

# Human Enhancement and Communication: On Meaning and Shared Understanding

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**Abstract** Our technologies have enabled us to change both the world and our perceptions of the world, as well as to change ourselves and to find new ways to fulfil the human desire for improvement and for having new capacities. The debate around using technology for human enhancement has already raised many ethical concerns, however little research has been done in how human enhancement can affect human communication. The purpose of this paper is to explore whether some human enhancements could change our shared lifeworld so radically that human communication as we know it would not be possible any longer. After exploring the kinds of communication problems we are concerned with as well as mentioning some possible enhancement interventions that could bring about such problems, we will address some of the ethical implications that follow from these potential communication problems. We argue that because of the role that communication plays in human society, this issue deserves attention.

**Keywords** Communication · Enhancement · Ethics · Technology

*“The way we communicate with others and with ourselves ultimately determines the quality of our lives”.*  
Anthony Robbins

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## Introduction: Why Human Communication Deserves Attention

Communication matters for meaningful human lives. Human communication, in its different forms, matters because it sets a common ground for meeting common basic human needs, such as the need to belong and the need to be recognized by others (Maslow 1943). It also matters because humans have evolved as social creatures, herd animals. We are gregarious and like to live in groups. Communication enables us to be social beings. Very few of us are rugged individualists who put autonomy above most else. And for groups to be successful there must be communication between the members and successful communication requires a solid base of shared experiences and beliefs.

With the proliferation of emerging (National Research Council 2008)/converging (Roco and Bainbridge 2003)/enabling (Nordmann 2004) and often disruptive (Council 2009) technologies (such as nanotechnology, neurotechnology and synthetic biology), the scope for changing both the world and ourselves has expanded and the desire for improving or changing particular human capacities and features has become controversial (Coenen et al. 2009; Farah and Wolpe 2004; Turner and Sahakian 2006).

The debate around the use of technology for human enhancement has already raised many ethical concerns, for instance, with respect to health and safety, coercion and autonomy, fairness, dignity and human nature. With human enhancement becoming an increasingly important topic, more research exploring whether human enhancement might lead to communication problems is warranted. One communication problem in the framework of the debate on ethical issues surrounding enhancement technologies,<sup>1</sup> is that suggested by Parens (2005). Parens has argued in relation to the ambivalence found in the debate about enhancement technologies that the ambivalence is the result of different understandings and views about moral ideals held by the critics and proponents of these technologies. While this can be regarded as a communication problem, these differences in ethical frameworks are not the ones that we aim to address in this paper. However, they clearly illustrate the consequences that different understandings could have for meaningful human communication.

The purpose of this paper is to explore whether some human enhancements could change our shared lifeworld so radically that human communication as we know it would not be possible any longer. After exploring the kinds of communication problems we are concerned with as well as mentioning some possible human enhancement interventions that could bring about such problems, we will address some of the ethical implications. We argue that because of the role that communication plays in human society, this issue deserves attention.

## Human Enhancement and Communication

Humans have different forms and degrees of interactions with technology and some of these interactions have changed the nature of human communication and have

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<sup>1</sup> Here and in what follows we will be referring to the tools, methods, or substances used for the purposes of human enhancement as enhancement technologies (Coenen et al. 2009; Elliott 2003).

done so for a very long time (e.g. smoke signals and computer networks). Our argument here rests on the fact that certain forms of human communication depend on a shared lifeworld which in turn depends on similar bodies, perceptual equipment and socially embedded nature (Passer et al. 2005). In relation to human enhancement, our argument is not that all human enhancements will lead to communication problems nor even that those that do will lead to insurmountable problems. Our aim is the more modest one of arguing that there is an issue here that deserves serious consideration.

Before proceeding, it is important to spell out what we are referring to when we say a shared lifeworld or common ground. Here we are not merely referring to common knowledge or common ways of perceiving the world, instead we have in mind the idea of a shared point of view<sup>2</sup> as used by Thomas Nagel, or a 'shared lifeworld'<sup>3</sup> as used by Husserl (1970). In what follows, we will use the term 'shared lifeworld', following Nagel's and Husserl's views, to refer to the idea that it is through a set of shared values, abilities, beliefs, knowledge, perceptions, and other social and psychological factors that current humans build up meaning about the world and themselves and create and maintain meaningful social relationships.

In spite of some differences in our shared lifeworlds we still can attain partial understandings, in which the more subjective viewpoints of individuals play no role in the apprehension of the shared lifeworld. For instance by sharing a 'lifeworld' you can grasp 'what it is like to be on a roller coaster', however, as Nagel has argued a human 'shared lifeworld' would not be useful when trying to grasp 'what is it like to be a bat' (Nagel 1974). We do not have a shared lifeworld with bats. We, as human beings, cannot really know what it would be like to be a bat, he claims (we will argue later that this claim is a little strong).<sup>4</sup> This idea was also reflected in Ludwig Wittgenstein remark: "if a lion could talk, we wouldn't be able to understand it" (Wittgenstein 1953: 227). This claim has been much criticised but makes sense in terms of his accounts of language games and forms of life. A lion has a different form of life from a human and in Wittgensteinian terms would not share enough with a human for them to understand each other. Their languages would be incommensurable. This may be a bit of an overstatement too, given that humans and lions are both mammals and so do have quite a lot in common but the general point is not without some force. They lead very different lives from humans, have a different body shape and most likely have at least some different perceptions from us. Arguably, it is

<sup>2</sup> According to Nagel (1974) points of view are shaped by values, beliefs, education, and other social and psychological factors (Nagel 1974).

<sup>3</sup> The term has been used widely by Habermas (1987) as the set of skills, competencies, knowledge and perceptions used by humans in order to negotiate their way through everyday life, that is to say by interacting with other people, understanding and manipulating their environments (physical and social) and themselves, differentiating distinct entities and events in the world, and ultimately creating and maintaining meaningful social relationships (Habermas 1987).

<sup>4</sup> We can imagine what would be like for me to behave as a bat, but not what it is like for a bat to be a bat (Nagel 1974). In that sense we are restricted to our biological and historical resources, and as such it is beyond our ability to conceive what it is like to be a bat.

because of this same reason that if we manage to create strong artificial intelligence embedded in robots, this might still not be sufficient to attain the type of shared lifeworld with those robots that would be needed to establish meaningful human communication.

These examples highlight the importance of having a particular kind of body, perceptual equipment and social nature to establish meaning and understanding in communication. It is not only that “our own experience provides the basic material for our imagination, whose range is therefore limited” (Nagel 1974, n.a.), but also that certain kinds of experiences are not accessible to us by the limits of our own human condition.<sup>5</sup> The problem is not confined to exotic cases, the subjective character of experience of a blind person from birth is not accessible to me, nor presumably is mine to him or her.<sup>6</sup> In this regard we are not so worried about the differences in perception arising from individual differences. There will always be a private component of experience, which is not only that each one of us possesses a particular view, but that nobody really knows whether other people also have the same internal experiences as we do. Thus, it might be reasonable to think that some people have one sensation of red and another group of individuals a different one (Wittgenstein 1953).<sup>7</sup> I might see the colour of this wall as being red, while you might think is more close to orange. But the idea is that this kind of subjective difference (in this case of colour perception) still allows for understanding and is not particularly important. Our claim is that the more alike our shared lifeworlds are the easier it is to understand and establish meaningful communication, and the less alike they are the harder it is to communicate. If this is true, one could imagine some future human enhancement interventions which could change so drastically the lifeworld of the enhanced individuals that they could no longer reach understanding and establish meaningful communication with unenhanced individuals. While we still do not have empirical evidence of the kind of human enhancement interventions needed for such a dramatic lifeworld shift, there are some parallels that can be made in relation to communication problems arising from enhancement. In the next section we will point out three forms of human enhancement that could challenge aspects of our shared lifeworld and could potentially affect communication.

<sup>5</sup> There would be of course still be private experiences that are accessible to only a particular individual, but we are concerned with the type of facts that we *qua* humans can have access to in general terms, and which are as such not limited to one’s own individual private experiences of the world.

<sup>6</sup> We might have partial understanding of certain facts, but not the kind of understanding that would be needed for meaningful human communication. However, up to certain level of meaning we could try to develop concepts that could be used to explain the objective facts of the world we live in.

<sup>7</sup> Wittgenstein also uses the case of feeling pain as an experience in which in principle we can imagine someone else’s pain on the model of our own experience of pain. Although he also pointed out that this is already not an easy thing to do since “I have to imagine pain which I do not feel on the model of the pain which I do feel” (1953: 101). So even though one can empathize with someone else’s pain one still would not be able to experience that person’s pain (we can think for instance that they might be more sensitive to pain than I am or a difference like that).

### Three Kinds of Enhancement: Body, Senses, Cognition

We already have examples where communication seems to be limited by not sharing a lifeworld and cases where it is difficult to reach understanding. The natural world is a good example of the different forms and channels of communication which are not fully accessible to human understanding. We might claim to have some understanding of animals that show certain high cognitive capacities (for instance when they are suffering or in pain) but these are not sufficient conditions to reach higher levels of communication. The same would probably be true if we were to establish communication in an efficient and meaningful way with an alien form of life. Some forms of human enhancement, as briefly described above, may be so radical that enhanced individuals could be unable to fully communicate with unenhanced individuals. Here we explore three kinds of modifications that could lead to such communication problems.

#### Body

Children's storybooks abound with stories of animals and humans talking happily with each other and, apparently, understanding without any problems what each other is talking about. Carroll was aware that the real situation might not be so unproblematic. Consider the following two extracts of Alice's conversation with the Caterpillar (Carroll 1998: Ch 5):

'I can't explain myself, I'm afraid, sir' said Alice, 'because I'm not myself, you see.'

'I don't see,' said the Caterpillar.

'I'm afraid I can't put it more clearly,' Alice replied very politely, 'for I can't understand it myself to begin with; and being so many different sizes in a day is very confusing.'

'It isn't,' said the Caterpillar.

....

'What size do you want to be?' it asked.

'Oh, I'm not particular as to size,' Alice hastily replied; 'only one doesn't like changing so often, you know.'

'I don't know,' said the Caterpillar.

In the first, Alice's problem of not knowing who she is stems at least partly from the fact that she has frequently changed size, something that she finds confusing. Little girls do not normally change size quickly. For the Caterpillar, changing size, in the sense of length, is a common affair; it happens every time that he moves. For him it is not confusing. In the second the theme is continued with the Caterpillar asserting that he does not know that one does not like changing size frequently. He almost certainly likes it. So while Alice and the Caterpillar communicate fairly well, Carroll points out one area where they cannot understand each other. Their experiences are just too different and they are different because of their bodily characteristics. The main point of this example, that bodies are important in communication, should come as no surprise. We experience the world through our

bodies so obviously they shape our lifeworld. That creatures with radically different bodies should experience the world differently and therefore have some difficulties communicating seems self-evident. The caterpillar regularly experiences rapid changes in its length so finds it commonplace and cannot understand Alice's confusion. Alice, on the other hand, never before having experienced rapid changes in the length of her body, is quite perturbed. Size, for humans, is a relatively important part of one's self-identity. That is why Alice says "I'm not myself, you see." The caterpillar of course "can't see" because rapid changes in length of his body cause no self-identity problems. The point here for our discussion of human enhancement is that some bodily enhancements could lead to the sorts of communication difficulties that arose for Alice and the caterpillar. Modifications to our bodies and to the pace of changes in our bodies could have a significant impact on our lifeworld.

### Senses

Frogs only see movement. Saying to a frog 'that moved' wouldn't make much sense to the frog, and your pet fly would be bored if you took it to the movies because it would see it as a slide show, and bats use echolocation, something for which we do not have adequate perceptual apparatus. In all of these cases, if we could talk with the frog, fly and bat, our communication would be limited, or so it seems.

In the human case too there are several examples where different levels of or complete lack of certain senses raise questions whether or not meaningful communication can be achieved. Consider the case of colour blindness (CB). Most CB people can make most of the distinctions that non-CB people can. Thus, in most cases it probably does not present much of a communication problem. However, if we think about how poets evoke emotions when talking about the intense red colour of a rose or the changing tones of a sunset then it is plausible to think that some human enhancement in relation to adding or enhancing a sense could open a gap of understanding between enhanced and unenhanced individuals. Even though not all sense enhancements might lead to communication problems, the possibility should not be overlooked.

Another example to help us understand if human enhancement would cause communication problems is to consider communication between the sighted and the blind. If the enhancement is enhancement of a sense or of enabling a new sense, then the difference between the enhanced and the unenhanced, at first glance looks similar to that between the sighted and the non-sighted but it is not quite so straightforward. To make this point clearer we will first look at a discussion between Bryan Magee, a sighted philosopher and Martin Milligan, a blind philosopher (Magee and Milligan 1998). This example suggests that communication problems between the sighted and the non-sighted might not be great. We will then consider a short story by H. G. Wells that suggests differently. This will enable us to give a qualified defence of the claim that the difference between the enhanced and the unenhanced is similar to that between the sighted and the non-sighted.

Milligan believes that the blind can do just about everything that the sighted can, though not always as quickly. Both can, for example talk about the external world and

the blind can understand this in a similar way to the sighted. Magee doubts this. The difference between them can be demonstrated by considering the two Frank Jacksons (1982).<sup>8</sup> Jackson<sub>1</sub> believed that the Mary of the black and white room would know more about colour etc. when she emerged into the outside world than she did while still in the room. Jackson<sub>2</sub> believes that she would not. Jackson<sub>1</sub> held that the phenomenal aspect of vision provided extra knowledge to the purely scientific, materialist aspect while Jackson<sub>2</sub> believes that if we know and understand all of the physics then we know all that is to be known. The phenomenal adds nothing. Magee seems to hold Jackson<sub>1</sub>'s view and Milligan, Jackson<sub>2</sub>'s. On Milligan's view, blindness would not be much of a barrier to communication with a sighted person. Both can have access to the same knowledge. For Magee however, there is an insurmountable problem. The blind do not have access to all of the knowledge that the sighted do. It is not obvious however, that serious communication problems arise even if Magee is right. He and Milligan can discuss the external world meaningfully even if their phenomenal experiences are different. Those differences seem little more significant than me seeing what you call green when I see red. The phenomenal differences may be there but they have little impact on communication between us.

Now to the second case, the short story by H.G. Wells *The Country of the Blind* (Wells 2006). In this story a young man, Nunez, fell into a valley in the Andes that had been cut off from the outside world for many generations. The inhabitants had gradually lost their sight and eventually all were blind and nobody remembered anything about sight. In this valley Nunez was not well understood and could communicate nothing about sight to the inhabitants in the way that Magee could communicate something about it to Milligan. The relevant difference is that Milligan lived in a sighted community, could use that community's language and was well aware that the majority of people could do various things faster and easier than he could. The valley inhabitants however had no reason to believe that Nunez had a way of experiencing the world that they lacked. Anything that he could do, they could do and many things they could do much better.<sup>9</sup> When he did talk of seeing colours and so on they had no reason to believe him. Here the lack of communication was significant, at least for Nunez.<sup>10</sup>

What follows for human enhancement and communication? The claim was that the sighted versus non-sighted case was similar to the enhanced versus non-enhanced one. In the first example, the communication between Magee and Milligan did not seem great while in the second, the sighted Nunez had insurmountable communication difficulties. We suggested that the relevant difference was that Milligan had always lived in a sighted community and understood its use of language. Nunez on the other hand, could not make his sightedness understood because the community into which he fell, had no concept at all of what it was to

<sup>8</sup> In this paper Jackson uses the case of Mary who knows everything about the science of colour but has never actually 'experienced' seeing colours because she is forced to investigate the world from a black and white room via a black and white television monitor.

<sup>9</sup> For instance these people could lead nocturnal lifestyles without having to depend on special infrastructure.

<sup>10</sup> If a few humans were enhanced with a new sense perhaps the situation would be more like this than like the blind in our society.

see. A reasonable claim is that lacking a sense in a community in which the vast majority have it, does not raise insurmountable problems for communication, providing that one is part of that language community. Having a sense that all or most others lack, creates greater difficulties and this would be the more common case with enhancements. The possibilities seem to be that the enhanced in this situation would either be ostracised in the way that Nunez was or perhaps more likely, would form an elite. We will now look a little more at what it might be like to have a new sense.

It is a bit difficult to imagine what it would be like to have a new sense, so considering the example of echolocation may help. Echolocation, as mentioned previously, is used by bats to perceive the external world. By determining how long it takes the reflections of their high-frequency shrieks to return from objects within range, bats determine how far away an object is. A bat can also determine through echolocation where an object is, how big it is and in what direction it is moving. In order for bats to perceive using echolocation, their brains need to be designed to make sense of the inputs received by it. In his paper 'What it is like to be a bat', Nagel (1974) argues that echolocation, though clearly a form of perception has no equivalent in its operation to any human sense. However, most humans can tell a bit about location and distance through hearing already (Blauert 1997; Rosenblum et al. 2000) so we can partly imagine what having echolocation would be like.<sup>11</sup> Moreover, there is evidence that humans have or can develop a 'natural' echolocation ability, in particular research has shown the potential of this ability in a segment of the blind population that "has learned to sense silent objects in the environment simply by generating clicks with their tongues and mouths and then listening to the returning echoes" (Thaler et al. 2011: 1).<sup>12</sup> This ability can now be enhanced by the use of devices for sending the sounds (Hughes 2001). Thus, communication problems arise not necessarily because humans lack this ability, rather it could be argued that communication problems arise given that humans use a different range of frequencies and/or use external devices to their inherent biological make-up, which might not enable us to perceive the same aspects of the world as bats do. Thus, even if this suggests that communication with a bat may be possible, albeit within certain limits of understanding, this partial understanding<sup>13</sup> might be possible only because echolocation is based on a sense that we do share with bats, namely hearing (Stroffregen and Pittenger 1995). However, if we were given a totally new sense about which those lacking it knew nothing, as in the H. G. Wells story then, it is less clear just how much understanding would be possible. In other words, certain human enhancements might lead to a situation where the enhanced individual and the unenhanced may not share much of their lifeworld. Thus, while having a new sense might not necessarily lead to communication problems between the enhanced and the unenhanced, some types of these sense

<sup>11</sup> Humans have also external devices that enable them to process sound information in an analogous form to bat's echolocation (e.g. sonar technology).

<sup>12</sup> Interestingly, Thaler and colleagues note that in early blind echolocation experts, the visual cortex is activated in response to auditory stimuli.

<sup>13</sup> In addition, partial understanding might be necessary but not sufficient for the type of meaningful communication that is needed in certain spheres of human communication.



enhancements might. There is at least a case to me made further examination is warranted.

### Cognition (Including Memory)

Our cognitive capabilities, including the ways in which we acquire, select, represent and retain information and later use it to guide behaviour, have been seen in the past as superior to those from other living organisms (Dennet 1978; Savulescu 2009). Moreover a great many of these features that we use to define our human condition (such as analytical and conceptual thought, different degrees of communication, awareness of ourselves across time and space and the capability of feeling and emotions) are dependent on the particular ways our brains are connected and functioning (Farah and Heberlein 2007). In addition to this our cognitive processes are seen as constitutive of our being and life (Sacks 1985).

Our thesis here is that some forms of cognitive enhancement could pose communication problems between the enhanced and the unenhanced. Some support from this thesis is that the different cognition abilities humans have in comparison with other living organisms already pose communication limitations between humans and other non-human animals. Moreover, there are cases in which even among humans differences in brain chemistry, anatomy or similar bring significant differences in the way certain humans know the world. Brain damage and neuro degenerative diseases have also changed the way people experience the world (Sacks 1985), for instance there are cases of people who after accidents have lost the capacity to recognize faces, objects, movement, and music (without being deaf); or cases in which certain neuronal disturbances (such as those caused by epilepsy) have made people experience enhanced feelings of spirituality and beauty.<sup>14</sup> Some of these differences already make us question our understanding of the world they see and know.

Some good examples can be found in Oliver Sacks's book *The man who mistook his wife for a hat and other clinical tales* (1985). An interesting case is the one he describes in his story of the twins who happened to have an almost limitless memory and with this the way in which memories are retrieved. The twins, when asked how they managed to hold so much in their minds (e.g. a three hundred figure digit), answered that they 'see it'.

A box of matches on their table fell, and discharged its contents on the floor: '111,' they both cried simultaneously; and then, in a murmur, John [one of the twins] said '37'. Michael [the other twin] repeated this, John said it a third time and stopped. I counted the matches—it took me some time—and there were 111.

'How could you count the matches so quickly?' I asked. 'We didn't count,' they said. 'We saw the 111.'

'And why did you murmur "37," and repeat it three times?' I asked the twins. They said in unison, '37, 37, 37, 111.' (Sacks 1985: Ch 23)

<sup>14</sup> Some researchers have argued that epileptic individuals with seizures in certain areas of the brain can have intense, spiritual experiences and bursts of creativity (Ramachandran and Blakeslee 1999).

Sacks's tells us in his book that he founded puzzling not only the fact that they could see the '111-ness' in such a flash, but that they factored the number 111 without having any method or 'knowing' (in the ordinary way) what a factor means.<sup>15</sup>

The second anecdote he narrates about the twins was a time when while sitting in a corner together locked in what seemed to be a singular, purely numerical conversation.

John would say a number—a six-figure number. Michael would catch the number, nod, smile and seem to savor it. Then he, in turn, would say another six-figure number, and now it was John who received, and appreciated it richly. They looked, at first, like two connoisseurs wine-tasting, sharing rare tastes, rare appreciations. I sat still, unseen by them, mesmerized, bewildered. What were they doing? What on earth was going on? I could make nothing of it. It was perhaps a sort of game, but it had a gravity and an intensity, a sort of serene and meditative and almost holy intensity, which I had never seen in any ordinary game before, and which I certainly had never seen before in the usually agitated and distracted twins. I contented myself with noting down the numbers they uttered—the numbers that manifestly gave them such delight, and which they 'contemplated', savored, shared, in communion (Sacks 1985: Ch 23).

Sacks invites us to ask ourselves whether the numbers had any meaning or universal sense, or (if any at all) a merely whimsical or private sense, like the secret and silly 'languages' brothers and sisters sometimes work out for themselves. Kurt Gödel, has discussed how "mathematical objects are as concrete, as stable, and as well-behaved as physical objects, and that the axioms do indeed govern their behaviour. In this respect, mathematical objects are neither illusory, nor ephemeral; neither figment, nor allegory. They are real" (Ravitch 1968: Ch 2). If this does occur, it is possible that only those who can understand this being in the world as numbers can experience a "strange and precise communication too" (Sacks 1985: Ch 23). However, such a world does not seem to be the world most of us know and as such not a world we can easily grasp.

Another famous case is the one presented by Alexander Luria (1987), in his book *The Mind of a Mnemonist: a Little Book About a Vast Memory*. Luria describes in this book the case of a mnemonist patient, that is to say someone with a remarkable capacity and durability of memory, he calls S. S's incredible memory capacity prevented him not only from reading, abstracting and understanding simple stories (as details would create more details until his mind was a complete chaos), but more importantly it prevented him from establishing meaningful communication with other human beings. Presumably, this was because others could not grasp what it was like to be saturated by so many details even in engaging in simple tasks.

<sup>15</sup> Sacks's has already put them to the test about their understanding of simple calculations such as multiplication or division of which they seem to have none. However, they had divided spontaneously "a compound number into three equal parts".

These examples aim to highlight the possible communication problems that we could encounter when human enhancement comes in the form of enhanced cognition (such as memory enhancement).

These three different aspects –body, senses, cognition—suggest that certain neurological and bodily differences between humans inhibit at least some meaningful communication. In the next section we will outline some examples of human enhancement interventions that are aimed at changing our bodies, our senses and our brains.

## Enhancement Technologies and Interventions

It could be argued that all forms of technology-human interaction have the potential to change the way we perceive and understand the world (Haggard 2010), but only a few cases seem to really have the potential to disrupt meaningful communication. Technological interventions that tinker directly with our brains, for instance, do seem to bring something new compared with other kinds of human-technology interactions. This is because the human brain is considered the human organ with the highest level of complexity and is the most dynamic and sensitive organ that we have (Society for Neuroscience 2008a). It is the organ that most of us would consider makes us unique, not only because we associate it with our identity and our conscious perception of the world, others and ourselves (Glannon 2007; Hayles 1999; National Research Council 2008; Varela et al. 1991),<sup>16</sup> but also because it orchestrates all our body activities, functions and capabilities, including memories, emotions, affective and cognitive capacities of reasoning and decision-making (Society for Neuroscience 2008a, b; Berger et al. 2005). As such, interventions of the brain will probably have more far reaching consequences for human interaction (Berger et al. 2008) and for human self-perception and understanding (Farah 2010), than any other intervention in our body.

The following are some examples of human enhancement interventions that could potentially disrupt our communication processes:

- **Pharmaceutical interventions:** generally speaking pharmaceutical interventions alter the chemistry of our brains. They do so by mimicking neurotransmitters, the chemical messengers neurons use to communicate with each other (Society for Neuroscience 2008a). Let us use the example of stimulants drugs which affect norepinephrine and dopamine receptors. Dopamine, for instance, carries messages in the brain about feeling good. When used for human enhancement, some stimulant drugs have psychological effects that range from temporal altered thinking process, synaesthesia and altered sense of time and sense of self, to long-term psycho-emotional effects. Some other drugs have shown some improvements for episodic and working memory, as well as concentration.

<sup>16</sup> For instance, generally we believe that human beings see with their eyes; however, it does not matter which sense someone is using to gather data, rather it is how the brain interprets it what counts (“you don’t see with your eyes, you see with your brain” (Bach-y-Rita and Kercel 2003).

- Brain stimulation techniques such as transcranial magnetic stimulation (TMS), and brain deep stimulation (DBS)<sup>17</sup>: When used for human enhancement, certain brain stimulation techniques have the potential to stimulate areas of the brain activating certain emotions or behaviours that are not characteristic of the person in question and that in some cases could produce feelings that go beyond what we as humans have been so far able to relate to (Heinrichs 2012; Klaming and Haselager (2010); Baylis 2011). For instance, Helmut Dubiel, a philosopher and author of *Deep in the brain: Living with Parkinson's disease* (Dubiel 2006), at a conference on deep brain stimulation in 2010 mentioned that with the stimulation he has experienced happiness as never before, and that it was so suddenly that he described as not human. This highlights the possibility that certain interventions to our nervous systems could enable us to experience things that we generally do not categorize as human. Brain stimulations techniques can also be used for enhancement of human sensing capabilities and cognition (Farah and Wolpe 2004; Benali et al. 2011; Hamani et al. 2008).
- Genetic interventions: The way the human brain is wired up and constituted has a great genetic component (Society for Neuroscience 2008a). If in the future genetic interventions could selectively turn off or on certain genes related to our neuro-traits or we could engineer to include certain non-human traits in our genomes it is likely that the set of capacities current humans experience could drastically change (like being able to see a wider selection of the light spectrum or hearing different frequencies). Genetic interventions could also be used to change our bodily features, for instance by genetically engineering different features or numbers of limbs. One futuristic example would be to genetically engineer a human-animal chimera. If such intervention were to change so much our phonic and auditory system, how can we be certain that we would have the same capabilities to speak and listen to sounds the way we do nowadays?
- Brain computer/machine interfaces and cognitive/body prostheses: here we are referring to those that do not only improve or rehabilitate function or cognition (Donoghue 2002, 2008; National Research Council 2008), but about the sort of implants used for human enhancement, such as those that could enable new senses as well as new modes of perception (Coenen et al. 2009; Berger et al. 2005).<sup>18</sup> Or implants that affect our bodies such as those providing us with an extra pair of hands, or a tail. Arguably, people using a cane already experience an extended body. Similarly modern day prosthetics, including implants, embedded devices (like pacemakers) and wearable devices cannot be seen just as inanimate and separate objects from our bodies.<sup>19</sup> Now if we have prostheses that enable us to basically change our whole body, our exploration and

<sup>17</sup> Neurostimulation have already been used beyond just improving mood and mental function in patients with neuropsychiatric disorders, into enhancing certain features in normal people (Snyder et al. 2003).

<sup>18</sup> The computer game industry, for example funds many brain-computer interfaces designed to enable users to directly control their avatars in "virtual worlds" (Waters 2008). Other relevant non-medical arenas for the use of BCI are the automotive, telecommunication and robotics industries (F. Berger et al. 2008).

<sup>19</sup> For a case portraying this view see [http://www.washingtonpost.com/national/on-innovation/ethics-in-the-age-of-acceleration/2012/07/13/gJQAzVDUiW\\_story.html](http://www.washingtonpost.com/national/on-innovation/ethics-in-the-age-of-acceleration/2012/07/13/gJQAzVDUiW_story.html).

knowledge of the world might also be altered. These ‘enhanced’ bodies could potentially pose communication problems inasmuch as they enable the enhanced individuals to explore and being in the world in ways that might be significantly different to those of unenhanced individuals. How much can I really grasp the lifeworld of a human that has three pairs of hands? A less fictional case, could be that of soldiers using exoskeletons, how much the perceptions enabled by their new bodies (i.e. being stronger or faster) affect their interaction with others and their environments? At this point in time we might not be able to assess the degree and scope of the communication problems these human enhancements might bring along, but that does not make less important that we start discussing the possibility that such changes might bring.

These are some possible examples of the kind of human enhancement interventions that could alter our brains and bodies in unprecedented ways and with it disrupt the ways in which we perceive, sense, and know our environment and ourselves, thereby challenging the possibility of meaningful communication. Maybe human enhancements that add one new capability, such as echolocation would still leave room for reaching partial understanding, but imagine what would happen if we keep adding different kinds of new perceptions to the ones known by humans. We might reach a stage in which the lifeworld of techno-enhanced beings (i.e. posthumans) would be so different to the human lifeworld that it would seem absurd to speak of such a thing as a common world. The same could occur if we engineered babies with different non-human new ways to explore the world.

### Some Ethical Considerations

We certainly do not need to think of exotic implants to see the difficulties that certain enhancement technologies could pose for reaching meaning and shared understanding.<sup>20</sup> How much these different ways in which we can live in the world (body), perceive it (senses) and know about it (cognition) change our lifeworlds and whether it elicits or not a communication divide might be empirical questions. However, what is hard to deny is that certain uses of enhancement technologies could indeed challenge meaningful human communication, as they are likely to significantly change our bodily features, senses and cognitive capabilities, in addition to the changes to our social and cultural lifeworlds.

Here we want to establish the importance of taking seriously the possibility of a communication disruption by highlighting the ethical importance of communication as such. The communication difficulties we have highlighted are of considerable moral importance because of the role human communication has for humans as relational individuals.

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<sup>20</sup> Presumably we can try to come up with ways to translate different experiences in order to communicate to others experiences that otherwise they cannot experience. But this takes us to Nagels point in which I might reach a partial understanding that is good enough to reach certain level of communication, but the more ones share lifeworld diverge from others the more likely meaningful communication would be impaired.

One ethical concern is that such a divide could bring a kind of hermeneutic crisis (Edgar 2009; Habermas 2003). One of the main reasons for a shared lifeworld being crucial in human communication, is that it enables us to secure a horizon “within which [we as humans] can refer to one and the same objective world” (Habermas 2000: 315). That is why communication is not only easier between people with similar experiences; but it might be the case that meaningful communication is only possible between those who share a minimal reference lifeworld (what this minimal reference entails is outside the scope of this paper). A hermeneutic crisis then would imply the possibility of meaningful communication being eroded. This would include an erosion of the possibility for discussing and deliberating about the implications and applications of new technological interventions as well as the legitimate uses of them. Furthermore, when meaningful communication is not possible anymore, the basis for social interaction, social engagement and cooperation, would not be possible to sustain or even try to sustain.

Another related ethical concern deals with empathy. The epistemic form of subjectivity deals with the limits on the understandability or knowability of various facts about conscious experience (Nagel 1974). That is why only creatures capable of having similar experiences can understand their ‘what-it-is-likeness’ in the empathetic sense. Generally speaking, empathy is regarded as the ability to take the perspective of another individual; that is, imaginatively assuming one or more of the other individual’s mental states (Goldman 1993). In common language empathy is seen as the ability to put oneself in another’s shoes, in order to understand the emotions and feelings of the other. Empathy is important because it can play a significant role in motivation and in people’s ability to show moral concern for others. Having different and diverging lifeworlds, as implied by the kind of communication divide described here, might shift our perception and moral concern towards those who do not share our particular lifeworld. Thus, it can be argued that sharing a lifeworld is not only needed for meaningful communication, but also to come to agreement and understanding of moral propositions (Haidt 2001) as well as to help us decide whom and what to include within our circle of moral concern. An example of this is the way we more readily empathise with the suffering of other humans in comparison with the suffering of other non-human animals. However, before we can expand our circle of moral concern beyond the human, as suggested by many ethicists, it seems we still need to work harder in empathising with those individuals who do not share our beliefs, cultures, socio-economic status (i.e. gays, immigrants, addicts, and people living below the poverty line). Imagine then introducing even more radically different ways of experiencing the world. That is why we argue that a communication divide as the one suggested here could bring even more worrisome consequences.

One more ethical concern has to do with the idea that for the first time certain neurotechnologies are enabling a third party to, in principle, bypass the peripheral nervous system—the usual way in which we communicate information—gaining then, direct access to the center of our thoughts, intentions, feelings and knowledge (Wolpe et al. 2005). How could this become a threat to communication? We communicate because we let others to know about our mental life, which is not the same than others having direct access to it. If others can access the world of our

thoughts without us being able to control what we want to communicate to others, can we still call that human communication?

The last ethical consideration we want to mention here is the *transcending power* we encounter through communication, particularly when we reach an understanding with one another about ourselves and the world (Habermas 2003). Reaching understanding can be conceived as a mechanism that socializes and individuates in one act. Communication contains “the possibility of universal understanding within the shell of the most individual expression” (Habermas 2000: 187). This is one of the most interesting paradoxes of human communication; it bridges and awakes a feeling of unity, while at the same time it also inherently divides, as it entails a process of individuation.

Human communication as was mentioned before is important because it allows us to engage with the world and share meaning with others. A shared human lifeworld has enabled us to cooperate and communicate in more advanced and adaptive ways. Certain technological interventions could threaten communication, as we do not know the effects they could have on an individual’s life, inner world and in the way he or she interacts and understands the world and other human beings. If we acknowledge the pivotal role human communication plays for the individual and society, then the ways in which human enhancement interventions might impact communication calls for more seriously ethical deliberation.

## Conclusion

The special status of human communication comes from the fact that it is more than merely a passive flow of information within a system. Human communication enables us to convey intentions and meaning, allowing us to express our inner states, and establish relationships with others and our environment.

Given that our brain is the organ that allows us to understand and create frameworks to engage with the world and this engagement comes, by and large, through our bodies via our senses technological applications that directly tinker and alter our brains and bodies call for more ethical discussion. While there are positive outcomes that can be reached by using these neurotechnological and other technological interventions, such as bridging communication gaps and improve channels of communication between individuals with different biological human realities, this does not necessarily mean that it will always enable us to communicate in humane or meaningful ways. As such, we also need to be cautious with the ways our shared human lifeworld is changed and challenged by new uses of technology (e.g. human enhancement), as we could end up creating a communication divide between ‘enhanced’ and ‘unenhanced’ individuals, in which no meaningful human communication would be possible or would be very difficult to attain. We need to think about technological interventions in terms of the impacts they have on the brain and body, positive or negative, and importantly providing a framework for thoughtfully engineering their direct as well as their emergent effects.



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