Erschienen in: NanoEthics ; 9 (2015), 3. - S. 237-250
https://dx.doi.org/10.1007/s11569-015-0242-1

Human, Non-Human, and Beyond: Cochlear Implants in Socio-Technological Environments

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Abstract The paper focuses on processes of normalization through which dis/ability is simultaneously produced in specific collectives, networks, and socio-technological systems that enable the construction of such demarcations. Our point of departure is the cochlear implant (CI), a neuroprosthetic device intended to replace and/or augment the function of the damaged inner ear. Unlike hearing aids, which amplify sounds, the CI does the work of damaged hair cells in the inner ear by providing sound signals to the brain. We examine the processes of the CI's genesis as well as its specific uses by and interrelations to the different and divergent actors that the CI assembles. We argue that the technological device and the implicated normalization process mobilize complex effects in varying socio-technical arrangements. The CI is conceived as a "boundary object" [89] or a "quasi-object" [49, 83], i.e., a metastabilized medium of translation that coordinates social, cultural, and technological (inter)action. Although intended to transform non-hearing or hard of hearing people into competent and "normal" hearing subjects, the CI system reproduces the asymmetrical structures of the disability discourse [14] through its function of "developing and maintaining coherence between intersecting social worlds" [89, 393]. Additionally, it initiates controversial discourses that have resulted in new forms of biosocial collectivities ranging from cochlear implantees with (restored) normal human hearing to (trans)human configurations who have passed through (post)human enhancement. Our approach is thus situated at the intersection of disability and media studies and tackles the particular conditions technological media configurations impose upon the (re-)production of dis/ability.

Keywords Cochlear implant · Disability · Biosociality · Media studies · Socio-technological environments · YouTube activation videos · Humaneness · Human enhancement · Cyborg

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Introduction

When looking at recent medical technologies, the cochlear implant (CI) system is a crucial example as it shapes and reshapes discussions about concepts such as restoring therapy and/or enhancement. That is, this neurotechnological device raises the question whether its application merely serves to cure a specific disease or disorder, turning non-hearing or hard of hearing people into "normal" hearing subjects, and therefore has to be seen as a therapeutic object or if its intervention improves an organism beyond normal capacities. While the, quite one-sided, success story of the CI as a techno-medical instrument is widespread, we approach this phenomenon

from a different perspective. In this respect, our main interest is twofold. Firstly, we conceive of the CI as an effect of a specific sociotechnical system, arrangement, or network. Depending on which framings the CI is interrelated to, it can be produced as an entity with certain exclusive attributes and thus appear as merely social *or* scientific *or* human *or* technical [86, 34]. On the one hand, the CI can be framed as an object with (meta)stabilized attributes that are the results of common denominators across different socio-technical arrangements; on the other hand, it remains capable of being locally attributed thoroughly different characteristics and agendas according to the specific constellations of single socio-technical environments. Thus, we conceive the CI as a "boundary object," as termed by Susan L. Star and James R. Griesmer [89]. According to these authors, "[b]oundary objects are both plastic enough to adapt to local needs and constraints of the several parties employing them yet robust enough to maintain a common identity across sites. They are weakly structured in common use and become strongly structured in individual-site use" [89, 393]. Based on this assumption, we secondly investigate the implant's potential to mobilize and enroll particular agencies [72, 6]. More precisely, this paper aims to trace the practices connected to the CI that have far-reaching effects and result in ever newly (re-)processed boundaries and re-enacting normative demarcations like what it means to be normal or "deficient," "human" or even "non-human," and "transhuman" or "posthuman." Given the possibility of creating other forms of "anthropofacts"[1] by connecting bodies and technology, different and contradicting conceptualizations of (non-)humaneness emerge, a human body and mind at risk of losing autonomy and individuality through the implementation of technology or a "deficient human" body that requires enhancement whatever the cost [11, 19].

Therefore, the remainder of this paper analyzes processes in the course of which certain discursive constructions of non-humaneness/humaneness, which have been widely discussed within the context of transhumanism and human enhancement [10, 22], are produced in relation to the CI and the socio-technical arrangements interconnected with it.

In working with a clearly media theoretical approach, the aim of this article is neither to praise the CI as a medical means of restoring hearing loss and thus turning non-hearing people into "competent normal subjects" [63] nor denounce it as a "tool for cultural genocide" [72, 4]. Rather, we emphasize the particular socio-technical arrangements that condition the (re-)production of dis/ability, a dimension which has yet to be sufficiently addressed in the field of disability studies. Scholars from this field mainly focus on critical examinations of social, political, and economic issues as well as the resulting mechanisms of inclusion and exclusion.[2] In doing so, we base our analysis on approaches from Actor-Network Theory (ANT), a theoretical and methodological concept which was developed in the field of Science and Technology Studies (STS) in the 1980s—most prominently by French sociologists such as Bruno Latour, Michel Callon, and John Law—and has recently been adapted in media studies [81]. According to the "horizontal" approach of ANT, neither technical objects nor human beings can a priori be defined as fixed entities and divided into passive or active actors as far as carrying out action in networks is concerned. ANT constructs networks as relations of heterogeneous actors whose actions and identities depend on specific network relations and who cannot be prescribed as stable "subjects" and "objects" with inherent attributes and courses of action *before* analysis. Instead, non-human and human actors—medical experts, technical devices, medical and media discourses, and "media" itself—are "what they are" and "do what they are" strictly in relation to each other. This means that we witness a shift from asking "what causes what" to "how things happen", i.e., to the analysis of collaborative processes in which objects like the CI, just like discourses on non-humaneness/humaneness, are evolving in parallel with their socio-technical environment [92, 284]. This also applies for concepts of dis/abilities, which cannot be considered as being prefabricated then applied and attributed to humans regardless of the socio-technical context. Speaking with Moser, our "point of departure is that disabled [and normal] is not something one *is* but something one *becomes* and, further, that disability is ordered and enacted in situated and quite specific ways" [63, 374].

[1] The notion of "Anthropofakt" refers to a current research project by the Technical University of Berlin and the Deutsche Hygiene Museum (DHDM) on the hybridization of bodies and technologies. Cf. Anthropofakte. Schnittstelle Mensch, http://www.anthropofakte.de/ (accessed 22 September 2015).

[2] Exceptions are Schillmeier and Winance [77, 96]. See also Mills [59, 321] as well as Ochsner, Stock [67].

Thus, by taking into account the different entities by which it is reciprocally shaped, we suggest that the CI arrangement is a mobilizing agency that engenders mediation processes. Consequently, the constructions of the CI are exclusively produced by the type of interrelation applied by each collective [13]. Taking into account that technology and technical objects are to be thought as "clusters of relations" [84, 101], rather than as bound to materiality, stabilized inscribed attributes or agendas, or "exterior to the social" [54, 7], this paper makes an effort to describe the CI as a "boundary" or "quasi-object" [83, 225] that is processually negotiated in relation to the actors of the network it is enrolled in [86]. Thus, depending on the type of connection and socio-technical or discursive arrangement, concepts like (restored) normal human hearing, transhuman hearing, or even posthuman hearing are produced as fluent and constantly negotiated notions. The status of metastability, however, does not mean that these concepts do not produce effects; instead, the process through which technological transformation of hearing is meant to overcome dichotomies between hearing and non-hearing people is not only renewed but even amplified through those networks.

Based on these theoretical premises, we take the CI as a case study because it allows for a striking "description" of controversial debates on the normalization of hearing and demonstrates how such argumentations are intrinsically shaped by interactions between human and non-human agencies [1]. Therefore, the first section focuses on a collective construction of the CI as a demonized cyborg instrument of power that forces deaf people into a "hearing normality" and thus dehumanizes the deaf. By analyzing so-called first-time-activation videos,[3] the second section addresses some of the ways in which CI implantation restores normal hearing in order to (re-)humanize and/or assimilate formerly deaf people into the hearing world by making them addressable. Finally, the last section frames the implant as a subcutaneous device that puts into practice posthumanist and transhumanist utopias of so-called self-proclaimed "cyborgs." Our approach emphasizes the specific relational configurations of the collectives in which the CI as a quasi-object is enrolled and which in turn are mobilized by the neuroprosthesis.[4]

Dehumanizing: Robobabies and Shambling Zombies

As the CI can be considered an actor enrolled in networks with mutually exclusive agendas and formations of articulation, be that scientific, social, or technological networks, the question can be raised whether the implant should be considered a social actor or a technical device with agency. Within a "flat" or "horizontal" network analysis—such as the ANT perspective, which "provides a framework that does not privilege certain perspectives" [76, 171] and thus sidesteps hierarchy—the CI needs to be considered social and scientific as well as human and technical. Thus, the constitution and stability of the implant's "identity" can be seen as an effect of its relations to the networks (or collectives) it is enrolled in [13].[5] Moreover, although one can argue that the technical components of the CI remain stable and coherent while it is being circulated in mutually excluding, interrelated networks [89, 393], this position is complicated by the fact that "the social elements are subject to incoherence" [86, 33–34]. This incoherence is expressed in the contradictory agendas of the specific networks and the corresponding discoursive productions of "normality" and "humaneness." Such an understanding of the CI allows us to explain the emergence of controversies and discourses on the "dehumanization" and "eradication" of deaf communities that result from the contradictions within the local socio-technological translations of the neuroprosthesis. According to the perspective of deaf communities, hearing and oral speech are not necessarily the natural and normal conditions of human communication and should instead be considered mere constructions of specific hearing communities [68]. "In this conceptualization, the medical construction of deafness as a disability to be overcome is jettisoned for a social construction of deafness as a characteristic way of life" [18:300]. As a result, a large number of members of deaf communities

[3] The notion of "first time activation videos", as can be found on YouTube, refers to the concept of the "activation scene" as developed by Pamela Kincheloe [43].

[4] However, methodologically speaking, in order to observe and describe such processes, a temporal fixation of the object of investigation (in popular imagery as well as in scientific contributions) is the heuristic condition of the production of dynamic knowledge [80, 119].

[5] Callon (1986) uses the term identity for both human and non human actors in order to remain what he calls a "generalized symmetry." Thus, identity is not thought of as a fixed and restricted to human entities but needs to be understood as a list of attributes, which can be "negotiated and delimited" [13, 203] in the process of networking.

do not consider themselves to suffer from the social exclusion, isolation, and depression that some health professionals ascribe them as a result of their perceived inability to participate in "social activities" [36, 18].[6] Thus, although the "technical" aspects of the CI maintain "coherence between the intersecting social worlds" [89, 393] of hearing and non-hearing communities, not all deaf people perceive the implant as a "blessed" social equalizer which enables "barrier-free communication" [42, 15; 78, 93] and participation in normal hearing communities. In fact, there is a range or spectrum of deaf people who consider deafness a natural and normal state of their own culture [85]. In this view, communication is not defined by hearing and oral speech but is provided by the use of sign language, which enables barrier-free communication with other deaf people [52, 65]. As implantation is generally a "matter of choice," ethical discussions have arisen around the implantation of children and infants. As a consequence, discussions on the "forced implantation" [64] of deaf infants lead to a discourse on a supposed "sociocultural genocide" [66, 338], in which the CI's identity is translated into an instrument of power by which deaf people are "normalized" and assimilated into the majority of hearing people [46]. "The surgery forces the child away from a natural means of communication (i.e., ASL) into an artificial hearing status that will still not guarantee full acceptance by the hearing community" [18, 300]. Furthermore, the argument was made that such "forced normalization" would by no means lead to a complete adaption to hearing communities but instead would enforce the typification of deaf people as "other," "different," or "disabled" since the CI functions as a marker of these attributes. Especially in visual representations of "successful," normal communication via the implant, such as in parent's guides for implanted children,[7] the CI must remain a visible marker of deafness in order to demonstrate (paradoxically) that a deaf person is not a deaf person once implanted [87].

Within these ethical and medical controversies, the question was raised whether the CI and the corresponding implantation as a typifying cyborg technology should be considered as a means of either humanizing [95, 641–642] or dehumanizing the implantees or making them "less human" [30, 38], respectively.[8] The first perspective, the affirmative view on the CI, is narrated and produced in Michael Chorost's biographic account *Rebuilt: How Becoming Part Computer Made Me More Human*. "My bionic hearing made me neither omniscient or dehumanized; it made me more human, because I was constantly aware that my perception of the universe was provisional, the result of human decisions that would be revised time and again" [17, 157]. In such a medial environment, the CI is transformed and translated into a technological and social leveler which "can enhance the humanness of the individual by enabling a greater level of participation in the world" [65, 177]. Such a perspective corresponds with the discourse on deafness as a deficit or disability and at the same time mobilizes a discoursive construction of deafness as a state of inhuman existence based on the assumption that the inability to communicate via spoken language precludes "being human" [31, 226]. This logic is demonstrated by a syllogism that was formulated by Brueggemann. "Speech is language, and language is human; therefore, deaf people are inhuman and deafness is a problem" [12, 11; see also 79, 162]. In addition to this, Chorost's notion of "omniscience" in relation to the CI refers to transhumanist discourses on the technological modification of the body in order to evolve physical

[6] For the sake of completeness and in order to avoid the miscon ception of a homogeneous group of deaf people with a common agenda, it should be mentioned that views on CI differ greatly. The views expressed in the following correspond with those of deaf communities, whose members are born and raised in a context with a strong communicational focus on sign language and feel discriminated against by biological/medical concepts of hearing as natural. Depression as a result of feeling excluded from the "hearing world" is a typical clinical view of people who are born with hearing and live large sections of their lives communicating via spoken language before becoming deaf in adult life and being unable to easily adapt to a non hearing lifestyle.

[7] Examples of such typifying visualizations are Senf, Chute and Nevins, Eisenberg, and the children's picture book *Kylie Gets a Cochlear Implant* by Rose [20, 26, 75, 82].

[8] Of course these are extreme points in the debate. There is without a doubt a whole range of other constructions of "deafness" and "hearing" in relation to the CI such as reconciliations of both "worlds" [7, 4; 8, 211] and identities "stuck in between" both sides [12, 92]. Also, it should be added that this kind of subjec tivization also depends on the degree of the hearing loss and whether the person in question was born deaf or lost their hearing as an adult. Identity constructions are certainly conditioned by a vast spectrum of other factors such as cultural and social environ ment, age, and gender. From the perspective of an ANT approach, this means that a homogeneous and sharply defined group of people cannot be set as the starting point of the analysis. Rather, subjectivization can as be described as relations to and negotia tions between different actors in the process of networking. In this case, the extreme points are results of specific mediatizations, which surface as the most "popular," "politically effective," or "controversial" in specific network constellations.

and psychological capabilities as well as states of consciousness that lead to improving the natural human condition [9]. While posthumanist and transhumanist visions euphorically affirm an enhancement of the "deficitary basic hardware" of the human body [35, 63], ethical discourses on dehumanization via cyborgization are reworked as dystopian visions in contemporary popular narratives such as Captain Picard's transformation into the Locotus of Borg in the *Star Trek: The Next Generation* (CBS, 1987–1994) series or Murphy's technological "restoration" in Paul Verhoeven's *Robocop* (Orion Pictures, 1997). Such filmic representations of the cyborg pessimistically articulate an erasure of basic human attributes and social skills either in favor of the greater good of a forced, assimilated society (*Star Trek*) or the physical and psychological tortures of the fusion of the body with technological elements and the lamentation over the lost humanness (*Robocop*) [91, 463]. Chorost however decidedly objects to such an "instinctive technophobia of the liberal humanist subject" [94, 245]. "Unlike Robocop or the Borg I was not disconnected from the world, remote and uncaring in the bioelectronic shell of my skin" [17, 157]. Although located within a philosophical framework, cyborgization does not necessarily result in dehumanization or a complete loss of humanness [88, 172] as the dominant discourse on CI cyborg technology refers to the pessimistic and dehumanized images produced by mainstream media culture. The cyborg either loses their human attributes in the course of implanting technological parts into their body or they were always inhuman villains lacking any kind of humanness.[9] This is especially true for forced implantation, which is paralleled with the Borg's malicious mission to assimilate all forms of life into one conformist collective with one collective mind, thereby turning humans into "shambling zombies" [17, 96]. Even Chorost, who basically affirms CIs, is sceptical about corporate and medical promotion and treatment of the implant as "a tool symbolizing forced cultural assimilation imposed by a largely hearing based society" [40][10] as he mobilizes discourses on the fictional Borg villains from *Star Trek* [17, 10].

Enrolled as an actor in other local CI networks, the implant's identity is translated into a technical device that not only eradicates human traits in individual subjects but can additionally be seen as a limitation of the "diversity and natural variation of the human species" [40]. Such discursive productions of the CI can be seen as decisive counterarguments to CI collectives. By referencing evolutionist theories of biological diversity and the natural evolution of ecological niches, they enroll and mobilize biologically grounded phonocentric views of the natural condition of a hearing and verbally communicating human species. This also shows how the CI is perceived in two ways. On the one hand, it can be conceptualized as a boundary object which is "plastic enough to adapt to local needs and constraints" [89, 393], where the CI is translated into an "unnatural" means of altering/eradicating natural human diversity. On the other hand, the CI is "robust enough to maintain a common identity across sites" [89, 393]; otherwise, there would be no shared subject of discussion, controversy, or need for action (implantation of the CI).

Another explication of the dangers of categorizing human beings with reference to scientific truths is the argument that forced normalization leads to social Darwinism as practiced in the Third Reich by German right-wing nationalists. Consequently, corporate and medical promotions of the CI as a re-humanizing device may ultimately lead to a degrading of the rights and freedoms and the dehumanization and segregation of the supposed deaf people [24]. While such radical positions are rather rare, the limitation of freedom as a basic human right and condition of the development of a personal human identity is a point made frequently within the ethical discourse on the CI.

> From the standpoint of the disability rights movement, the right and ability to exercise autonomy over one's own life is the basic, defining characteristic of what it means to be human. Marginalization (and, for that matter, stigmatization) is, therefore, oppressive. It is dehumanizing, in that it deprives persons with disabilities of their autonomy, their ability both to make their own

[9] Dehumanization as a result of invasive cyborg technology is even more stressed by Peter Artinian's concern, uttered in the documentary *Sound and the Fury* (Josh Aronson, Artistic License, 2000), that "cochlear implants will create a bunch of robots." However, technically speaking, there is a decisive difference between the concept of the cyborg, as a part machine part human hybrid, and the robot, or android, which is a completely artificial machine.

[10] However, "becoming a Borg" is not always discoursified as undesired. For example, on the blog *Graysdeafblog.com*, being implanted with cyborg technology is presented as a "cool," nerd ish gimmick. The blog's owner, Graham, has included a picture of the assimilated Captain Picard with the ironic side note, "I will begin my planning now for my role as a real life cyborg in the next Star Trek movie!! Beam me up Scottie!!" [33].

> meaningful choices, free of unwarranted constraint, and to carry them out [97].

This view on CI cyborg technology has also been reworked in certain "viscourses" [45] using iconographic references to *Star Trek*'s Borgs. The case of Jean-Luc Picard is set in comparison with that of deaf people who are deprived of their autonomy and freedom as stated in the quote above, because Jean-Luc Picard, "the 'everyman,' loses his personal identity, autonomy, and freedom, that is his selfhood, and therefore his humanity, as the result of invasive technology" [94, 245]. This reworking can be found in the photograph published alongside the article "Cochlear implants… not my choice" in *The Broadcaster* in 1997[11]. The image shows a depressed looking young girl with her head melancholically resting on her hands and tears running down her face, the reason for her depression being incorporated into the image via computer generated graphics. The left side of her face is rendered transparent to show that she has been implanted with cyborg technology—some sort of a metal plate and electronic cables [see also 87]. Not only is this a reference to the discourse on "robobabies" (children with CIs) [15] but the image is also iconographically linked to the topos of the villainish "one-eyed cyborg," which is most prominently represented by Arnold Schwarzenegger in *Terminator* (James Cameron, Orion Pictures, 1984) and the assimilated Jean-Luc Picard. Although the child in the image does have two eyes, the visible subcutaneous robotic left half of her face (a CI) evokes the cyborg villain, whose revealed technological subcutaneous parts mark them as the monstrous inhuman other [17, 153].

As has been shown in the network constellations and medial configurations as described above, despite being a non-human entity, the CI is not necessarily passive, isolated, or stable. Additionally, it does not remain untranslatable across different socio-technical arrangements. As a result, depending on its "medial relation" and relation to other actors determining its function, it can be transformed according to local collective agendas and used to recruit and relate other actors to produce incoherence and contradict the conceptions of the CI in other local socio-technical arrangements. Adapted to the needs of deaf communities, the CI can be interpreted as an actor representing the very opposition of their political and ethical views—a "dehumanizing" instrument, designed by a hearing collective. In the same manner, those deaf communities were brought to action by the CI, because reacting and adapting to the way it is locally shaped in hearing communities (as a tool of "implanting" cultural and ethical views) needs to be considered as some sort of action as well. In the following, we will give further examples of how the CI can take the position of such a boundary object, an entity in between, both separating and dividing different networks.

[11] The photography is used by Chaikof as an argument for her discussion of the acceptability of the CI [16].

Rehumanizing: the Staging of First-Time-Activation Videos

On January 5, 2007, YouTuber Kwilinski uploaded a video of a six-month-old deaf child hearing for the first time following the activation of his CI device. On July 16, 2007, YouTuber Nikki Buck uploaded footage showing her CI activation, gathering more than 530,000 views and 670 comments. On April 14, 2008, YouTuber beancounterbb uploaded a video an 8-month-old boy reacting to the sound of his mother's voice after activating his hearing aid. In the next 6 years, the video received over 4.17 million views and 3300 comments. When YouTuber Sloan Churman uploaded the hearing-herself-for-the-first-time video of his 29-year-old wife Sarah, this short film accumulated upwards of 18.3 million views and 75,000 comments within the following 2 years. And, last but not least, this year, Tim Nobes, live in the studio of Australian First TV, heard his family speaking for the first time thanks to a CI. Thousands of TV spectators suitably witnessed this miraculous "switch-on" event in front of their TV sets.[12]

In the following chapter, the focus is less on the narrative analysis of the first time activation as a filmic theme or motif [43] than on the reciprocal configuration of a media-technological object, the CI, and its mobilization of non-hearing/hearing environments.[13] Therefore,

[12] *Cochlear device switch on live in studio* (23 March 2014), https://au.news.yahoo.com/sunday night/video/watch/22127656/cochlear device switch on live in studio/, accessed 22 June 2015. More examples, *Activating Anderson's cochlear implant*(15 May 2013), www.youtube.com/watch?v=I_oB_CBPa04 (accessed 22 June 2015); *3 year old hearing for the first time with a cochlear implant* (15 May 2012), www.youtube.com/watch?v=DutzKqvH8DQ (accessed 22 June 2015); *Hearing for first time Wee Daniel's reaction to Cochlear Implant Switch On in Belfast* (05 January 2013), www.youtube.com/watch?v=FozmvMufIh4 (accessed 22 June 2015); and *2 year old Cooper hears mommy's voice for the first time!* (10 October 2011) www.youtube.com/watc?v=WDDfGMuofuw (accessed 22 June 2015).

[13] Cf. the *Listening demos* given by Dorman, Loizou, Rainey [25].

we first have to note that this kind of audiovisual production is an intended "fabrication" of a specific knowledge space within and through which the represented item (hearing) first comes into being. The film scenes should hence not to be seen as the representation of a (autonomously existing) first-time-hearing event. Relations, perceptions, or reflections that arise from the interaction of the different actors in this space solidify into images, texts, or practices [27, 136]. Therefore, rather than analyzing the behavior of hearing, deaf, hard of hearing, or CI-hearing people, we focus on the mediality of the participatory space and the (re-)production of concepts of normalhuman hearing or non-hearing. In this respect, the CI is conceived as a quasi-object [83, 225], a thing in-between, that separates *and* relates soon to be familiar and/or social communities (here the non-hearing and the hearing) as well as being shaped by mutually adaptive mediation processes. While other visualization practices, such as the ones analyzed in the first chapter, tend to dehumanize or typify the CI as well as the implantees, the astonishing success of the first-time-activation videos is based on the medical as well as the audiovisual objective to fix deafness and thus (re-)humanize the patients [95]. In a wider sense, the (re-)humanizing surgery, as well as the following adaptation process, is inscribed in the practices of normalization explained by Normalization Process Theory (NPT), a "sociological toolkit" helping to understand the dynamics of implementing, embedding, and integrating new technologies or complex interventions in medical practice in order to restore lost or deficient human capacities [58].

The few videos listed at the beginning of the chapter, however, raise questions concerning not only the attribution of agency to a technological device like the CI but the specific staging of these images. In the attempt to make visible the success of activation, the video has to (re-)produce the asymmetric differentiation between normal human hearing and non-human or CI hearing. If biotechnical practices or neuroprostheses like CI are often discussed in the context of the border between medical therapy and enhancement, these particular filmic production of first-time-activation videos demonstrate how the borders between hearing and non-hearing as well as between normal human hearing and CI hearing are re-inscribed by turning deaf patients into active participants in the hearing world. How these normativities are (re-)enacted [63] and what kind of (non-)hearing subjects emerge will be demonstrated in the following analysis.

As a specific and often identically reproduced socio-technical arrangement, the first-time-activation videos are designed to show the production of hearing people through the activation of the CI. While the enabling device is often focused on at the beginning of the video, using close-ups on the CI and the audiologist's computer, the technicitiy of the arrangement slowly recedes from the camera's eye once the patient is "turned on." First-time-activation videos thus illustrate a standardization operation procedure of how to transform a non-hearing patient into a competent human being with normal auditory perception, hence, an individual with normal capacities. The switch-on process is thus devised as an act of normalizing (re-)humanization based on the unquestioned existence of specific human and therefore natural (or normal) hearing as a fundamental capacity of the subjectivization process. The CI thus offers the possibility of being a part of the hearing world (that, in the same process, has to be differentiated from the non-hearing or deaf world) or mobilizes new biosocial identities [28, 56] (which necessitates new borders between the hearing, the non-hearing, and the CI-hearing worlds). In return, it requires self-enabling strategies of technical and social adjustment [74, 151]. In this respect, the implementation not only concerns the implantation of a technical device but the adaptation to a medico-socio-technical program or "pattern" [34, 28; cf. 59, 322] that requires training and habitualization.

In the first-time-activation videos, however, and due to a specific disposition of human and non-human factors, this mapping process is reduced to one significant moment. Yet, the mediation of this transformational event demands the production of a "transepistemic arena" [44], in which the audio visualization of the human encounter can take place. It is this specific audiovisual arrangement of first time activation as well as its continuous reproduction that conditions the function of the CI as a (re-)humanizing tool in the process of normalization. Thus, the majority of first-time-activation videos of babies or toddlers follow an elaborated script which programs the arrangement of gazes so as to translate the auditory event for the viewer. Little *Drake's Cochlear Implant Activation* video is one such example[14]. While the audiologist remains mostly unseen, the child sits on his mother's lap playing with a toy. The moment the CI is switched on, eye contact is established firstly between the

[14] *Drake's cochlear implant activation* (18 June 2006), http://www.youtube.com/watch?v=F3qhj2DJaB4, accessed 22 June 2015.

source of the sound (the audiologist, the computer, illustration 2) and the toddler, secondly between the mother and her child (illustration 3), and last but not least, between the camera (the father, the spectator, illustration 4) and the little boy. Sometimes some emotional music accompanies the miracle.[15] And as most of the videos do not include subtitles or translation into sign language, deaf people are obviously not addressed.

Illustrations 1–4: Stills from *Drake's Cochlear Implant Activation* (2006)

The filmic configuration of exchanged gazes and the resulting production of a human communicational and affective space thus translate the child's becoming a normal hearing and addressable human being [5]. In fact, and due to the spectacularization of the scenario, it is rather difficult to recognize whether the babies or the toddlers react to the activation, to the touch of the parents (mostly the mother), or to the camera (often the father) recording the event. The entertainment factor, however, does not suffer from these doubts.

This audiovisual practice of miraculously "overcoming deafness" does, however, not remain without criticism. The standard scenario not only restores normal human capacities but it is staged as a miracle, an almost transcendent act of restoring the possibility to communicate, on which familiar or other human relations can be build. The initial mapping of the implant system only provides the basis for further self-governmental practices of both the patient and its audience since the long, difficult, and not always successful process of (re-)adjustment to human hearing and speaking is still to come. This long and arduous experience is not usually shown in the videos [18, 146–169]. Emily Howlett, a profoundly deaf actress and writer, feels rather disconcerted when watching the widely reported viral video of Joane Milne's "life-changing"[16] "first-time switch-on."[17] The focus, indeed, lies on the spectacularization of non-hearing persons being

[15] For example in Suzi's switch on: *Brain doctors. Emergency.* BBC Two (02 February 2013), http://www.bbc.co.uk/programmes/p014jy3z, accessed 22 June 2015.

[16] Joanne Milnes' very emotional viral cochlear implant switch on, http://limpingchicken.com/2014/03/28/watch joanne milnes very emotional viral cochlear implant switch on video/, 28 March 2014 to 27 May 2014.

[17] "[…] moments after switch on takes place, she can understand the days of the week being read to her, knows she is speaking with a Geordie accent and tells the audiologist that the sounds seem "too high"… Hang on, wait… "Geordie accent? This is the first time she has ever heard and she can not only speak, but with a recognisable accent? That is not a cochlear implant, that is a miracle." Joanne Milnes' very emotional viral cochlear implant switch on (28 March 2014), http://limpingchicken.com/2014/03/28/watch joanne milnes very emotional viral cochlear implant switch on video/ (accessed 22 June 2015). Another critic, Betty Hoven, expresses her anger about this kind of videos as it focuses on entertainment rather than the long process of auditory mapping [41].

transmuted into perfectly hearing ones "only" by pushing "the right key." The impact attributed to the CI, respectively; its activation in this kind of videos stresses, once again, the fact that agencies and arrangements are neither separate nor immutable objects [50]. It is the audiovisual space as a specific techno-social arrangement or "transepistemic space" that enables and conditions the becoming of a normal hearing human being. Thus, the audiovisualization of the CI and its "fixing" of the non-hearing, on the one hand, displaces the boundaries between normal human hearing and non-hearing while, on the other hand and as Howlett declares, it (re-)inscribes asymmetric relations between normal human hearing and CI hearing, or in the words of Michael Chorost whose bionic ear made him even "more human" [17],[18] between human and transhuman hearing.

Transhuman Configurations of Hearing

As Stuart Blume notes, medical discourse shaped the CI from the beginning as an innovative neurotechnological device and not as an imperfect and uncompleted prosthesis [6, 33; 7]. One may take this argument further and affirm that such a rhetorical construction of the "bionic ear" [21, 32] resonates with popular culture and heroic figures from film and television. Conceptions of overcoming human nature and corporeality in order to achieve an enhanced and augmented sensory perception are for instance produced in *The Bionic Woman* (NBC/ABC, 1976–1978; NBC, 2007), where the protagonist is implanted with several devices after an accident and transformed into a being who, e.g., can use her bionic ears to listen to conversations at a distance [4].[19] Hence, it is hardly surprising that the CI serves—among other devices—as one of the central points of reference when it comes to a futurist discourse on enhancement, implants, and prosthetics [51]. Speaking on the disembodiment of experience, Moravec contends that the CI may be only one of the many devices that will position the human body within "artificial indoor settings" and produce virtual sensory perception by stimulating the auditory nerve with acoustic signals that are translated into electric current [61, 169]. Also, around the turn of the millennium, an article in the *Hastings Center Report* reflected on "implantable brain chips," noting the likely shift from prosthetics to enhancement and that it is only a question of time before nondisabled people start to use devices like CI. Equally, the report affirms that military use of neurotechnology will become a widespread phenomenon for adapting the human body to specific circumstances imposed by combat or military operations [55, 9–10; 59, 336]. No matter how one may judge such thoughts, it is certain that this is one of the many ways of conceptualizing the CI as a means of enhancement. The following paragraphs will dwell further on this dimension of the device while focusing on one of the "deaf futurists" [59, 336] and discussing a hacker logic as well as reflecting the so called transhuman abilities that could be potentially inscribed into the CI in the near future.

Consider the hardware of the CI system, whose design is subject to specific strategies implemented by the manufacturers of the neuroprosthesis. There are several accessories that enable extended use of the implant system. One of them is the patch cable allowing a direct connection of the CI system to digital multimedia devices like MP3 players or television sets. As an implantee, the late-deafened Enno Park criticizes the relatively high price of these cables and proposes that CI users should produce the cables themselves thereby disagreeing with the price regulations and license terms advanced by companies like Med-El, Cochlear, or Advanced Bionics. The argument is equally relevant for the remote control for the CI system, which in Park's view is an old fashioned interface that could easily be substituted by a particularly configured smartphone [69, 93]. Against this backdrop, it seems that the CI system—similar to other technical objects—can be conceived of as a "large set of technically delegated prescriptions" [1, 211] intended to shape a particular type of non-user/user. In this case, the inscriptions by designers and engineers that shape the implant do not match the vision of the actual user. Instead, as Park's commitment focuses a reconceptualization of the system's script, its constraints become visible. This user's claims echo with approaches one can find in the field of genetic research, where so-called do-it-yourself practices emerge in home laboratories or high-precision instruments are built with simple and cheap materials [29, 98]. Also, given the

[18] For other autobiographic experiences, see Romoff and Biderman [3, 73].

[19] Other examples from television series highlight the implementation of visual prostheses. In *Star Trek*, Geordi la Forge uses his visor in order to sense a frequency range that goes far beyond the capacity of human physiological sight. But the visor also transmits the recorded visual material wirelessly so that his user is transformed temporarily into a mobile camera. The six million dollar man (ABC, 1974–1978) uses his telescope vision in order to track down suspects.

rapid dissemination and popularization of scientific knowledge about the functionality of nanotechnological devices, it is possible to presume that the hacking of CI systems may become possible. Consequently, other sensory forms of perception could be shaped through the creation of new hardware and software [82].

Park and others already imagine such new forms of sensory experience. The CI system would thus not serve as a mediator, transforming a deaf person by connecting them to the hearing world [71].[20] Rather, the implant system is conceived of as subcutaneously inscribing transhuman abilities onto its user, therefore transgressing the limits of physiological hearing. The CI is hence thought of as a device that potentially enables a form of auditory perception extended to spheres that go beyond human sensory experience. Whereas the medical interpretation of the CI emphasizes its significance as a functional prosthesis operating with different algorithms in order to translate speech and relevant ambient sounds which eventually enable a "social re-integration" and "normalization" of the deaf person, Park is interested in the perception of articulations produced by non-human actors. As he affirms, "I would like to go on further, for example, hear ultrasounds. Then I would not only be able to hear the twittering of the birds but also the high-frequency calls of bats" [71, our translation].[21] What is at stake here is not a specific purpose or functionality of the CI. Rather, the implant system is perceived as a means to achieve something which is "technically indeed possible" [70]. As a programmer and coach for online communication, Park's claims collide with the prescriptions imposed on the implant system by the manufacturers mentioned above. That is, the CI is designed according to the "walled garden" principle in order to restrict the possibilities of manipulation by non-experts [2, 32].[22] In doing so, the system also imposes a normalization of technologically induced hearing by favoring certain modes of auditory perception while excluding others. Although knowing that the programming and individual adjustment of the implant system is a delicate issue, Park insists that as the owner of his implant he wants the liberty to decide its programming [53, 27–33]. He argues against normalization even if he knows about the implicated risks, e.g., that hacking the implant could overexcite or injure his auditory nerve [93].[23] Against this background, one can observe the mobilizing potential of the CI and its medical inscriptions that result from the enrolment of Park and others within the field constituted by the implant system. As founders of the *German Cyborg Association* (Cyborg e. V.) [23], they contend that it is necessary to defend the rights of implant users, find ways to hack devices like the CI, and therefore pave the way for alternative uses of nanotechnologies [60].

It is not yet decided whether CI users will be able to hear infrasound or high-frequency signals in the near future. Notwithstanding the above, Park identifies himself already as a person with transhuman capabilities. As he can adjust the implant system, he can turn it off to avoid noise pollution or select a particular mode in noisy environments in order to improve speech perception [2]. While such arguments seem rather banal, it is important to grasp the understanding of such a way of being transhuman. It is grounded in a concept of the "cyborg," and it focuses on subcutaneous implanted devices and stresses the inextricable physical connection of organic tissue and technology [88, 170]. One also encounters this line of thought in the linking of different devices, i.e., an interconnection often conceived as a particular form of artificial hearing enabled by the CI. When there is a direct connection between the CI and a digital device, the data read from the MP3 player or television, for example, are translated and retranslated algorithmically into electronic and digital signals that reach the auditory nerve without being processed by a loudspeaker or microphone.[24] Such a constellation, which nowadays is already appropriated by market logic of wireless connectivity advanced by Med-El, Advanced Bionics, and others, demonstrates how CI users are presumed to be embedded in extended cybernetic circuits shaped by

[20] For ambivalences in the medical and rehabilitation discourse, see the analysis by Moser, who emphasizes the "relocation" of dependency through the use of assistive technologies [62, 205].

[21] Being able to hear bats is an idea also articulated by biohackers like Rich Lee [47, 90].

[22] In the case of the CI, these restrictions are not only commercially motivated. The process following the implantation is very complicated; audiologists and CI users have to collaborate to define how the implant system operates. The initial adjustment or mapping is followed by fine tuning, hearing training, speech therapy, and further medical tests to measure the auditory perception of the CI user.

[23] Chorost, for instance, despite a keen interest in improving the perception of music using CI, points out that he would not dare to hack his system due to its complexity [cf. 59, 338].

[24] Chorost describes such a scene, "I'm plugged directly into the player. Its electrical output goes straight into the processor, which converts it to binary and passes it on to the implant. The implant decides which electrodes to trigger in my cochlea. These are no physical vibrations *anywhere*" [17, 58].

the technological condition [38, 39]. Imagined as a futurist scenario only a decade ago [59, 337], it is nowadays a seemingly "conventional" position situated in an epoch of ubiquitous computing, wearables, and the like. This shift moves questions of disability and normalization further and further into the background [57, 63]. At the same time, it resonates with the thesis advanced by Hayles where it is the integration of people into computerized environments that produces a posthuman condition and, to a certain extent, contradicts the discourse advanced by transhumanist hackers such as Enno Park.[25]

The analysis of this section demonstrates the manifold and complex entanglements between the CI as a key element mobilizing a socio-technological environment and discourses on the posthuman implications emerging from this very framework. Oscillating, as a boundary object, between an instrument that enforces normalized technological hearing and a potential site for enabling transhuman ways of listening, the signification, relevance, and use of the CI are constantly shifting and subject to new inscriptions.

Conclusion

As this article argues that the CI is shaped by the different collective and discursive formations that are reciprocally produced by the techno-medical device, special attention is placed on the relationality of constituting subjects and objects. Taking three different scenarios as examples, the above analyses demonstrate how particular mediatic settings and environments frame the production of "anthropofacts" as well as knowledge concerning their respective status of normalcy, humanness, and disability that are (re-)produced as effects of distinct local socio-technical arrangements. Thus, within the processes of mediation, new dichotomies and shifting boundaries are constantly and processually engendered. The sections on dehumanization and re-humanization demonstrate that this focus on the collective negotiation of differentiations and mechanism of inclusion and exclusion is situated at the perpetually changing borders between normalcy and disability, that is, between hearing and non-hearing as conditions of different forms of humaneness. The third section addresses questions of posthumanism and approaches the relation of technology to nature and technology to humaneness to provide insights into the normalization of CI-hearing practices. All of the examples suggest that the inevitable re-production of boundaries and their continuous shifting are constitutive of the production of knowledge generated by particular collectives, which in turn contributes to their formation and to the emergence of different inclusive and exclusive practices.

Having said this, it is necessary to take into account that the mentioned discourses on dehumanizing, re-humanizing, or posthumanizing practices often implicitly postulate and re-produce such differentiations as given or natural truths [48]. Contrary to this, from our perspective, such distinctions have to be regarded as processually emerging constructions that are under constant negotiation. Differentiations between humaneness and non-humaneness are therefore not to be conceived as a priori truths but rather as collectively and socio-technically produced effects. Considering critical disability studies, this means that physical integrity (respectively, ableism) and impairment/disability are by no means naturally or biologically given truths that can be taken for granted and used as categories for the inclusion or exclusion of certain social groups or individuals. Furthermore, these concepts do not provide a basis for arguing for the posthuman overcoming of a presumably "inherently deficient human body." The body is thus not a stable category but rather constituted in and by specific discursive practices. As Hirschauer argues, "[t]he body [and we would like to add non-humaneness/posthumaneness/humaneness," the authors] cannot be *presumed* a priori, it is also not only to be located as a *result* of discourses and practices, it is rather embedded *in* the practices" [37,75, our translation and emphasis]. However, this neither implies that only (human) bodies are subject to processual translation and transformation nor that agency is exclusively attributed by humans. Bodies and technical objects (like the CI) are co-constitutional. They are co-produced in processes of reciprocal translation and transformation.

[25] Discussing the Turing test, Hayles contends that the specificity of this setting is not to be found in the decision whether one communicates with a computer or a human person but in the fact that the test person is participating in a "cybernetic circuit that splices your will, desire, and perception into a distributed cognitive system in which represented bodies are joined with enacted bodies through mutating and flexible machine interfaces" [34, 14].

Acknowledgments We would like to acknowledge the thorough comments, encouragement, and instructive suggestions of the editors and anonymous reviewers which contributed to the prep aration of this manuscript.

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