of a scientist who obsessively tries to 'cure' the birthmark of his otherwise beautiful, perfect wife, leading in the end to her untimely demise.[9] Soon after their marriage Aylmer, "a man of science," becomes increasingly irritated by a birthmark in the shape of a tiny hand that adorns his wife Georgiana's cheek. For him, this birthmark becomes a symbol of sin, decay, death, sorrow, imperfection, a "frightful object, causing him more trouble and horror" than her beauty ever caused him joy. Determined to remove the mark from her cheek, it becomes the central point of their life together, turning it into a burden also for Georgiana. She had previously seen it as a magic fairy's touch but now wishes it removed at all cost, simply to satisfy her husband and free herself from his gaze. 'Curing' her of this physical imperfection, however, is a death sentence for Georgiana. It is implied that she is now too perfect a creature to live. This 19th century story speaks to the cultural embeddedness of the fascination with (self-)enhancement, of making the already good "better than perfect."[10]

Even natural limits have never been seen as a deterrent: As Ralph Waldo Emerson already remarked in 1836, the American attitude to nature is that of a refusal of "natural" limitations, that nature is "not fixed but fluid," can be altered, molded, made ("Nature 1836" 80). As Lake summarizes: a widespread attitude is that Americans must "build their own worlds" and shape their lives according to their desires (1-2). Nature becomes a resource that Americans can use, for example to further their own success or to transform their body according to social and cultural ideals of "beauty, youth, and longevity," as Jakob J. Tanner claims (40). A core belief is that people can shape themselves, be whatever they want to be, and do what they want to do – and that technology can help in overcoming natural limitations (cf. Lake 13). This belief is also the basis for the belief in science and technology as means to shape and define the self.

We can argue that part of the foundation of American culture and society, is a belief in the perfectibility of human beings through work on the self. Such work to optimize the self is common, encouraged, sometimes even demanded: What previously was primarily expressed as work on personal morals or an abstract sense of self, is in the mid-20th and 21st centuries reframed as (also) a materialist work on the body. In

9 Hawthorne, it seems, could only image the science in his book in analogy to magic.

10 In Wegenstein´s reading of the short story, it is not just a "'warning' not to mess with nature, it is also an exploration of the meaning of beauty and our attempts to define and capture it." According to her, the story also speaks to some of the anxieties and problems around the process of makeover, such as the desire to restore or reach some "image of perfection" that might not necessarily be self-chosen and the importance of the gaze for the desired outcome of the project as well as its effects on the object of improvement: When the birthmark is turned into a problem by Aylmer, his wife is thrown into misery and self-hate (*Cosmetic Gaze* 70-72).

such a discourse the body is not a given but, as Wegenstein terms it, "a platform to invest in." In such a "make-over" culture of fluid selves and bodies, the body becomes a project that is to be aligned with your own individual life project (*Cosmetic Gaze* 131). Self-control, self-discipline, self-denial and will power – note the ongoing focus on the self as agentic and responsible – are needed to perfect and govern the body, most visible in discourses of diet and physical fitness that require deliberate action on the body and serious commitments of energy and time to the cause (Lupton, *Medicine* 42-43). Fitter bodies, a youthful appearance, or athletic vigor are all "deeply ingrained social and individual goals in American culture" (Conrad, *Medicalization* 89). Such an ideal of perfection, that is also perpetuated in fantasies of perfected bodies, opens up the body to enhancements and modifications. Strategies and techniques of enhancement – ranging from supplements, training regimes, to after-school tutoring – are today enriched by biomedical enhancements through medical interventions aimed at bodily improvement such as cosmetic surgery, performance-enhancing drugs, or "cosmetic psychopharmacology" (Conrad, *Medicalization* 70-71). Biotechnological developments and the contemporary mechanistic-systematic body concept mean that also the inner makeup of the body is amenable to enhancements. The plastic body is open for modifications that reach deep beyond the skin.

In his exploration of American Medicine and the American Dream, *Better Than Well*, Carl Elliott locates the paradoxical uneasiness about and appeal of enhancement technologies in the American understanding of the self. He argues that in the US individuals are encouraged to express what makes them who they really are and to present themselves in the best light possible (70). The importance of and responsibility for individual choices and "life projects," according to Elliott, explain the "lure" of many enhancements technologies as tools to make said life project better, more successful, more rewarding, more "fulfilled" (299). This cultural ideal of "fulfillment" as the essence of a "good" life makes individuals susceptible to the idea that they and their life need to be better, can be improved (289-99).[11] This ideal of self-fulfillment ideally means creating a more authentic self, and presenting that self and its social status to others. The American belief in technical solutions – mentioned already above – means that also biomedical and technological enhancement techniques are fair means in this game of presentation, judgement and the pursuit of a good life (C. Elliott xx–xxi).[12] A cultural ideal is given expression through biotechnological processes. Here, we can see how ideas of self-modification are also connected to the pervasive belief in technological and scientific solutions perpetuated by scientism as a dominating world view (cf. Ch. 2). By trying to connect the acceptance or rejection of biomedical technologies to some of the foundational American "promises" such as fulfillment, happiness, choice, regard for the individual, Elliott's "diagnosis" (as he calls it), connects the technologies of to-

11 'Fulfillment' is a highly individualistic and subjective notion that nonetheless is floated around as a 'cultural ideal' with no clear connotation. Who then is to judge what a fulfilled life looks like?

12 Carl Elliott writes that Americans see the pursuit of self-fulfillment and happiness as a "strange sort of duty," as an obligation to be happy, an obligation to the self (303). This stance seems to mirror Croly's assertion that the promise of America responsibilizes Americans to certain behaviors.

day to centuries old traditions and values. He thereby elucidates how these values are the foundation of contemporary uses of biomedicine.

Perfection, however, is a *moving target*, something that is always 'not-quite-there-yet,' a promise that notoriously remains unfulfilled. That we can never reach it lies in its very nature. Whenever one ideal of perfection is almost achieved, we tend to find new flaws, question the ideal, find a new goal, a new subject of improvement. This is particularly relevant in a culture that continuously craves bigger, better, faster, stronger. At the same time, it buys into almost modernist grand narratives of progress: We need to push the boundaries of our bodies and technology, because only progress will bring us closer to that which we desire. This promise of progress, perfection and fulfillment, particularly in US culture, is reinforced by consumerism.

Consumerism and the Value of Health

Consumption and commodification, according to Paul Brodwin, have to some extent always been central to personhood in the US, especially in the 20th century (15). Consumption is seen as a means to perform a certain identity, assert one's uniqueness and individuality. Consumerism, Hallam Stevens argues, is part of the American Dream and the quest for happiness, the idea is that "you can spend your way to happiness" (275). The "postmodern identity-seeker," a type of consumer that Colin Campbell describes as being prevalent today, consciously consumes products, selecting them for their symbolic meaning, in order to present a certain identity, impression or lifestyle (24). Consumption, thus, is also part of the construction and presentation of cultural, social and today increasingly also bodily capital – and it is this connection between consumerism and the body or health that I want to look at.

During the 20th century patients have become reframed as consumers that play an active role in the medical market place, whose choices and desires structure supply and demand, whose preferences sometimes even take precedence over the authority of medical professionals (Conrad, *Medicalization* 151–55). The beauty industry, or more precisely cosmetic surgeries, are a common example of how patients' desires influence bodily interventions (cf. A. Elliott; Wegenstein, *Cosmetic Gaze* 114). As seemingly autonomous participants in the medical market, the patient-consumer has to assess and select how much they can or are willing to pay for 'health' or wellbeing as the newest consumer good (Lemke, "Disposition" 559). Exercising their right as a consumer, as Rose already hinted at, however, is reserved for those who have financial and cultural resources: Gaining access to technologies of maximization requires capital and it is the people who have that sort of capital who drive the quest for enhancement (*Politics of Life* 105). As Lupton remarks, informed consumer choices are often closer connected to middle class economic ideologies (cf. *Medicine* 149). Capital, prices, and economic class are thus creating barriers to access. Health becomes a commodity; you have to decide yourself how much of it you can afford for which price.

As a consequence of a consumerist ideology of the self and wellbeing, health receives a price tag. It becomes a *value* in a double sense: It is valued as a state-of-being and it has a literal economic value as a resource that people use to position themselves as fit, exploitable, 'value-adding' in a market economy. As a commodity, health and enhance-

ments can be purchased in the medical market place. However, this commodification also means that we need to invest into our bodies in order to reap the benefits: we need to invest work, time and money so that in the end we (seemingly) have added value in terms of bodily and social capital. The body is seen as a 'raw material' that has to be worked with. We spend hours perfecting our bodies, appearances, and (virtual) persona so that in end other people recognize the work we have put in (value it), but by doing so we also make our bodies more in line with neoliberal market ideals. Similar to antique techniques of the self – a "care for the self" closely connected to philosophical ideas of a "good life" – today self-care has become an ethical maxim and moral requirement (M. Butler, "Spiel" 77-78).[13] Health, wellness, well-being, fitness are values pioneered also by "cultural heroes" such as celebrities or more contemporarily, social media personalities, health and fitness bloggers, that create artificial needs and trends. Health and body-conscious behavior are engineered also by popular culture.[14] But the goal, as stated above, is no longer simply health, but more than that, the moving target of perfection, the promise of completeness and authenticity.

To summarize the basic ideals taken from this discussion: There is a keen focus on the able, autonomous and responsible self in American culture, an individual that is expected to take care of its own situation in life, that is self-reliant and self-governed, coupled with an idea that there is always room for improvement or perfection. The latter is emblematic of contemporary developments in relation to health and wellbeing, while the former is especially relevant for the notion of 'do-it-yourself.'

4.2 Tracing DIY – From Home Improvement to Citizen Science

This subchapter wants to go back in history to connect contemporary forms of biological DIY to their older precursors: It looks at the history of DIY from home improvements to leisure activities, often bordering on the thin line between bare necessity and beloved hobby. It thereby tries to follow the successful rise of DIY as an omnipresent cultural trend that reaches into almost all aspects of human life. I then move on to more recent developments in the DIY area. Topics include the rise and success of maker culture, hacking and technology as well as the transformative and democratizing potentials of self-made solutions. Lastly, I turn my focus onto amateur and citizen science and its new guise: DIY biology.

As the name already suggests 'do-it-yourself' implies active individuals 'doing' projects of their own choosing themselves, rather than looking to others for their

13 Historically, a prime example is the hygiene discourse of the 19th century, that as Philip Sarasin argues in *Reizbare Maschinen*, can also be seen as a set of instructions for a "care for the self" (23-24), constructing a modern body of health and well-being – an example for how a new popular science found expression in material work on bodies.

14 John McKinlay looks at how at-risk behavior in the 20th century was engineered and artificial needs created, by "piggybacking" them on legitimate values, beliefs and norms, often through the endorsement through "cultural heroes" (580). One of his examples is how smoking tobacco was championed in the public. Today, these same techniques are used to instill health as a cultural value.

completion. These projects can vary widely from cooking to gardening, knitting, crocheting, sewing, woodwork, pottery, to hacking, science, and biology. Paul Atkinson summarizes that DIY has in past scholarship been approached as craft activity (Attfield), pastime (Gelber), financial necessity (Goldstein), lifestyle choice (Sparke), as social and cultural phenomenon, from economic, ideological, and feminist perspectives (1). The multiplicity of contexts in which 'DIY' has been described also reflects one of its essential complexities: There is no clear-cut definition or classification of what constitutes DIY, which practices are included, which should be excluded.

According to Atkinson, the term "DIY" is employed for a "wide range of activities which are carried out for a variety of reasons," though he does split them into the "making of objects" – including handcrafts, furniture building, sewing, knitting, and the like – and home maintenance, such as decorations, gardening, building, or renovations (2). DIY can thus be a hobby and handcraft, essential home maintenance, or lifestyle and consumer activity. However, as David Gauntlett describes, these practices often overlap in their motivation and ethos, namely that you *can* do it yourself and it feels good to do so (56). This notion of empowerment is the joint mentality of many DIY activities. Also Atkinson takes the motivation behind the activities as a key organizing principle, categorizing them into four different types of DIY: pro-active DIY (those self-directed activities that involve creativity, skill, originality in which personal pleasure or financial gain are key motivations), reactive DIY (hobby, handcraft, building activities with kits, patterns and predetermined components, with pleasure and occupation in one's free time as motivation), essential DIY (home maintenance activities out of economic necessity), lifestyle DIY (home improvement as consumption) (2-3). These different types serve as a broad classification of DIY activities that also show how complex the motivational forces behind DIY are. But they can also be seen as reflections of different phases of DIY during the past century, moving from essential, reactive activities to lifestyle and pro-active ones.

DIY Conquers Culture

We can roughly discern three, to a degree intersecting waves of DIY in the last century – the 1950s/60s home improvements, 80/90s punk counter culture, and the more contemporary 'maker movement.' These waves represent instances in which DIY cropped up as an explicit trend and start with the first time that the term 'do-it-yourself' was used as a denominator. Its history, however, is much older, when self-made solutions were necessary and normal parts of everyday life.

Historically, DIY has always straddled an ambiguous position between pastime and necessity.[15] In the 19th century, DIY activities were unavoidable for most of the population from the poor to the middle classes. The upper classes, on the other hand, saw arts and crafts as a good way to pass time doing something useful, such as knitting, stitching, and so forth, and taught them as signs of (female) accomplishment. This early

15 I broadly combine Atkinson's narrative of the historical development of DIY primarily in the UK with Gauntlett´s considerations of the 'American' spin on DIY.

arts and crafts movement, as Gauntlett claims, "connected meaningfully with American notions of self-reliance, individualism, community," but the American version of this movement gave it an American spin by adding a "democratic element" to DIY culture (47-49). Gauntlett's example is Gustav Stickley, who published the magazine *The Craftsman* from 1901 to 1916 and through this medium spread a "distinct American version" (49) of the arts and crafts movement. Stickley, Gauntlett argues, had a vision of "'a simple, democratic art' that would provide Americans with 'material surroundings conducive to plain living and high thinking'" (49). Subverting his own business of selling finished products, he inserted plans for needlework, furniture building and metalwork in his magazine. This early "open source" system, claims Gauntlett, is the epitome of an (American) anti-elitist, "democratic approach" to DIY (47-49).

During the Great Depression and primarily the Second World War, then, in the UK and to a lesser degree the US a "make do and mend" ethic made DIY activities a necessity of national concern that was propagated as a valuable skill and crucial contribution to the war effort on the "home front" (Atkinson 3-4; Gauntlett 61). This reality of DIY as an economic necessity should not remain unrecognized. While this characteristic is part of some later uses of the term, the majority of DIY activities quickly moved into the realm of hobby and voluntary activity. Atkinson references Carolyn Goldstein when he writes that in the US DIY became "perhaps less of a necessity and more about social aspiration" and the realization of new domestic dreams propagated by the rise of suburban living (Atkinson 3-4). The Second World War, as Atkinson claims, had prepared especially the men with the skills to now tackle the projects of the day: Home improvements.

In the 1950s and 60s these self-made home improvements became somewhat of a national obsession, representing the first time, according to Steven Gelber, that 'do-it-yourself' entered public conversation on a large scale.[16] In 1952 the magazine *Business Week* proclaimed the 1950s to be "The age of do-it-yourself" (271). Gelber maintains that even though the phrase had been used before, the proliferation of the term "do-it-yourself" in the 1950s was the one that made it "commonplace" and gave it its widespread currency (271). DIY was mass-marketed and popularized via instructions in newspapers and magazines but also expositions and workshops directed at the new DIYers (cf. Atkinson 2).

In essence, much of this first large-scale wave of DIY consisted of work around the house, be it decorations, renovations, or improvements – turning homes into hobbies (Gelber 271). With the rise of suburbia as the American ideal, remodeling and improving the cookie-cutter homes that surfaced all around the country became a (primarily middle class) homeowner preoccupation. Families banded together to paint walls, remodel basements, attics and garages, upholster furniture. They gave their home an individual touch and personalized it, with their own two hands, effectively creating a new way to productively pass time together. A prerequisite for this development was the new availability and affordability of power tools designed for lay users, such as power drills or woodwork tools (Gelber 278-82). This 'new' trend was a mixture of necessity and lifestyle DIY, a necessary means of home maintenance but also leisure activity and consumer

16 Gelber's analysis of hobbies as an American pastime gives a detailed history of how DIY became a cultural movement after World War II.

choice – or as Gelber calls it a form of "productive leisure:" A work-like activity that is however carried out because people want to not because they have to (269).

These DIY activities seem to embody the very definition of a "hobby:" a solo or group project done during spare time, "reinforcing and replicating work values" (providing psychological fulfillment), with the extra "benefit of being useful" (Gelber 269). However, they quickly also became somewhat of an obligation, especially for men. Gelber's analysis shows how DIY became not a voluntary but a *mandatory hobby*: Men were expected to take up the role of handyman if they did not want to lose their standing in the community; DIY became a "badge of 'manhood'" and its tools (once mastered) emblems of a new masculinity (287, 290, 294).[17] Another downside along gendered lines was that while the whole family seemed to be included in the projects, there nonetheless was a distinction between tasks for men, primarily those including heavy machinery and hard manual labor, and women, who were primarily expected to take on the 'softer' and supporting tasks such as planning, cooking, or decorations. In DIY exhibitions and magazines craft-and decoration-oriented projects were marketed for women as well.[18]

At the same time, the de-skilling of the tasks through assembly sets and kits, heralded the invasion of consumer culture into DIY: New products that were easier to use were designed and new forms of distribution implemented that would better satisfy the growing consumer demand to take part in this new suburban-American ideal – pre-cut wall papers and fast-drying wall paints are cases in point (cf. Atkinson 4-5; Gelber 298-99). DIY was recognized and exploited as a major new market, that according to Mark Hatch in 2014 was worth $700 billion in the US DIY home improvement industry alone (12). Self-assembly and pre-fabricated kits became necessary means to fully permeate this new market, opening up the experience of DIY to all ages and levels of skill.[19] This downright assimilation into consumer culture as well as the problematic gender relations and prescriptive tendencies are some of the more crucial downsides of DIYs first wave.

The compensation came in the 1980s and 90s when DIY was revived as part of the punk, protest and counter cultural movement. After a time of increasing commodification of culture, DIY now was seen as a means to counter that commodification. The "lo-fi" movement in punk and feminist cultures saw the birth of low-cost, DIY alternatives to mainstream media, meant also as forms of activism and protest: Most popular

17 There was an Australian TV show called *Handyman* that aired between 1957 and 1958. This genre has remained popular until today, reaching from the TV sitcom *Home Improvement* (1991-1999) to a plethora of home renovation and home make-over reality TV shows.

18 This remained the case until the 1970s, when according to Atkinson (referencing Goldstein) the supporting role of women changed to make their input much more explicit (Goldstein 67-82, Atkinson 7).

19 cf. also Gelber on the history of kits. He claims that during the same time as the DIY movement in the 1950s and 60s, kits and plastic materials that had previously been used to assist the rehabilitation of soldiers wounded during World War II became a civilian product that reduced the "productive process" into the assembly of pre-fabricated parts. Nonetheless, Gelber argues that together with DIY home improvements it brought handcrafts and making activities to an exceptionally wide audience, allowing parents and children to feel the satisfaction of having "done something productive with their hands" without however having to learn a new craft skill (298-99).

among them were "fanzines," DIY productions of fan magazines that came with a distinct aesthetic of cut-and-paste pastiche and collage, appropriating and critiquing mass culture at the same time (Ratto and Boler 10; Triggs). "Craftivism" is a more contemporary equivalent of this protest-oriented, *anti-consumerist* DIY (Ratto and Boler 10).[20] Craftivism or critical making combines DIY approaches with social activism and societal relevance (Richterich 160).

Since that time, such material renditions of DIY quickly spread and became a cultural phenomenon that has proliferated also in other areas: Making one's own clothing and accessories, DIY decorations and life hacks have become common and desired free-time activities. In the last decades, DIY has expanded even further with the global spread of the internet, where online tutorials, videos, and homepages dedicated to self-made 'things' and easy DIY 'life hacks' can be found aplenty. The "diyization of modern society" as Buck Clifford Rosenberg called it in his examination of IKEA's self-assembly furniture – a new rendition of domestic DIY emblematic of postmodern consumer culture, he claims – has now reached almost all aspects of society. Today, rather than straddling an ambiguous position between pastime and necessity, however, it is wedged between consumerism and anti-consumerist activities.

A New Quality of Making

The latest rendition of the DIY ethos has spread under a new name: the Maker Movement. The underlying values, on the other hand, are still the same. As Sara Tocchetti comments, self-sufficiency as a (Protestant) American core principle is still one of its main sources. Fun, innovation, creativity, curiosity, collectivity, community, openness, excitement, passion, innovation – these are some of the most common buzzwords used by members of the community to describe this new movement, a self-proclaimed 'revolution' of how we design and produce, collaborate and create meaning. Like past DIY practices, the "maker movement" includes a plethora of different activities – from crafting to high-tech electronics – but with two decisive differences, as 'maker' Chris Anderson remarks: digital tools for design and fabrication and a new sharing ethos facilitated by the internet as a source of inspiration, community and communication. It is especially the "Web's culture and collaboration," Anderson claims, that is responsible for the new and unprecedented quality and scale of DIY (21). Mark Hatch, another 'cultural hero' of the maker movement, similarly sees "cheap, powerful, and easy-to-use tools," easier access to knowledge, markets, and capital, a "renewed focus on community and local resources" as well as a desire for authentic things as the most salient trends that push the interest in making things and the maker movement (5).[21]

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20 Spencer, Amy. *DIY: The Rise of Lo-Fi Culture* (2008) (historical overview); Levine and Heimerl. *Handmade Nation: The Rise of DIY Art, Craft, and Design* (2008) and Tapper and Zucker's *Craft Activism: People, Ideas, and Projects from the New Community of Handmade and How You Can Join In* (2011) focus on craftivism.

21 In my discussion I also include pop-cultural non-fiction written by members of the maker movement. They serve as illuminations of the values and ideals of maker culture, but also of how makers want themselves to be seen and of how the community sets its purposes and boundaries.

They are not alone in their assessment: Critics that are not economically connected to the movement distinguish similar characteristics as giving the maker movement a new quality. David Gauntlett for example claims that collaborative, creative activities are on the rise both on the Web and in 'real life,' with the former being a great communication, networking and organization tool for the latter that shapes how maker culture is spread and conceptualized (11-13).[22] Similarly, Alessandro Delfanti asserts that the DIY movement is "witnessing a renewal and is now part of a broader social phenomenon centred around the convergence between online peer production, the diffusion of cheap and open source tools and machinery (such as 3D printers) and a widespread 'maker' culture" (*Biohackers* 118-19). As critics and makers say alike, much of this new rise of DIY is due to the internet allowing new forms of communication and sharing with its collective and collaborative premise, thus fostering a democratization of and easier access to information. Gauntlett sees the internet as a new avenue of public participation, with the contemporary "Web 2.0" approach turning it into a decisively collective, collaborative, and shared space (3-5). Similarly, Mark Frauenfelder says the Web helped in the rise of contemporary DIY activities due to its greater "information-delivery capability" (15).

Not just the internet, but also the hacker culture of the late 20th century had an enormous impact on contemporary making.[23] Born in the 1950s and 60s and expanding alongside the development of the personal computer and internet as well as the counter cultural movements, hacking is a diverse phenomenon – its practices ranging from coding free software to breaking into systems and stealing data – with as diverse politics (Delfanti, *Biohackers* 56-57).[24] However, the "hacker ethic" of those first computer hackers at MIT remains very much foundational for contemporary hacker culture. According to Steven Levy this ethic includes free and unlimited access to computers and information, a mistrust of authorities, a valuation of the quality of hacks rather than social or class criteria, and the realization that computers can have life-changing effects (Delfanti, *Biohackers* 58; Levy). Contemporary hacker ethic can thus be understood as a set of values and core ideals, among them an open-source ideology, stressing openness, access and free sharing of information and knowledge; inclusion, collective work and peer recognition; innovation, curiosity, fun and play; as well as transparency and a distrust of institutions (Delfanti, *Biohackers* 3, 56-57, 138). The "essential meaning and promise of hacking," as Soderberg and Delfanti argue, is a "recuperation from below" in which technology is re-designed and created in order to serve the ends of those who use it (2). It is a grass roots initiative that aims to change the logics of contemporary production by focusing on those which will in the end be using the products. These ideals have shaped the outlook of makers. While makers might see 'hacking' as an immaterial form

22 On the web, he finds a broad range of collaborative activities ranging from *Wikipedia*, to political activism, *YouTube* and blogs; in 'real life' examples for him include crafts, clubs, DIY, re-using and re-cycling (Gauntlett 11-13).

23 Especially Alessandro Delfanti has looked at the hacker movement as foundational for the maker, and especially DIY biology, movement.

24 In fact, as Delfanti points out its political heterogeneity, diversity and multiplicity makes it so interesting and is, as he claims, reflected also in biohacking, which I come to later (*Biohackers* 12).

of DIY and thus different from contemporary making, the values behind hacking are nonetheless certainly foundational for 'making,' and some of the (legal) goals of hacking are often taken as a blueprint for more material forms (cf. C. Anderson). Moreover, many makers have their roots in digital contexts and also linguistically there is an overlap. According to Steve Mann, making involves the moral, ethical, lawful parts of the "hacker ethos," combining the DIY ethos of earlier practices with the "do-it-together" (DIT) ethos of hacking (30).

However, in all its similarities to hacker culture, makers often consciously pitch bits versus atoms, software versus hardware, firmly positioning themselves on the side of atoms (C. Anderson 14). Making is *intensely material* and differentiates itself through its materiality (cf. Bean and Rosner, Mann 30, Hatch, C. Anderson). The tactility and material presence of the objects made is one of the main selling points of the maker movement, thereby positioning itself as an alternative to the increasing virtualization, abstraction and displacement of contemporary life.[25] 'Making' according to its proponents, can counter the disconnection and alienation of late capitalism: making is intensely personal, with many contributors such as Anderson or Frauenfelder arguing for the transformative potential of making on the individual. 'Makers' are embedded in what they make and draw from this a deep satisfaction and connection to their environment, they claim. Hatch proposes that making will allow you to feel whole, a "more complete version" of yourself (1-2). With this high emphasis on personal change through the fundamental experience of making, Hatch positions making as similar to other ideologies of self-transformation, "techniques of the self" (Foucault) fundamental to the experience of being human. While I think this view might be a bit tainted by his entanglement in the maker movement, the idea of 'making' as a form of (psychological) self-transformation, its materiality and deep personal connection nonetheless align with my argument about the connection between DIY and self-modification.

Those describing the maker movement from within often tend to focus on the "broader social changes their practice promises to bring," as Bean and Rosner argue. They focus not on the material consequences but on social change, often in the language of "revolution" (26). While revolution might be exaggerated, my hypothesis is that DIY or making is a cultural, as well as material, social and political movement with tremendous potential for change. This is corroborated both from within and without the movement. The revolution makers like Chris Anderson envision is one that mirrors the development of web-based start-up companies (C. Anderson; Hatch): Innovation, economic considerations, new impulses for entrepreneurship and manufacturing based on open source and open innovation approaches form the core of making's

25 This materiality, the 'genuine' nature of the end product, (re-)connecting both with where things come from and how they are made, certainly, is one of the many appeals of making that critics and makers have cited. Other appeals include: individuality (Atkinson 7; Gelber 292); agency and competence (cf. Gauntlett 2); play, experimentation, tinkering (cf. Diana); its process- and project-oriented nature (cf. Gauntlett 64–66; 95-106; Watson and Shove 81–84); community (Gauntlett 95, Ratto and Boler 8, C. Anderson); searching for and finding meaning (Frauenfelder); as well as desires and feelings of satisfaction and pride (cf. Gauntlett, Hatch).

transformative potential for them.[26] Others stress the possibility for community and collaboration, the emphasis on sharing and the interplay between individual and community (Delgado 66; Anderson 74). A democratizing potential is often ascribed to the new ideology of access: putting tools and knowledge into the hands of everyone who wants to use them is a necessity for the maker movement (C. Anderson 63).[27] It thereby creates more participation and also serves educational goals. Similarly, critics Soderberg and Delfanti describe making as a special case of citizen engagement that, despite the lack of a unifying collective identity or political subject, has been ascribe an "emancipatory potential" by many scholars (2). As such, DIY or making can also be political. Making is positioned as liberating individuals from the economic reality of today with its constrained and inflexible roles of production and consumption of goods and knowledge. It gives rather than takes away agency, provides an alternative and creative means to manage problems and find solutions. Alexandra Bal et al. argue that "[m]aker culture has the potential to represent a cultural model that encourages individual citizens to construct their own social realities, connections, and material aspects of living, to take user-generated production as a key to individual self-determination, knowledge sharing, and community building" (158) – an instance in which culture is made that is reminiscent of earlier times, as the discussion in the previous subchapter has shown. All of these potentials have their merit; which ones of them will be fulfilled at this time remains an open question. What we can ascertain is that DIY has become a social and cultural phenomenon, almost a *cultural value in and of itself*. Today, do-it-yourself is not merely a side issue but a pervasive principle of much of everyday activity, whose appeal lies in the cultural contexts of today as much as in its historical continuities.

A Special Case of Making: Citizen Science and DIYBio

This social and cultural trend towards doing things 'with my own two hands' spills over into more and more areas, among them DIY science and biology. But truly, citizen engagement in science is much older than that. Already Thomas Hobbes saw science as something everyone can do (Erickson 105). In contrast to the contemporary view of

26 Like the internet before it, Chris Anderson claims that "making" has the potential to give new impulses for transformations in manufacturing and entrepreneurship based on open-source ideals. "Making," for him, creates new forms of open innovation, new types of localized global businesses and entrepreneurship, creating new jobs and manufacturing possibilities in a world that is characterized by global outsourcing to cheaper production places. Focused on this entrepreneurial side, the "revolution" he envisions is one that mirrors the development of the Internet and web-based start-up companies. While Hatch and Anderson mention the intrinsic motivation and potential of making ("a better version of you"), they are very much focused on the social-economic level and makings potential for innovation and production.

27 Even though people like Chris Anderson often prefer to conceptualize the maker movement as a "garage phenomenon" with bottom-up approaches (*Makers* 20-22), Bean and Rosner, point out that this "maker revolution" in reality primarily attracts males with disposable (and thus higher) income, resulting in a high gender and class gap. But rather than broadening the base, Bean and Rosner contend, *Make* journal for example started a "sister journal" called *Craft*, focusing on "female" making (Bean and Rosner 26-27).

the 'ivory tower' citizen engagement in science had actually been the norm for quite some time: From the very beginning of scientific knowledge production, 'citizens,' 'amateurs' or 'volunteers' had been involved in the process, from natural history, astronomy and meteorology, to epidemiology.[28] Amateurs were collecting and classifying biological specimen, monitoring and describing the stars and solar system. Benjamin Franklin and Thomas Edison are probably two of the most famous amateur scientists and inventors in the American cultural imagination and 'founding fathers' of the 'inventor myth,' the lone genius tinkering his way to knowledge and innovation, prevalent until today. But also in medicine self-experimentation had been a major part of medical history before large scale and systematic clinical trials (Neff and Nafus 16).[29]

Media representations are symbolic of this pervasiveness. Magazines such as *Popular Science* or *Scientific American* published columns, articles and instructions well into the 1960s, detailing a wide variety of projects the public could tackle, from constructing electronics, to making amino acids, to experiments with cockroaches or growing HeLa cells in culture (Frauenfelder 188-89). In the last decades of the 20th century, coverage was, according to Frauenfelder, slowly ceasing, shifting to 'Big Bio' and institutionalized science, while interested people jumped onto the next big thing: computers and software. Science-as-hobby, he proclaims, was dead – until about 2005 and the foundation of groups like "DIYbio."

Foundational for these groups was a disillusionment with Big Bio and corporate science, the exclusion of lay people from scientific knowledge, the spread of the open source and open science movement and a political request for public participation. The Open Science Movement advocates values such as openness, sharing, access and transparency, which would make science "more productive, more inclusive, more democratic," as many proponents claim (Delfanti, *Biohackers* 11). The goal is to "tear down the barriers to the access of scientific knowledge" (Delfanti, *Biohackers* 5), it is thus primarily concerned with the control of and access to information, public participation and restrictions to said participation. Open Science, like open source, denounces elitists and exclusive claims, while promoting open, peer-to-peer knowledge production (Delfanti, "Users and Peers" 1). Citizen science and P2P science is the result of the convergence of these phenomena with a broader availability of the needed technical infrastructure, the spread of maker culture with its support of free soft- and hardware and tools for online peer production as well as broader political shifts toward more participation and inclusive communication. As a result, Delfanti argues, today far more people are involved in the production and discussion of scientific knowledge without formally being recognized as scientists ("Users and Peers" 2).[30] That to a certain degree maker culture (and

28 cf. Delfanti, „Users and Peers" 1; Meyer, *Domesticating* 4; Dolgin 953.

29 cf. also L. K. Altman, Lawrence K. *Who Goes First? The Story of Self-Experimentation in Medicine.*

30 As a consequence the distinction between esoteric and exoteric communities is diluted: Members of exoteric communities claim membership in esoteric, specialized science communities and not just in the sense provided by Erickson – the discussion and representation of scientific ideas in exoteric communities as a contribution to scientific knowledge production – but they want to be seen as equally-valued producers and communicators of knowledge (for esoteric/exoteric thought communities and their interaction cf. Erickson 2-3, 19, 23, 215).

its values) paved the way for citizen science is visible in the importance of the internet and the sharing practices promoted by makers. Citizen science has become "more diffused" through the use of Web tools for cooperation, collaboration and communication: From online discussions, to large scale efforts of data collection, procession and analysis as "volunteer scientists" for big institutions to independent and community-driven P2P science, where design research, experimentation and analysis is done in the community (Delfanti, "Users and Peers" 1–2).[31]

DIY biology is often considered an offshoot of the open-science movement (Ledford 651) and amateur science tradition (Delfanti, *Biohackers* 2) as much as of the maker movement and hacking ethos, visible also in the alternative term "biohackers" (cf. C. Anderson 221-22). In 2005, a citizen science/biohacking group called "DIYbio" was founded in the United States, and their name has resonated so much that it has been taken over as an alternative name for the whole movement. It is thus noteworthy that while the biohacking movement has spread around the globe, the first and in fact most of the groups today are located in the US (Meyer, *Domesticating* 7).[32] Borrowing principles and practices from all of the aforementioned ideological sources, the basic values and ideas of 'biohacking' are knowledge sharing, a community orientation, a pinch of rebellion and a passion for opening the doors of the 'ivory tower' in order to let 'lay' people participate in the wonders of science. DIY biology tries to "extend [hacker culture's] idea of openness to biology" and is often practiced as and in resistance to the "closed" biology of institutional science and the biotech industry (Stevens 351). Correspondingly, the goal of DIY biology is to move biology out of institutions and into the public (Delgado 66), to make "biology for the people" (Bennett et al. 1109).

Alessandro Delfanti specifically focuses on the connection between DIY biology and the hacker movement, claiming that DIYbio is an embodiment of hacking's fundamental values, such as openness, sharing, individualism and rebellion (*Biohackers* 125). Biology, here, becomes a strategic site on which these values can be played out and negotiated, in relation to big cooperations and government bodies, but also individuals, their bodies and surroundings. It is at once private and public. However, Delfanti also claims that despite the deep roots in hacker culture, the commonly used name "DIYbio" and its explicit reference to do-it-yourself culture "positions DIYbio within an old American movement of makers and inventors who work in their garages, and also gives it a rebel flavour." He thereby emphasizes the connection between the resurgence of the DIY movement in the guise of 'maker culture' – also as an 'American' movement – and biohacking, visible also in the use of similar communication tools such as *Make Magazine* or the website *Instructables* (Delfanti, *Biohackers* 118-19). Indeed, *Make Magazine* was one of the early publications that explicitly included 'making' with biology in their projects.

31 Zooniverse, for example, is one of these platforms on which volunteers can contribute to "people-powered" research in diverse fields such as arts, biology, climate, history, language, literature, medicine, nature, physics and social sciences. Without specialized training or equipment – a computer and internet connection suffice – volunteers assist 'professional' researchers and research projects using the 'wisdom of the many' to recognize patterns, classify and analyze information.

32 Like in the hacker movement the Massachusetts Institute of Technology (MIT) had a foundational role: Like the first hacker groups in MIT labs, the first DIY biology groups were located in San Francisco and Cambridge, representing new and old elites.

One of the first issues, in August 2006, was dedicated to "Back Yard Biology" (07, August 2006) – turning the homes and yards of ordinary people into spaces for experimentation.[33]

Space and place, in fact, are some of the more decisive geographical and material aspects of biohacking.[34] While some groups meet informally or share spaces with hacker or maker spaces, the past ten years have also seen the creation of labs with second-hand or donated equipment and "hacked solutions," such as self-built, open-source instruments. Such labs are often modeled after hacker spaces, in that they are collectively run, community-oriented and shaped by similar political approaches, such as openness (cf. Delfanti, *Biohackers* 112-13). Following the idea that "biological information, knowledge, and techniques should be free, unlimited, and without ownership" (Stevens 351), these community labs give workshops on different biotechnologies, can facilitate informal mentorship and hands-on training (also for students and school classes) while simultaneously giving more experienced biohackers a cheap and well-equipped space to conduct their experiments in.[35] The DIY biology movement, however, has also been known for more informal laboratories in garages and kitchens – the 'backyards' of 'ordinary' people.

The 'hacks' performed in these various settings range widely: Some of the projects are aimed at fun tinkering – for example creating fluorescent bacteria or yoghurt – others at self-knowledge – such as extracting and analyzing one's own DNA. Some try to solve medical problems or to build alternatives to scientific equipment, accepted health care practices and technologies. Others are creative, such as biological art. While much of it is educational – public workshops and outreach activities, student education and discussion rounds – only small parts are cutting edge revolutionary or truly dangerous.[36] Ana Delgado argues that DIY biology is focused on more routine making of (living) things: instead of producing "sophisticated biological objects" or the scientific innovations of institutional science, it engages with and produces more "mundane" (living) things, thus embodying "a different way of engaging with science and technology" (66). Everyday materials – what Stevens calls "whatever they can get their hands on" (351) – but also more specialized tools and materials are used for those experiments. In

33 Critic Sara Tocchetti looked at how "backyard biology" as a category was employed by *Make* magazine: She concludes that the magazine included both "hacking" in the form of "hacking your plants" (through e.g., hand pollination) and bio-engineering as a "hack" in their articles and proposed projects. In these, she claims, the backyard becomes a place of experimentation and analyzation, biology becomes a "material for personal experimentation" (Tocchetti n.p.).

34 In *Domesticating and Democratizing Science*, Morgan Meyer focuses his analysis of biohacking on the spatial-material configuration and enactment of the phenomenon.

35 Some labs in the US collaborate with local high schools to make their spaces accessible for student education. What needs to be acknowledged, however, is that despite the aim of openness and access most of these labs work with fee-based systems: Membership fees for regular access, course fees for their outreach activities, thus restricting their very ideals along socio-economic lines.

36 The specter of bioterrorism is evoked again and again, especially in popular media discussions and amongst institutional scientists. Synthetic biology does play a role, but not in a way that makes it truly dangerous – at least not today (cf. also Ch. 10).

all of them, however, *biology becomes a resource for experimentation*, a material that can be tinkered with.

The potential ascribed to this trend, as in the maker movement more generally, is one of empowerment and democratization, giving people access to their own biological data as well as biological knowledge about the world around them, fostering engagement and education (Meyer, *Domesticating* 2). This educational focus, I will argue, can promote a *scientific literacy* that is needed for the public to not only participate fully in the (political) decision making around biotechnology and its applications and use, but also to make the most productive use of contemporary biomedical technologies, such as direct-to-consumer genetic testing, molecular tests or even tracked biological data: The other sphere of contemporary DIY that is the topic of the next pages.

4.3 DIY Medicine? – Doing and Making in the Healthcare Sector

The grassroots nature of DIY is also visible in how its key principles are carried over into different contexts, here, into medicine. In line with some of the basic cultural values discussed above, health care in the US is a highly individualistic enterprise, based on market rationales and a consumerist idea of the patient (Hall 43, 268-69). The rise of personal responsibility in a medical culture based on risks and susceptibilities, patient empowerment, shifting relations between medical professionals and patients, as well as the Web as communication and information tool have over the past decades contributed to fundamental changes in the health care economy. Patients are reconceptualized as 'consumers,' gathering information, browsing and weighing their options. In the name of empowerment, they are responsibilized to take an active role in their health care, to assert their choices in the medical encounter also against professionals. These developments are preconditions for current DIY trends in that they propagate self-responsibility, self-reliance and self-direction.

This turn towards individualism is foundational for numerous visions of future health care. As many critical theorists and practitioners imagine it today, the most promising developments in health care are consumer-oriented, individualized health solutions through technology: They promise to be more cost effective, targeted and based on prevention instead of therapy. "eHealth" is one of the avenues (and terms) praised for its potential to reduce costs while increasing quality, safety and access to medical prevention and treatment – reached in essence through the employment of information- and communication-technologies in medical settings (cf. Andelfinger 27). Part of this is the growing trend towards "personalized medicine:" Instead of a "one-size-fits-all" model, personalized medicine espouses a preventive, participatory model based on the individual and their own "data," which promises to be better equipped to deal with an aging population and increases in chronic diseases (Sharon 95). Examples include personalized, targeted therapies such as genetic or molecular diagnosis to evaluate individual responses to drugs as well as personal health technologies to gather data and take a more personalized view. These visions of future medicine are focused on the individual, involving them in the process of 'data' collection and decision making. One of the downsides is that here we are witnessing the making of a new *private* health-

care sector, in which personalized approaches are not just restrict to those economically well-off but might also undermine successful community-oriented interventions.[37]

Active Patients and Personalized Medicine

Patient empowerment and personalized solutions are key and center of 'DIY medicine' and thus deserve closer inspection. During the 20th century, medical encounters often left patients feel exposed, helpless, victimized and without control, especially during hospitalization due to the dominating power relations and authority given to doctors (Lupton, *Medicine* 96) – perceived as the sole authority over health and illness, the repository of truth about the body. Such feelings gave medical encounters a bitter aftertaste and contributed to a reversal of power roles, so that power today is increasingly spread evenly between the actors in medical encounters. For one, dissatisfaction with the conditions lead to a growing movement encouraging patient assertiveness that eroded the traditional power of doctors and turned patients into active, resourceful participants (Lupton, *Medicine* 113-15). They were expected and encouraged to do their own research and then take that newly gained knowledge into the medical encounter, challenging the doctors' authority. The internet, some argue, changed the "balance of power" in favor of the patient, allowing easy access to information, the possibility to meet and interact with doctors and other patients, and take an active part in diagnosis and treatment using information from health websites (Oudshoorn and Somers 205). With the wider availability of information on diseases and treatment options, the medical doctor is no longer the only source of information, so their authority is no longer given or (blindly) trusted. This new medium, on the other hand, can also become a source of confusion and anxiety: The wealth of different, in some cases contradictory information, questions about the reliability of sources and their sheer number can turn the gathering of information and their evaluation into an impossible task (cf. Ch. 11.3). Another part of the critique of medical authority and paternalistic relationships is the increased commodification of health care since the 1970s. This commodification has embedded patients into a discourse of empowerment that aims to create responsible, informed consumers, which tend to their own needs, for their own sake and that of society as a whole. More and more medical products are marketed directly to consumers to improve their own health, wellness or simply appearance, as the example of cosmetic surgery shows (Conrad, *Medicalization* 16-17).

The desire to be in power – to be informed and in charge of one's own situation – that is such a central part of DIY medicine today, thus, is also the result of a radical change in the US health care landscape during the last half of the 20th century. Control, in this neo-liberal, individualistic marketplace of health, lies not with authorities but

37 One example is vaccination: On the one hand, those well-off might be able to better protect their children because they are able to pay for vaccinations out-of-pocket. On the other, the high value given to personalized approaches also gives rise to problematic aspects such as anti-immunization movements that risk undermining herd immunity as a successful example of community-oriented healthcare.

with the self; only the self can control the self and pay for the tools needed to do so. Previously thought to be the result of meticulous medical training, the competence believed necessary for such an authority can today be facilitated by technology. Contemporary medical power, thus, does not play out in the form of domination and control but in monitoring and surveillance, discourses that make the intimacies of the patient visible, subjecting them to continuous analysis and record-taking (cf. Have 299). Active participation in health care choices has become a cultural imperative for the (neoliberal) subject, shifting the responsibility and blame for their own wellbeing to themselves and thereby encouraging ever more self-interventions and self-screening.[38] Coupled with the pervasive discourse of risk and susceptibility, this trend makes it necessary for patients to collect even more information on themselves in order to make informed decisions and thus take control into their own hands.

For Till Hänisch the starting point for a broader implementation of personalized technologies is not an initiative on the side of health providers or legislation, but the more widespread adoption of practices such as the Quantified Self movement. He conceptualizes these as the start of an "extensive personalization of health care systems" [my translation], in which the patient takes an active, maybe even central role in health care provision – now oriented towards prevention ("staying healthy") and improvement of life quality instead of cure and extension (6-7). What Hänisch calls "eHealth," following the World Health Organization's definition, has as its goal the personalization of therapy on the basis of individual circumstances. This new individualism in health care, he argues, is also due to the increasing desire for attention to and consideration of individuality, already visible in the high appeal of alternative medicine. Maybe, Hänisch muses, "eHealth and Quantified Self will be the modern form of holistic medicine" [my translation] (7). This statement points to the "deep continuities" between new (DIY) technologies and practices and those that came before them (Greene 306). Complementary and Alternative Medicine (CAM), self-help discourses and self-medication can be seen as precursors for today's more sophisticated and invasive technologies.

CAMing It

Apart of – or rather part of – the growing focus on patient empowerment and consumerism, the past decades have also seen the rise and increasing incorporation of holistic, alternative approaches to health into 'orthodox' medicine. 'Complementary and Alternative Medicine' (CAM) espouses simple, non-technical and non-invasive treatment methods many of which are patient-chosen and paid for out-of-pocket. Many of these are age-old techniques that with the rise of biomedicine had become regarded as 'unscientific' but have in the past decades enjoyed a renewed interest among health-conscious groups.[39] The *National Center for Complementary and Integrative Health* (NC-

38 This ideology of course tends to neglect those patients who either cannot (due to lower levels of education or literacy, for example) or will not fill out this role: This could be the case, for example, when patients have lower levels of education or literacy or when they perceive hierarchical distributions of power as a necessary part of medical treatments.

39 A study by Eisenberg et al. looked at the use of alternative therapies from 1990 to 1997 and came to the conclusion that "alternative medicine use and expenditures increased substantially between

CIH), a US government body responsible for research on medical practices and products that are not commonly considered as part of conventional medicine, lists several different types of Complementary Health approaches on their website, among them natural products – such as herbs, vitamins, mineral, probiotics, and dietary supplements – and "mind and body practices" such as homeopathy, chiropractic and osteopathic manipulation, meditation, massage therapy, acupuncture, relaxation techniques, and movement therapies. Moreover, other approaches – taken over from other cultures – such as yoga and Ayurvedic medicine or traditional Chinese medicine are also included in their list.

All these approaches have in common that they conceptualize health and the body in a holistic manner. Such holistic health approaches do not just include medical concerns – a narrow, technical focus on symptoms and disease – but assume a broader focus that includes nutrition, psychological and spiritual well-being, relationships as well as environmental influences (Lowenberg and F. Davis 581). This holistic view of illness, however, follows the same ideology of active participation in the maintenance of health, maybe even more so (Lupton, *Medicine* 125). While consumers already became increasingly responsibilized for their own health choices during the commercialization of healthcare, this responsibility is heightened in holistic health: individuals are accountable for their own wellbeing (or absence of such) and compelled to prevention (cf. Lowenberg and F. Davis 588,593). Even for healthy individuals there is always room for improvement and optimization, an approach that forces them into constant surveillance of their own bodies. The patient is encouraged to closely monitor their physical and psychological status, actively change her lifestyle, and seek out information and experts in the name of pursuing health.[40] While the symbols and rituals of both medical paradigms differ, they tend to remain mysterious for most patients and require not so much understanding as faith or belief in them (Lupton, *Medicine* 126-27). Thus, also in CAM, specialized knowledge is sold as a commodity, creating barriers of access for consumers who cannot afford to use such technologies (Lupton, *Medicine* 125-28).

Even though some CAM practices are practitioner-based and thus need the interference of an Other in the process, they are most often chosen by the patients themselves. The agency, at least on the surface, traditionally lies with them.[41] Others can simply be taken on if a patient feels like this is the right 'treatment' or solution to their problem. The Web as information medium provides not just free tutorials on mind and body practices but also guidelines on self-treatment with dietary supplements as well as corresponding shops. Part of the medical consumer market, these practices are marketed

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1990 and 1997" primarily because a higher proportion of the population sought alternative therapies, from 33.8% in 1990 to 42.1% in 1997.

40 While some point out that CAM challenges medicalization by bypassing the medical model and medical professionals and creates more informed and articulate consumers (cf. Conrad 11), other critics like Lupton argue that the quest for holistic wellbeing or total health, in contrast, adds to the medicalization of western culture (*Medicine* 127).

41 The question of agency becomes more problematic when we consider how the discourses in health-conscious parts of the population have turned some practices considered to be CAM into 'mandatory' activities for their members. Agency, here, becomes a pretense that is part of their ideology. What comes to mind are practices like Yoga and meditation, or dietary supplementation (think Omega-3) and probiotics.

directly to the consumer as means to fulfill their ideal of health, fitness and wellbeing – on their own accord. However, many of these practices are not 'quick' or easy solutions. Rather, the patient is responsibilized to stick to their treatment regimens, whether they involve regular practice or daily intake. Thus, work on the self – mentally, physically, emotionally – by the self is required to fulfill the ideal of holistic health behind most of them.

Self-Help Discourses

Work on the self is also an inherent part of self-help practices and discourse. From its beginning as a group and community effort of mutual support and the pooling of resources (Withorn 510-14), self-help discourse has morphed into an individualistic enterprise focused on self-transformation. This change is also visible in some of the DIY techniques under consideration in the later chapters, warranting a short historical view of self-help in American culture.

Micki McGee argues that until the 1970s, self-help was characterized as a cooperative, political effort by a community of peers (18-19). Still practiced today, this type of traditional self-help often takes the form of self-help groups. Self-help groups, online and in person, emphasize community, information exchange, collective (political) activism and mutual support and empowerment. The social and collective support provided by such groups was meant to help individuals with personal, family, or emotional difficulties and to achieve personal change or reach their goals (Withorn 510-14). *Alcoholics Anonymous*, established in 1935, with its Twelve-Steps program is emblematic for this type of self-help and served as a guiding principle also for other groups, primarily in the area of substance abuse. Following a similar structure, *Weightwatchers* can be seen as emblematic for self-help groups focusing on self-transformation. Collective activism, information sharing and social support are primary goals of patient and disease victim groups, such as for cancer survivors or chronic health conditions. As information- and support groups this type of self-help can be conceptualized as peer-to-peer support, fostering a sense of belonging and community in which people learn from each other's experiences.[42] Like the maker movement or DIY biology, they are a collaborative effort based on open sharing of experiences, knowledge and information. In successful cases, self-help becomes transformative for the self, in that problems can be solved and solutions found together. This 'do-it-together' attitude, however, is not about making but about doing (something), about taking action to improve your own situation and to help others in a similar situation.

However, since the late 20th century, wide parts of self-help culture has morphed from one focused on mutual aid and support into an isolated, individual 'undertaking,'

42 Even though the impulse for communal support is a healthy one and the emphasis on sharing and a like-minded community counters isolation and feelings of alienation, social components and structural difficulties are often disregarded in favor of a high focus on the individuals and their need to work on themselves (Withorn 517-518). Creating new forms of "biosociality" (Rabinow), these groups continue discourses of personal responsibility and expand the normalizing gaze to peers (Lupton, *Medicine* 128-29).

focused not that much on collective, political action but on self-fulfillment. According to McGee, this focus on self-fulfillment has expanded the scope of self-help indefinitely because there is no end-point, no conclusion to such projects of self-making (18-19). The self, the body in this individualistic self-help becomes a personalized project. As McGee writes, "[i]magine a self and then invent that self […] [p]icture a life, then create that life" has become the motto of American self-help – one that "has long infused American culture with a sense of endless possibility" (11). These endless possibilities are also highly visible in popular culture: A trip to the bookstore will reveal countless shelves filled with books, manuals and guidebooks on how best to go about your personal project of self-improvement and self-empowerment.

Self-help books, in fact, are to a certain degree emblematic of the erosion of collectivity and the rise of individualization: Reading self-help literature is not a community-oriented but a solitary activity, not focused on exchange but on individual work on the self. In 1859 Samuel Smiles published *Self-Help*, a widely-sold book on personal development and character building based on values such as hard work, morality, thrift and perseverance, that turned out to be a precursor, and in fact eponymous for the whole genre. It was however not until the last half of the 20th century that the US saw the explosion in self-help or self-improvement literature we see today. These self-help books typically span from psychological topics (work on the soul) to physical fitness (work on the body). What they share is, according to Sandra Dolby, a distinct combination of self-improvement content, an informal style, a problem-solution structure, and an educational function – turning them into an own genre of popular literature (37). This genre, argues Dolby, is commonly used as part of a self-education process in which people create a "self-directed" course of study for themselves that addresses their concrete situation and context (viii). The self-help genre has come to be a distinct element of American culture, as Dolby claims (37). For her, self-help books are a cultural resource that reflects and perpetuates foundational American values. Authors often draw on ideals and wisdoms deeply engrained in American culture and heritage and pass them on to the reader, for whom the books become a way to personally "experience" culture and incorporate some of its core values into their own worldview. As such, readers of self-help books are both embedded into a wider community and culture and solitary learners on a path to self-education (Dolby viii).[43] Today, this type of self-help has reached past books into audio-visual and multi-media channels.

Most self-help books promise some sort of transformation, to become better, healthier, happier, more productive, successful and satisfied. Economic success, intellectual advancement, emotional or physical health, losing weight, increasing one's performance, self-confidence and positive thinking are typical topics of self-help discourses.[44] They are marketed and sold as tools for self-optimization and improvement

43 Dolby argues that the "underlying assumption" of self-help books is "the prominence of the self" in American culture. The community is a concern, but the individual comes first also in many self-help books (21-24).

44 Medical advice books can be considered as part of this self-help genre. Gathering information about how to identify, treat and cope with health problems can be seen as self-help more narrowly. This is by no means only a recent trend. Medical advice books have since the 18th century distributed information on illnesses and their prevention as well as desirable health-related be-

in almost all aspects of life. This is reflected in the basic structure of all self-help books, the identification of a problem or a lack (in ourselves, our culture or the information about the world we possess) and the suggestion of a solution (Dolby 5). This structure, though superficially empowering the reader with new knowledge, always engulfs them in a *discourse of deficiency*, in that the appeal to self-improvement necessarily defines the reader as always insufficient in some regard (McGee 17-18).[45] The focus, again, is on personal responsibility for your wellbeing and active participation with knowledge being key to success (Lupton, *Quantified Self* 50-51). As a contemporary technique of the self, self-help discourses become a means to display and perform a desired identity, to shape your conduct, self, and body through psychological and material work on the self. Like Gelber's view of DIY home improvements, self-help becomes a form of "productive leisure," work-like but now focused on psychological and bodily improvement. Similarly, for McGee self-help or self-improvement is a new form of immaterial labor that is expected of the individual. As such, the individual has become a "belabored self" burdened with constant evaluation, management and reinvention of the self to remain competitive (16).

This is a very much consumerist undertaking: In personal coaching, (online and offline) seminars, books, videos or tutorials 'experts' sell their knowledge to the uninitiated who want to 'transform' their lives for the better. A whole array of marketing techniques creates a complex of artificial desires and needs that self-help promises to fulfil. It is no wonder, McGee argues, that the popularity of self-help rose in economically precarious and uncertain times: Insecurity and unpredictability in the labor market and personal life call upon individuals to work on and invest in themselves, to improve themselves to remain competitive, attractive, valued (12). In self-help, actual lives are continuously assessed against some imagined future, a "pleasurable pornography of possibilities," a promise of power that far from actually bringing pleasure, according to McGee, is a recipe for dissatisfaction and erosion of collectivity in favor or narcissistic individuality (158-60). Contemporary self-help, following this line of thinking, is propped up by some of America's core values as well as a complex network of affective structures, most prominent among them anxiety and desire.

To summarize, I would argue that *DIY Patients* are nothing particularly new. But today the tools at their disposal are much more sophisticated, knowledge easier accessible and socio-political as well as economic factors in their favor. For a long time, paternalistic doctor-patient relationships resulted in feelings of helplessness and alienation on the side of the patient. Already older DIY techniques in medical contexts, their empowerment and self-starter attitude, can be read as a symptom of this strained distribution of power. Coupled with a commercialized responsibilization of the patient as

haviors. Around that time, self-medication through lifestyle changes and herbal remedies had been common (cf. Lupton, *Medicine* 83). While that has changed wildly with the professionalization of medicine, advice books and guides to self-medication – especially in the area of homeopathy, CAM and over-the-counter drugs – are still commonly available, even more so through the Internet. In this case, the patient-consumer becomes diagnostician and practitioner in one.

45 We could speculate that this fact, and the sheer number of self-help books out there, might also lead to some form of 'self-help dependence' in which readers move from one self-help book to the next, never knowing what to do, which information they can trust and which they can ignore.

consumer and prudent citizen committed to health and fitness as personal goals, they have normalized self-reliance, self-responsibility, self-direction and self-improvement also in biomedical contexts. Most of these common DIY techniques are more abstract forms of medical DIY, focused on psychological changes to health as well as collective action, means of participating in the medical encounter and decision-making processes yourself. Those that come closer to the material nature of contemporary making are included in the next part of the book, since those are the 'new' forms of medical making that are my primary concern. It is, however, highly interesting how many of those 'old' practices find their way into some of the 'body hacks' looked at in the next chapters.

4.4 Coda: The American Maker

> "Off all things Americans are, we are makers. With our strengths and our minds and spirit, we gather, we form and we fashion. Makers and shapers and put-it-togetherers" *(Banes and Hoag, 0:16)*

Like the opening quote for this chapter, these words are setting the stage for a 1960s patriotic documentary, produced by the automobile industry under the name *American Maker*.[46] Individualism, self-reliance, self-sufficiency, autonomy, have as fundamental American values paved the way towards this diagnosis. Do-it-yourself is omnipresent in US culture, not only in its crafty sense of home-made alternatives to commercial solutions but also ideologically, and possibly more pervasively, in the sense that you need to take care of, look after your self yourself. DIY is not a purely American phenomenon, but one that is much more prevalent in the US: especially the DIY activities under consideration here have their birthplace in American culture and contexts.[47] Part of an old movement of makers, tinkerers, inventors and hackers, they are, essentially, old practices in a new guise, continuations of foundational American myths with tremendous formative effects, such as the Horatio Alger-style rags-to-riches stories or bootstrap ideologies such as the American Dream. In press accounts, maker culture and DIY biology are often represented as part of a long tradition of American innovation, that last raised its head in the tale of Silicon Valley as the worldwide hub of software innovation (Delfanti, *Biohackers* 117). DIY, thus, is integrated into a (proposedly) unique American myth of innovation, entrepreneurship and self-reliance: Making is not only fundamentally human, it is fundamentally American.

As many scholars point out, however, 'making' or 'doing' is not a new phenomenon, but rather today it has entered a new phase in which it is experienced as having a new

46 This documentary – a promotional video for 'made in the USA' – does not just perpetuate the ideology of American exceptionalism, it also perfectly reflects the problematic gendered divisions of 'making' in the 1950s and 60s. Its ideological scaffolding should thus be seen critically, an emblem of its time and place.

47 The first DIY biology groups were founded in the US and medical DIY is more prevalent in the US, also due to its market-based health care economy and lack of comprehensible health insurance for all, cf. for example Keulartz and van den Belt.

quality. It is a phenomenon that goes back decades, but that with a new coating is experienced as 'new' (cf. Gauntlett 61-63; Bal et al. 157-58). According to Gauntlett, part of this 'newness' is a different form of visibility, empowerment, inspiration, and connection especially through changes in media and communication technologies (61-63). The DIY techniques included in my discussion are a similar case: Neither biohacking or DIY biology nor the DIY patient are new phenomena. Delgado argues that DIYbio is not an original or isolated phenomenon, but "emerges as one of many DIY outbreaks that we see today within different sectors of the public," a proliferation of making, mending, hacking of different kinds (66).[48] The new quality of these developments is the result of tremendous technical and biomedical advancements during the past decades. These have not just made them easier to do yourself, but have also raised the stakes both for individuals and the community.

Moreover, the DIY trend is the result of its socio-political and historical contexts: The political, social, cultural climate also in the US points into the direction of more participation and activism, in different forms and in certain circles. DIY citizenship, participation in decision making processes is part of a larger (political) shift – ranging from absurd and small-scale decisions, to large ones such as national budgets. More participation, thus, has come to be a cultural consensus. Many of the practices under discussion in my project, in this regard, are not necessarily isolated processes, but point to a larger yearning to be heard and acknowledged, to be part of the decision-making process and not subject of it (cf. also C. Lee).[49] In this context, the contemporary "Do-it-yourselfism" (Frauenfelder 217) also has a transformative potential for the material world as well as public life: fostering engagement and communities in individualist societies, bolstering confidence and competence in an ever changing world, providing possibilities to intervene in established systems of power.[50] Also leisure activities can be political because they directly influence – generate and reproduce as Gelber phrases it – the structure of society. No matter whether they are mainstream pastimes or counter cultural ones, they are part of the "mutually compatible and reinforcing" public institutions that form the fabric of everyday life (Gelber 11). Ratto and Boler argue in a similar way that making can be understood as political because it invites critical reflection on

48 A similar stance is visible in Keulartz and van den Belt: "But the significance of its incipient paradigm of knowledge production is not limited to the DIY-Bio movement. DIY-Bio is not an isolated phenomenon but has emerged as one of many Do-It-Yourself initiatives that we see today within different technological domains (food consumption, repairing and re-using electronic waste etc.) in which citizens manifest themselves increasingly as makers, menders, and hackers." (Keulartz and van den Belt 16).

49 Caroline Lee in *Do-It-Yourself Democracy* discusses public engagement and citizen participation in various (political) domains and decision-making processes. Examples include the decision-making processes and efforts at public participation in the rebuilding activities in New Orleans after hurricane Katrina.

50 For a similar argument cf. Gauntlett, who provides a discussion of the creative, self-transformative and community-building potential of making (245), and Ratto and Boler on "critical making" and its potential to disrupt, intervene in and critically reflect on established systems of authority and power (1-3).

systems of power and ideologies, modes of production, and processes of interaction (1-3). Likewise, Gauntlett says that the growing maker movement rejects the wide-spread "sit back and be told" ideology and its passivity in favor of a "making and doing" culture oriented towards "creativity, social connection and personal growth" (11-13). Do-it-yourself, it is implied in all these scholarly accounts, is also a form of socio-political intervention.

DIY biology and medicine, in my view, are the logical expansion of more traditional 'DIY' projects: In their process orientation, the satisfaction they bring and appeal they create, their self-directed and highly material nature. In DIY we are constructing knowledge about our bodies, selves and life in general from very much material practices. DIY in its essence is learning by doing, a tinkering with processes, the modification of matter for utility, fun, education or exploration. It is this essence that the practices and techniques under discussion in this book take over from historical DIY practices. For Delfanti, biomedicine is one of the spheres in which openness and accessibility is the most valuable and "culturally entrenched" *(Biohackers* 12). The ideology of openness and transparency so foundational for DIY biology is visible also in the DIY patient. Breaking down the doors of medicine, gaining agency in medical decision making, giving and gaining access to medical knowledge and technology, open sharing of information – these were and still are some of the most important goals of proponents of consumer-medicine and self-help cultures. New technologies and the Web 2.0 sharing ethos make it all the more applicable and relevant today.

We need to be careful, however, to acknowledge that this is still an emergent phenomenon "looking for stability," to quote Delfanti: It is still immature and hard to grasp (*Biohackers* 25). Its contours and consequences remain open and are subject to the pervasive uncertainty that rapid technological change brings with it. Still, seeing it as the result of recent convergences and age-old traditions and values allows us to discern some of the concerns, potentials and problematizations social and cultural discussions need to consider. One contributor to *Make* inspired Frauenfelder with "his perspective of the world as a hackable platform, something to be remade and remodeled" to his own liking (21). It is this idea of *life* as a "hackable platform" that is emblematic of the pervasiveness of DIY: Everything can become your new project, life is your oyster. You might only need a bit of creativity and perseverance. The question remains whether or not this ethos of 'do-it-yourself' will reach a cultural relevance that equals a downright revolution in how people innovate, collaborate, and produce knowledge and material goods; whether or not it will achieve a fundamental change in how people perceive of themselves and their material environment.