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Taming monsters: The cultural domestication of new technology ☆

Martijntje Smits

*Department of Technology Management, History, Philosophy and Technology Studies,
Eindhoven Technical University, The Netherlands*

Abstract

Central to public discomfort about new technologies is the notion that they are unnatural. Experts often suppose that better knowledge of technology and risks would help overcome public aversion. This assumption turns out to be fairly fruitless, often even increasing social polarization. The pattern of diverging risk assessments about technology might be improved by a better understanding of the moral gut feelings at stake. However, current technology ethics does not seem to be equipped for elaborating theories to explain public discomfort. Either public fear is not taken seriously, or ethical–theoretical rationalizations of moral intuitions lead to unsatisfactory, naturalist constructions, such as the intrinsic value of nature.

For a better understanding of current risk controversies, a detour is made to the cultural anthropology of Mary Douglas on pre-modern ideas regarding danger. This offers some clarifying insights into modern perceptions of technological risks. Departing from anthropological observations, a so-called *monster theory* is sketched, which gives an explanation for the fascination with and aversion towards new technology, leaving aside 'naturalist' and 'nature-skeptic' explanations of technology ethics. Monster theory offers a point of departure for a new, pragmatic approach to controversies about new technology, the approach being named a pragmatist monster-ethics. It tells us we have to reflect on and shift cultural categories as well as to adapt technologies in order to domesticate our technological 'monsters'.
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1. Two worn-out grooves

During the Christmas holidays of 2002, an American company called Clonaid claimed the birth of the first cloned human baby. Before any scientific proof of this media-provoking news was offered (in the end the baby never appeared), opinions exploded from newspapers, chat sites and broadcasting stations all over the world. Apart from the skepticism about the news itself, the media coverage enflamed the ongoing controversy concerning cloning and 'designer babies'. While disapproval and disgust about the manufacture of babies dominated, together with calls for a ban, others continued to tell us that cloning promises great perspectives, particularly therapeutic cloning in the interests of medical science.

The commotion about the alleged cloned baby does not represent a solitary case. Public and expert reactions to new, evocative technologies actually show a steady and persistent historical pattern. Whether it is nuclear energy, plastics, steam engines, GM food, xenotransplantation or nanotechnology, time after time public discussion remains stuck in a groove. More exactly, public discussion is stuck in two worn-out grooves, one of salvation and fascination, the other of doom and abhorrence. Indeed, it seems that this 'utopia-dystopia syndrome' [2] shapes initial public judgment. However, the syndrome does not appear in all cases of new technology. Useful innovations such as fiberglass cables, a new type of wheelchair or a technique for storing heat slipped into use without being exposed to suspicion of special, unknown risks, or of wide-ranging forecasts of human welfare. But as soon as the cloned sheep Dolly was presented in 1997, opponents hastened to declare that fundamental, natural boundaries had been crossed, while proponents were sketching the limitless frontiers that could be opened up by this kind of experiment on animals.

In this recurring pattern two aspects catch the eye. First, it seems that different risk perceptions in the technology debate are linked to different ways of appreciating the unnaturalness of technologies. The fact that technology oversteps natural boundaries is regarded as having either very positive or very negative value. Secondly, the controversy is often portrayed as a conflict between emotion and reason. In 2000 for example, Greenpeace provoked the Dutch public with large roadside billboards, suggesting that an American genetic company had them posted with the message (translated from Dutch): "*Your lettuce stays fresh because we put rat genes in it. Enjoy your meal!*" (Fig. 1).

In a recent lecture to an audience of Shell managers, Rudy Kousbroek—a well-known Dutch writer, cynically criticized Greenpeace's campaign: "They even gave up trying to assert something sensible. They do nothing more than speculate on the public's ignorance, their only target being to frighten people. The tragic thing is that this emotional language without argument doesn't make the public and the media suspicious at all. It is alarming that the public does not automatically choose the side of those who appeal to verifiable facts and data" [3].

Thus, it seems, we should welcome the increase in official efforts to grapple with public polarization. At present, in fact, we are being bombarded by a number of attempts at steering, from governmental bodies, to raise the quality of public debate on technology. In the last few years these attempts have resulted in large-scale information campaigns and carefully orchestrated public discussion. But so far they have not been very successful in avoiding intense public disquiet about new technology. We have seen various examples of this in the Netherlands. In 2001 the national government launched a broad discussion on

Fig. 1.

GM food, the 'Public Debate on Food and Genes', which included voices from many social groups. When the Dutch Minister of Agriculture and Fisheries, Mr. Brinkhorst, announced the debate, he declared: "We should avoid thinking in fixed patterns and predictable positions." Instead, we needed "… an objectifying social debate, aiming at the development of knowledge, by using adequate debating methods" [4].

The organizing committee was aware of social polarization. With the disappointing experience of the Dutch 'Broad Social Debate' on nuclear energy in the mid-1980s still clear in the mind, the committee tried to avoid escalating emotions inside and outside the discussion rooms. Unhappily, despite these sincere intentions, these efforts also failed. Shortly after its start, most environmental NGOs withdrew from the round table, declaring that the steering committee's information about genetic food was not objective at all, that it had ruled out the most crucial questions and that the whole enterprise had the character of a governmental information campaign rather than an open debate.

Therefore avoiding public polarization might be much more complicated than the organizing committee had expected. The grooves and their persistency are the pitfall. It would seem that for a more successful approach, we first of all need to have a better understanding of this persistency, its causes and its underlying emotions. What is at stake in the public discomfort and the euphoria about new technology? What mechanisms are at work in giving sense to new technology? What can experts tell us about this problem?

To start with the last question I turn to two philosophers involved in the debate on biotechnology, both of whom have tried to explain public discomfort. Since their answers are quite unsatisfactory, I will sketch another approach to these questions—one that I have called the 'monster theory'—in the rest of the article.

2. Naturalism and nature-skepticism

Increasingly, applied philosophers and ethicists have dedicated themselves to analyzing and evaluating technology debates. Surprisingly though, their reflections often fail to question the roots of the pattern as sketched. Instead, philosophers rather tend to repeat the polarized pattern in academic disguise, instead of indicating new directions to escape it.

For instance, the American political philosopher Ronald Dworkin argued in *Playing God* (an article published in several international newspapers) that public and governmental reactions to clone Dolly were largely exaggerated [5]. He denounced the official prohibition on further research as definitely unjustifiable. Instead, he explains the strong public reactions as a product of fear, fear of a "moral free fall" and of a demolishing of our established convictions and views on nature. In Dworkin's eyes, this fear is a sad misconception. Our contemporary values, he states, are "ill-considered" and even "wrong" in the light of the new situation. The public rejection shows "an irresponsible cowardice in the face of the unknown" (Idem year??!).

An opposite response came from a celebrated British ethicist, Mary Midgley.[1] [6] Midgley asserts that the public discomfort regarding biotechnology should not be trivialized as if the public is blinded by exaggerated emotions. Instead, she thinks, these gut feelings should be understood as the result of justifiable objections. It is not just a question of getting used to the new biotechnological products, as is suggested by the proponents. On the contrary, biotechnology forces us to change our core ideas on the malleability of nature and on the distinction between species. These ideas on nature are not coincidental concepts, but fundamental achievements of evolutionary biology. Species cannot be mutually intermingled, and if they are, such mixtures usually turn out to be lethal. Denying these natural boundaries will unleash unforeseeable powers and dangers, according to Midgley. And while Dworkin actually encourages us to 'play God', Midgley tells us that such a call is inappropriate for several reasons. First, this call cannot be addressed to the entire community (as Dworkin suggests), for only a small elite of biotechnologists is able to manipulate genes. And second, 'playing God' is exactly what this elite, enchanted by "power fantasies", already does, pretending they can perfect living nature and solve social problems with a technical fix.

Despite their intention to reflect carefully and to give precise arguments, in the end Midgley and Dworkin stay close to the arguments and divergent risk assessments of public debate. But thanks to their philosophical explicitness we can see that their conflict concerns the moral status of nature. Dworkin could be called a *nature-skeptic*, for he is skeptical about using our preliminary visions of nature as a source of moral wisdom. Instead, he treats nature and visions of nature as malleable to human goals. Midgley on the other hand emphasizes the fragility of natural order and the limits of manipulation. She could be called a *naturalist*, for she considers natural order—particularly as it has been modeled by evolutionary biology as a decisive source of moral orientation.[2]

Unfortunately, neither of these positions is very convincing. In Dworkin's nature-skeptic position, public fear is subjectified. He suggests that fear is nothing more than sheer emotions devoid of rationality. Meanwhile Midgley's attempt to rationalize public gut feelings leads to an unsatisfactory naturalist explanation, mistakenly suggesting a logical relation between the 'is' and the 'ought'. Accordingly a salient asymmetry appears in the positions: either public fear is rationalized, while simultaneously fascination is trivialized, like Midgley did, or public fear is played down while fascination is legitimized, as in Dworkin's argument.

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[1]As a matter of fact, Midgley did not explicitly react to Dworkin in this article, but surprisingly most of the arguments in her article mirror Dworkin's arguments. Midgley disputes common arguments of proponents. It is a coincidence, though a salient one, that these correspond to the arguments Dworkin used.

[2]The difference between 'nature skeptics' and 'naturalists' is derived from Soper [7].

So far, ethical theory seems to fail in doing justice to strong, but hardly defensible moral intuitions in technology debates. Other authors have observed this as well [8,9]. This impasse gives us cause to search for a more convincing explanation for the fixed pattern— and for another way out. With an eye on the flaws in the arguments of Midgley and Dworkin, I suggest such an explanation should at least fulfill the following methodological demands: (1) It should give a symmetrical explanation, in which fear of and fascination for new technology are clarified by the same mechanism; (2) it should avoid a simplistic understanding of emotional reactions, (i.e. as if they resulted only from a lack of rationality), and (3) it should avoid a naturalist justification of moral intuitions.

A promising key to such an explanation can be offered by seriously considering the cultural dimension that mediates our ideas on technology and its risks. To work out this promise, I sketch the contours of a *monster theory* of technology in the following sections. I have developed this monster theory in my dissertation [1]. It is particularly inspired by the cultural anthropology of the British scholar Mary Douglas. Her famous research on the pre-modern ideas of impurity and danger offers some elucidating insights for understanding modern perceptions of technological doom and salvation.

3. Monster theory

The 'monster' is a popular metaphor to depict new technology, especially for those who adhere to the dystopia side of the syndrome alluded to. 'Frankenstein food' for example, the dystopian nickname for GM food, has become a popular expression since its launch by Prince Charles in his notorious attack on genetically modified food in March 1999. And lately the Prince has even recycled the monster metaphor for nanotechnology in medicine, declaring that millions of small monsters would inhabit our bodies, rapidly multiplying themselves and annihilating life on earth in the long term [10]. The use of the monster metaphor is not a coincidence. Frankenstein's monster in particular has long since been a key metaphor to illustrate the dangers of new technology. Here it symbolizes 'technology-out-of-control'; a technological creation that overrules the master's autonomy, with devastating results. Mary Shelley's novel teaches us that Doctor Frankenstein's creation developed his monstrous nature because his creator did not want to take an active responsibility for it. Instead, Doctor Frankenstein ran away.[3]

In elaborating the apparent attractiveness of this monster myth, I discovered the pioneering work of Mary Douglas on ideas of impurity and danger in traditional cultures [13].[4] Douglas shows that experiences of impurity and danger are inherent in any culture, in traditional as well as in modern societies. She disputes realist explanations of notions of impurity, such as the Jewish taboo on pork, which link these ideas to naive, pre-scientific ideas about hygiene. For example, pigs are allegedly considered to be impure because they root in the soil with their noses. Instead, according to Douglas, ideas of impurity and pollution refer to symbolical order. They emerge when a phenomenon does not fit in current cultural categories that order the world.

These categories differ from culture to culture. They are the result of a social learning process. For the most part they are shared collectively, therefore they could be called *cultural* categories. They give shape to a symbolic reconstruction of worldly phenomena.

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[3]Mary Shelley [11]. See also Langdon Winner's interpretation of the Frankenstein story [12].
[4]Actually Douglas only incidentally used the monster metaphor [14, p. 283–4].

This cultural order is of cognitive importance, but it also has a normative significance. Cultural categories are at the same time moral categories. Thus cultural, symbolic order is characterized by an inherent naturalism.

Cultural categories form a precondition for our perception of phenomena. At the same time perception often struggles with those categories. Many phenomena, particularly new ones, are at odds with clear-cut categories. In that case, the deviating phenomenon is experienced as 'dirt', or, in Douglas's words, as 'matter out of place'; it is not in its right place in the symbolic order. A special case of confusion appears when a phenomenon fits simultaneously into two categories considered to be mutually exclusive. Thus a situation arises in which the phenomenon cannot be transformed into 'matter in place'; the discomfort will necessarily persist. To distinguish this case from 'matter-out-of place' I have called this ambiguous phenomenon, this unnatural being, a *monster*. Douglas shows how the ambiguous gives rise to feelings of fear and abhorrence. But it could also cause feelings of fascination or reverence—or both. In that case, the ambiguous is experienced as a 'miracle'.

Accordingly, Douglas explained why some animals in traditional Jewish culture, particularly pigs, were perceived as 'abominable': pigs did not fit into the intricate taxonomy used by the ancient Hebrews to classify the animal kingdom. In this taxonomy quadruped animals were considered to be either ruminants with cloven hooves, or non-ruminants with uncloven hooves [14, p. 283–4]. The pig was impure, because as the only being in creation, it was not a ruminant but it did have cloven hooves. As a consequence, pigs did not fit into the natural order and therefore they were considered to be terrifying and 'impure'.

The ambivalent induces fear. Fear is one of our reactions to things or situations we cannot understand or control. Fear is connected to the presentiment of radical unknown

Fig. 2. The sacred pangolin.

dangers. Fascination or reverence is another reaction to the unknown. Accordingly Douglas shows how in traditional cultures the impure and the holy were often deeply connected. A remarkable example of this is the pangolin, a kind of scaley anteater, which had a very special status for the Lele, a traditional tribe living in the African Congo. In Douglas' description, the Lele were a very pollution-conscious people in secular and ritual affairs, which were especially expressed in their approach to animal food. [13, p. 167]. In their taxonomy of animals the pangolin had a special status, for it fell outside all kinds of categories in the Lele's view of natural order: it had fish-like scales, though it was a land animal; it looked like a reptile, but it was a mammal; animals were considered to have multiple births, but like humans the pangolin produced one young at a time. So it was a monster in many respects. However, in the most significant cult of the Lele, the pangolin turned into a sacred being. It was hunted by a group of initiates, prepared and eaten. The Lele believed that this would strongly induce fertility and prosperity in Lele society [13, p. 170] (Fig. 2).

4. Modern monsters

It is not only traditional society that is permeated by symbolical order. Today we still organize the world into cultural categories, though these are utterly different from those of traditional cultures. In fact modern societies comprise many subcultures that are distinguished by the use of different cultural presuppositions. Despite these differences, some central pairs of categories are widely shared: for example man and woman, nature and culture, human and animal, organism and machine, life and death. Artificial beings that combine properties of both are usually perceived as terrifying at first sight, for they transgress borders believed to be natural. Accordingly, the monster of Frankenstein as Mary Shelley portrayed him was a mixture of human and machine. It also was a living creature made out of dead body parts from the graveyard. So Frankenstein's monster represented at least two mixed-up cultural categories.

Yet, like pigs for the ancient Hebrews, new technologies often fail to fit into our standard categories. In medical technology and biotechnology, transgressions of categories are almost a regular feature. Modern medicine continuously mixes up life and death, human genes and animal genes, machine and organism. A clear example is xenotransplantation technology, which actually contains at least three kinds of cultural ambivalences: human and animal (animal organs are transplanted into human bodies), life and death (parts of dead bodies are transplanted into living organisms) and organism and machine (organisms that were traditionally considered as unique and indivisible have become repairable like machines). Cloning of humans or animals offers another disagreeable mix. In this case an exclusive quality of artifacts, their reproducibility, is transferred to an organism, a being that in our deep-rooted conviction is characterized by its uniqueness.

5. Plastics

The potency of these hypotheses can be tested by examining public discourse on plastics and plastic waste in history. The cultural history of plastics, profoundly reflected in 'American Plastic' by Jeffrey Meikle, a historian of technology, is a main source for this investigation. This piece of scholarship is a true goldmine of opinions on plastics in the last

century, with a focus on the US but also looking beyond national borders. It appears that for a long time public reactions showed a remarkably capricious pattern, filled with conflicting emotions and paradoxes. However, Meikle does not articulate or theorize this pattern. While the quality of synthetic materials was still poor in earlier periods, dreams about its potential were sky-high. But while its qualities and its reach of application seemed to improve by the day, its image deteriorated rapidly. The same special qualities that were initially praised—its cheapness, lightness, unnaturalness, durability, its moldability, its imitative properties, its capacity for mass production, its insensitivity towards forces of decay—these same qualities were despised in later periods. Can monster theory give a coherent and rich interpretation of this pattern?

The answer is affirmative. Public reactions to plastics, from fascination to abomination, can be explained by the culturally ambiguous position of plastics. From the very beginning, plastic was portrayed as an unnatural substance by its inventors and promoters. Initially, this quality had a very positive connotation. For the first time in history, mankind had been able to produce a raw material artificially. Until then, raw materials were considered to be the product of nature, to be elaborated by man. Plastics were considered as a unique exception to that rule.

Thus, in the first decades of 20th century, plastics were considered a miraculous substance. The 'unnaturalness' of plastics gave rise to widespread euphoria. It was a triumph of mankind over nature. All kinds of fabulous futures were predicted. Edwin Slosson, a journalist and director of the Science News Service, portrayed chemists as 'agents of applied democracy', since those rare materials that were formerly "confined to the selfish enjoyment of the rich", were now "within the reach of every one". So plastics produced "a state of democratic luxury" [15, p. 70]. Fulfilling the ancient alchemists' dream of transforming dirt into gold, chemists would gradually "substitute for the natural world an artificial world, molded nearer to its heart's desire" [15, p. 69]. The "Expanding Age of Plastics' was announced with great fanfare. In 1941, Yarsley and Couzens, two applied chemists, wrote in a popular science magazine how the Age of Plastics would open a world brighter and cleaner than any previously known, "a world free from moth and rust and full of color" [15, p. 68; 16]. It was a world in which 'Plastic Man' would live surrounded by safe, hygienic, strong, soft, light and clean objects. The utopianism of Slosson echoed undiminished, for those chemists sketched how, thanks to plastics, the human race was on the threshold of an age of abundance, "a world in which man, like a magician, makes what he wants for almost every need, out of what is beneath him and around him; coal, water and air" [15, p. 69].

Not long after, precisely this same quality of artificialness and unnaturalness became the essence of plastics' supposed evil. Now, the material was condemned as being fake. After the Second World War, in which many materials had become scarce and had been substituted by synthetic materials, there was a growing call for 'real', natural materials. Plastics started to symbolize a fake, cheap, materialist world that would finally end in human alienation, cultural decrease and loss of control over technology.

In a women's magazine in 1947, the young Rachel Carson[5] expressed an early sign of discomfort: "The witchery the chemist performs, turns them first into something unearthly, that gives you the creeps. You feel, when you go into a chemical plant where plastics are made, that may be man has something quite unruly by the tail" [15, p. 127; 17]. Roland

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[5]Rachel Carson also is the author of the well-known environmental indictment 'Silent Spring', 1962.

Barthes, the French literary critic, uttered a similar distrust some years later after visiting a large exhibition on plastics in Paris. Barthes feared that the whole world would become plasticized, even life itself. "Already they have begun to produce plastic aortas", he wrote [18]. But meanwhile Barthes supposed we would not be able to imitate living materials. Plastics will remain inferior to natural materials, he declared.

And there was the cult film "The Graduate" (1967). "Just one word:.. plastics. There is a great future in plastics". In the critical postwar climate, most cinema-goers immediately recognized this sentence as a cynical joke, as a metaphor of the phony, banal and materialist world the central figure has entered. During a party, one of his parent's friends offers unsolicited career advice to the new college graduate Benjamin Braddock (played by Dustin Hoffman): "Just one word: plastics". It became a famous saying, full of dense cultural criticism.

Carson's and Barthes' negative perception may have been understandable in the context of the late 1940s and early 1950s, in which a clear discrepancy between the actual qualities of plastics and the former promises became palpable. Despite their alleged durability and inviolability, many types of plastic still easily crumbled, discolored and broke. Indeed they seemed to be inferior to traditional, durable materials. But teething troubles of this kind gradually disappeared in subsequent decades.

The public image of plastic reached rock bottom in the late 1960s and early 1970s, when environmental concerns had turned plastics into a central emblem of environmental disaster, exceeded only by nuclear radiation. The plastic waste problem was eloquently portrayed by the novelist Norman Mailer, who talked about plastics as spreading through the country "like the metastases of cancer cells" [15, p. 177; 19]. Again its unnaturalness was the stumbling block for plastic. Whereas in the former phase plastics had been considered as an exception in the cultural domain, now their exceptional status in nature was being emphasized. Their essential flaw, according to biologist and environmental journalist Barry Commoner, was their inability to degrade when discarded as waste [20]. In terms of the monster theory we could say that plastics, in contrast to all other (natural) materials, retained their cultural inscription even in the waste stage. Normally, we suppose, discarded things lose their cultural, artificial identity in a process of pulverization, dissolution and decay. But plastics keep their cultural identity even when they are waste. Thus, they are not just matter-out-of place, but a monster, for their ambivalence in nature cannot be taken away.

Commoner saw the ultimate clash between nature and culture caused by plastics expressed in the image of a wild duck, a symbol of pure nature, strangled by a plastic ring from a six-pack of beer:

> "As the ecosphere is increasingly cluttered with plastic objects nearly infinite in their shape and size, they will—through the workings of nature and the laws of probability—find their way into increasingly narrow nooks and crannies in the natural world. This situation has been poignantly symbolized by a recent photograph of a wild duck, its neck garlanded with a plastic beer-can pack.
>
> *Consider the awesome improbability of this event.* A particular plastic pack is formed in a factory, shipped to a brewer, fitted around six cans of beer, further transported until it reaches human hands that separate plastic from beer can. Then, tossed aside, it nevertheless persists until it comes to float on some woodland lake where a wild
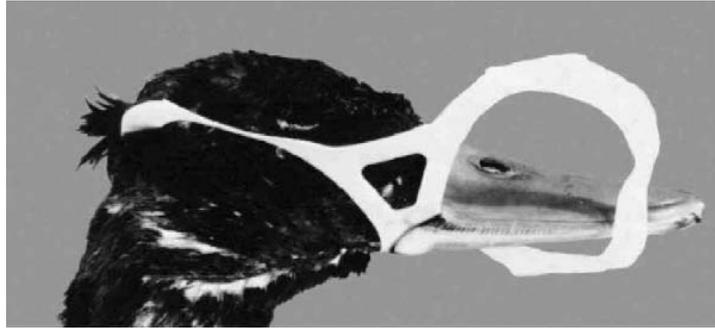
Fig. 3.

duck, too trustingly innocent of modern technology, plunges its head into the plastic noose" [20, p. 64].

"..This situation has been poignantly symbolized by a recent photograph of a wild duck, its neck garlanded with a plastic beer-can pack" [21].

Then, in the 1980s, the general aversion against plastics slowly abated. Instead of placing all plastics under a ban, environmentalists began to differentiate between the different types with different degrees of environmental burden. Several strategies were developed to cope with plastic waste monstrosity, such as material recycling, converting waste into new primary products; 'chemical recycling', decomposing polymer materials into oil-like products, or the development of biodegradable polymers (Fig. 3).

So the fierce emotions and, especially, the abrupt changes in perceptions regarding plastics cannot be explained by the qualities of the material. Quite the contrary. On the other hand, explaining the capricious pattern of public fascination and disgust towards plastics by pointing to the alleged 'emotional approach of the public', as spokesmen for the industry are apt to do, is somewhat unsatisfactory, since it fails to explain the emotions themselves.

The pattern becomes much more comprehensible if we consider plastics as an ambiguous substance that did not fit into the cultural scheme. The different reactions can then be understood as 'natural' reactions towards ambiguity. We see how the whole utopia/dystopia syndrome comes about and is determined by the way plastics were slotted into the culture/nature categories. Even the environmentally friendly solutions sought for plastic wastes are marked by the scheme; all the strategies employed can be understood as attempts to place plastics in a correct and unequivocal category. Product recycling, for example, means that we re-introduce the ambiguous waste into the culture category, while biodegradation returns it to the nature category. Either way, plastic waste will no longer be matter-out-of-place.

6. The monster theory revisited

Thus the monster theory accounts for the apparent erratic pattern of plastic's public image.[6] Moreover, the assembled ingredients of the monster theory answer the initial

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[6]There are other monster theories circulating, such as those elucidated by Cohen [22] or by Dashton and Park [23]. However, they do not focus on explaining today's technological monsters—and there are also other important differences, which would necessitate another essay.

question: How could the public's moral intuitions be explained more convincingly, in a way that fulfills the referred to demands?

The explanation runs as follows. Technological innovation is a rich source of new phenomena. These phenomena have to be appropriated to make them fit into our lives and practices. The appropriation process has various aspects, because new technology has to fit into diverse existing orders: social, technical, organizational and others. During the appropriation process both technology and existing social and technical orders are mutually adapted, as a central insight of Science and Technology Studies (STS) tells us [24–26]. However, new technology also has to be attuned to cultural order, since our perception of technology is mediated by our cultural categories and contemporary myths regarding nature and what it is to be human. Domestication of new technology is a process in which cultural imagination and technological change are intertwined.

New technologies are sometimes deeply ambivalent, bringing together, as they do, cultural categories assumed to be mutually exclusive. As in earlier times, this transgression of cultural borders causes two contrasting reactions: either a reaction based on fear of radically unknown dangers, or one of fascination related to the experience of a miracle and promises of salvation. By virtue of its ambivalence towards cultural order, new technology is experienced either as a monster or as a miracle.[7] However, academics of technology generally overlook this cultural aspect of technological domestication, as well as the impact of cultural transgressions on our emotions. The social domestication of technology is studied in many languages, but up to the present cultural domestication seems to have been a blind spot.[8]

This is, in a nutshell, is how monster theory offers an explanation of moral intuitions about new technology. In addition, the explanation meets the aforementioned methodological demands:

(1) Fascination and fear are explained by the same reading, that is, by the impossibility of interpreting an ambiguous phenomenon that has qualities of two or more mutually exclusive categories.
(2) Ignorance or 'lack of rationality' is not needed to explain either of the positions.
(3) A naturalist argumentation is avoided, but still moral intuitions are made comprehensible. Monster theory offers an explanation that takes public gut feelings seriously without being dependent on naturalist arguments. Monsters (and miracles) do not exist as the products of misleading emotions, but they really do exist as long as our cultural categories will not allow otherwise.

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[7]This invites the intriguing question as to the identity of conditions that determine whether the monster or the miracle comes to the fore. Douglas fails to provide an answer in 'Purity and Danger'. In Douglas's group-grid theory the diverse reactions to the ambiguous are linked to group structures [27], but this does not explain why an impurity-avoiding culture like that of the African Lele avoids some monsters while embracing others. So this question needs more thought. However, what we empirically see in the history of technology is that there is some chronology, since a technology is often first embraced and later despised. I would like to find a more theoretical account of this phenomenon.

[8]In fact there is a growing literature file on cultural approaches to technology in Science and Technology Studies. See for example: [28–30]. These publications, however, are not devoted to a study of the process of fitting technology into cultural categories.

7. Monster-ethics

How can we cope with these inevitable monsters? How should we approach unnatural technology that causes both fear and fascination? Monster theory shows that monsters will come and go and may never be eradicated, since the dynamics of symbolic order dictate that a final exorcism of waste, danger, violence and monsters is impossible as a matter of principle. However, this does not force us into fatalism; motivated by an inherent need to order the symbolic universe, people untiringly attempt to remove smaller and larger anomalies. In that process, several ways or styles are open for domesticating monsters. We find them already in tradition and described by Douglas. But we also find them in current approaches to new technology. Roughly, there are four styles of 'monster treatment' with different degrees of tolerance towards the abnormal. Some of these were already present in the approaches employed to overcome the bad image of plastic waste. These styles are: monster exorcism, monster adaptation, monster embracing and finally monster assimilation (Fig. 4).

Monster exorcists want to expel the monster. It simply does not fit within symbolic order as it is meant to be. Cultural borders are real and inflexible. This inherent inflexibility means that in the end this style cannot avoid violence. For example, in its approach to technology it reveals itself in the Luddite-like approach of action groups destroying GMO field experiments. Yet monster theory predicts that these attempts will prove to be vain in the long run. The chopped off monster heads will soon grow anew.

Fig. 4. Monster embracing (1950s): woman dressed in a mushroom cloud.

The second option, monster adaptation, aims at transforming the monster into a phenomenon that will better fit into existing categories. An example is the development of biodegradable plastics as an answer to the plastic waste problem. The idea behind biopolymers is that plastic waste would lose its ambivalent status if it degraded like natural materials. Thus waste plastic would shift from 'matter-out-of-place' to 'matter-in-place'.

The third strategy, embracing monsters, projects all kinds of utopian prospects onto new technology. The new is eagerly seized and placed on a pedestal because of its exceptional status. This option does not question the cultural assumptions, but turns the meaning of the ambiguous exception upside-down. The monster becomes a miracle or a saint.

Finally, monster assimilation refers to a strategy of adapting not only the monster but also the cultural categories by which it is judged. An example from medical technology is the introduction of the notion of brain death. This notion came as an answer to the embarrassments about comatose patients and about organ transplantation in the late 1960s. At that time, many considered organ transplantation as a monstrous technology. One of its awkward qualities was the necessity to commit possible murder on a dying person in order to be able to use the organs. The medical professionals intervened by shifting the traditional definition of death as the definitive stopping of pulse and breathing to the definitive halt of brain activity.

So in contrast to the other styles of monster dismantling, the style of monster assimilation makes use of the insight that cultural categories are flexible and can be reconstructed. In all other styles the new is somehow judged in terms of existing cultural categories and these cultural categories are in turn considered more or less as facts. This approach will prevent new phenomena from revealing their full potential.

By way of contrast, the assimilation style is open to considering anomalies and monsters as a creative challenge to reconcile new technology and existing categories by adapting both. Accordingly, this assimilation style represents a pragmatist approach, which regards technological facts as well as cultural categories as social constructs that can be adapted in time. This approach is pragmatist in the common meaning of an opportunistic attitude, in which theories and principles are not chosen a priori, but ad hoc, in relation to specific cases. At the same time the approach is pragmatist in the anti-foundationalist and anti-dualist sense of American philosophical pragmatism, coined by philosophers such as John Dewey and Charles Peirce.

Pragmatist philosophers argue that the cultural categories by which things and situations are morally judged are not set in stone. Together—and contrary to what I would call the 'naïve pragmatism' of Dworkin in the example mentioned—pragmatists argue that we need to take those categories and their resulting moral intuitions quite seriously, for we cannot do without our categories. In terms of philosophical pragmatism, a monster should be read as a so-called 'problematic situation', a confusing situation in which a new phenomenon severely challenges our preliminary categories of judgment. The uncomfortable monster challenges us to reflect on these categories as well as on the monster itself. Above all, a pragmatist would ask if these categories are still adequate to cope with the new situation or phenomenon.

8. Other monsters

I am not the first philosopher of technology to study technological monsters. At least four scholars paved the way by introducing corresponding concepts. Apart from Douglas,

we find similar concepts in the work of Langdon Winner, Donna Haraway and Bruno Latour. In this final section I will take a short look at them, in order to compare, contrast and refine the monster concept.

For Langdon Winner, Frankenstein's monster is a metaphor for the introduction of new technology in society [12]. The myth in essence states that if new technology is not nurtured and carefully steered during its development, it will turn into a dangerous monster, threatening society and human values, like the creation of Victor Frankenstein did. Thus Winner's monster resembles the monster in monster theory, since it is a metaphor for new technology possessing monstrous potencies. However, Winner seems to neglect the culturally ambiguous character of the technological monster. As a result he holds a rather realistic vision of the dangers of new technology. While monster theory holds that cultural categories give structure to the perception of risk, Winner considers the dangers as objective events.

Winner's approach resembles the style of monster adaptation, since he argues that new technology should be adaptable to existing rules and practices. In this way, he seems to miss the possibility of symbolic mediation of the monster. It is therefore doubtful whether Winner's approach permits the construction of new socio-technical practices. If we fail to acknowledge the role of cultural categories in the process of entrenchment of technology into society, social discourse will remain stuck in the utopian and dystopian grooves already mentioned.

Though I consider Douglas as the mother of the monster concept, close reading of her thoughts on risk management reveals that both her concept of risk as well as her recommendations for coping with uncertain risks do not correspond to her earlier insights into the culturally constructed character of monsters and their related dangers. Instead she reintroduces a realist explanation of 'dirt' by connecting present-day environmental risks with real dangers. To Douglas (and Wildavsky) it is only a social mechanism that causes selection and amplification of specific risks [31]. As a consequence, Douglas and Wildavsky recommend a strategy of resilience to cope with risk controversies in risk management, which means that we should foster flexibility in our capacity to accommodate, and diversity of technical means to react to the unknown. In contrast, monster ethics tells us that we should first and foremost think about our cultural categories.

Thus neither Winner nor Douglas exploit the full potential of the monster concept. Hence they can give us no clue as to how to open the black box of cultural categories, necessary to overcome social impasses on new technology. In contrast, Donna Haraway and Bruno Latour practice a more radical type of cultural constructivism. At the same time Haraway's cyborgs and Latour's hybrids more closely approximate the monster concept.

Like monsters, cyborgs represent tension-filled mixtures of organisms and machine, or of the human and the animal. Haraway feels no nostalgia at the cyborgs' loss of naturalness and enjoins us not to bother about their monstrosity [32]. Instead she pleads for an affirmation of cyborgs in order to escape dominant political rhetoric and repression. In this way, her approach resembles that of the fourth, monster-embracing style, which accepts contradictions and exchanges fear for fascination. However, this style is quite unsatisfactory for several reasons. First, it affirms existing cultural categories rather than criticizing and reconstructing them. Furthermore, Haraway's approach appears one-sided, since she emphasizes the pleasure of blurring cultural borders, while ridiculing the discomfort caused by cyborgs or monsters. She is not really interested in finding ways to cope with new, monstrous technology. Consequently, she fails to offer further clues for a pragmatist monster ethics.

Latour, however, is sincerely interested in finding ways to slow down what he calls the modern 'proliferation of hybrids' [33]. Therefore he proposes to make the process creating hybrids more transparent. Unfortunately, despite his original diagnosis of the modern pursuit to purify hybrids, Latour fails to be explicit about how to treat uncomfortable monsters. He only aims to reduce the number of hybrids, not to domesticate them.

9. Conclusions

As a result, this review of hybrids and cyborgs does not seem to add anything substantial to the monster concept or to the concept of pragmatist assimilation of monsters. Nevertheless, let me draw some conclusions on monster assimilation and its challenges for technology policy.

First of all, monster theory represents an analytical instrument for studying and explaining risk controversies and their moral dilemmas, since it enables us to articulate the accompanying cultural dimension of strong intuitions. This analysis should be directed at making ambiguities explicit at the cultural level. In this way, monster theory offers a contribution to descriptive ethics. Further, explicitation of cultural assumptions might make different risk repertoires of opposed views more accessible to one another.

Monster ethics might even facilitate the anticipation of future monsters. Nowadays, ethicists of technology often start their analyzing and judging activities when moral dilemmas and social deadlocks have already presented themselves [34]. In contrast, a more pragmatist approach enables us to take a more proactive stance towards world-shaping technology. The analysis of and reflection on cultural assumptions will help to anticipate moral controversies and to assimilate future monsters at an earlier stage.

This kind of cultural analysis and anticipation is a necessary step towards a second, more vital opportunity to elaborate technology policy. Analysis of cultural categories will uncover opportunities for enlarging the margins for action. This may encourage activities of pragmatic mediation, aiming at developing interventions in deadlocked debates, so that we prevent the two historical grooves from attaining their full, fruitless depth. Intervention is possible at the level of cultural categories, by way of shifts in those categories, or by way of shaping new concepts for interpreting anew the phenomena experienced as monsters. A pragmatist monster ethics means that we have to develop, renew, and differentiate our cultural categories as well as our technologies, so as to have them fit into a new order.

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