

New medical technology - to what does it lead?

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New medical technology - to what does it lead?⁽¹⁾

by Regi Theodor Enerstvedt

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In this paper I shall first discuss the concept of *medical technology*. Then some different meanings of the term will be reviewed. Next, the relationship between ethics and the scientific method will be discussed. Finally, the understanding that emerges from this account will be applied to a special problem, the relationship between technology and deafness.

What is contained in the concept of medical technology?

Both "medicine" and "technology" are words with many definitions and they are always used within a certain frame of reference.

Since an analysis of language in depth could be the topic for many articles the the discussion here will mainly be to delimit the field. It will simply be ascertained that:

Medical technology first of all is used

- 1) in the intervention with the body - operations, surgery, e.g., a scalpel.
- 2) in diagnostics.e.g, assessment of whether there is disease or injury and if so, what. For example, this could be done with an audiometer.
- 3) as aids in direct contacts with the body, or perhaps removed from it.

There would be gradual transitions between all points regarding whether an aid would be categorized as medical technology or simply if it could be called a "technical aid." That which is described by the name cochlear implant clearly comes under medical technology, because it requires medical intervention. However, it is not clear that a hearing aid is medical technology. Most people in the deaf community in Norway would probably be of the opinion that it is. Technology can be classified in many ways. What is important is that the classification is always subject to a definite purpose. Is a tactile warning device, or alarm clock, for the deaf medical technology or not? Certainly, there is no right or wrong answer to that question. It depends on the purpose. By contrast, the connotations of words or the meaning attached to them is of great consequence in certain connections. For example, if we call all aids developed for the deaf "medical" technology, that could be a terminology that promotes what I would call a pathological conception of deafness. That is one that would not be to the advantage of most of the deaf. Deafness is not usually an illness that can be cured, or one that is deadly. If that was the case, a pathological model would be appropriate. A cochlear implant also does not cure deafness. If it is disconnected, the person using it is just as deaf.

From another perspective, one might ask: Could we imagine a technological development that could take different directions, e.g., one that aims to develop a technology for the purpose of physiologically doing away with deafness, in contrast to a technology with the goal of improving the possibilities of communication for the deaf without doing away with deafness. This will be a central point in the present paper.

The question, "Medical technology-to what does it lead?" brings up an important problem. However, it cannot be answered unless it is reformulated. As it is stated, medical technology is considered as *given*. The only question that remains then is

only what it leads to. It is possible and usual to put the stress on this latter question. A correct answer can, however, only be given if we phrase the question as follows: What leads to medical technology- and, to what does medical technology lead?

This paper has three parts:

1. First, various meanings of technology will be explained. It will be done in a general way as it applies to most technical fields, the medical military, public transport, and others.
2. The second part presents different means or methods of scientific studies of social conditions and the relationship between them and two different moral, ethical principles. The first and third section is structured on one of these methods and one of the ethical principles.
3. In the third part the relationship between medical technology in the field of deafness will be assessed in concrete terms.

Some different meanings of technology

I remember many years ago when a member of government stated that to attempt to do something with a certain technological development was like asking the herring to come back to Vestlandet. That is, intervention in a social process is just as difficult as intervention in a natural process. This is a very common view. Technological development is something considered as given as nature. We can only relate to whether we shall use it or not. What is interesting is that because of human intervention the herring has in fact returned to Vestlandet. In other words, it is possible to do something with nature's development, but not with the development created by human beings themselves! This has been called technological determinism. How widely spread it is must be investigated, but it seems to be a quite common view. I have, in particular encountered two variations of it: the optimistic and the pessimistic. In the former technical development is essentially seen as progress, as a benefit to people. In the pessimistic variation technological development is seen first and foremost as an evil, as harmful to the human being.

The Young Right has a document (*Modern technology-Conservative ideology*) on the Internet which is an exciting variant of technological determinism:

"The Young Right has as a basic tenet that new technology contributes to the development of society and thereby to a better life for each individual. Technology by itself is neither evil nor good - people decide whether technology will be used in the service of good or evil.

The Young Right is of the opinion that it is both difficult and of little use to attempt to regulate the development of new technology itself. This is the case despite the

recognition that one can thus obtain technology one would never wish for or allow to be used. The Young Right thinks it is the use of new technology for which there must be set limits."

To The Young Right technology is something in itself that has its own natural course of development. However, one can apparently interfere with it, but that is considered difficult and of debatable benefit. The question, however, is not about whether one ought to intervene in the production process or not but about who intervenes, who selects it, and about who does not intervene or make the choices.

Technological determinism in its optimistic or pessimistic variant can not by itself be true or untrue. Both optimism and pessimism can evidently be true --as self-fulfilling prophecies. Just that indicates the importance of such conceptions. That is, if it is the case that the technical development express a chosen direction, and not a naturally given one, then the question becomes: If, for example, a majority in a country does not participate in making choices, who does? What driving forces and interests hide behind the choices in technological development? In this case no answer is given . It must simply be investigated.

With this understanding as a point of departure, I would draft the following spatial representation of the possibilities for technological development.

Intentions in the technology process

Intentions in production				
	Dimensions	One	Some	Many
INTENTIONS IN USAGE	One			
	Some			
	Many			

Beginning with the dimension of production , it quickly becomes evident that there certainly are intentions and purposes built into this aspect of technology, including medical technology. For example, there is a different intention, purpose embodied in a hunting rifle than in a AG-3 Gun (?), and different intention in a table knife than a hunting knife. This does not prevent the use of these objects in other ways than those intended. However, the actual idea expressed in the The Young Rights assertion above that technology is neutral, is nothing more than an ideological cloak that seem seem widespread; it is perhaps the most common view. ⁽³⁾ To repeat the quotation:

"Technology by itself is neither evil nor good - people decide whether technology will be used in the service of good or evil."

However, there is technology which obviously is produced first and foremost for one purpose; there is technology produced for several purposes; and there is technology produced for many purposes. For example, computers are now produced for many different purposes and they are used for many different purposes. On the other hand, if one looks at the dimension of usage in the table, it immediately becomes clear that technology that is produced for a definite purpose can, in certain instances, be used in one and only one way by the consumers. In other instances it can be put to many uses. This means that technology, not only as far as production is concerned, but also usage, always is a part of culture and not something from the outside that affects culture. Pictures from the last century may show low work benches and small tools. It was not the low benches and the small tools that created child labor, but rather it was child labor that created the low work benches. Nevertheless, it can correctly be said that the existence of child labor before the industrial revolution had a definite technological basis that made it possible. On the whole, just because technology and culture are intimately related, it is not possible to introduce a new technology and assume that the culture based on an earlier technology will endure. Considering the so-called Internet as an example of production, it was developed in a culture in USA with a definite purpose: To protect the American defense force against a Soviet attack. If the data technology broke down in one place, it would still function in another, and as a net. The purpose, in other words, had to do with war and destruction. However those who used it started to change this, first illegally, but later legally, with the result that the use of this technology almost became the opposite of that originally intended. It became tools, broadly defined, for science and culture, communication and education in a broad sense. It can indeed be said that the net obtained a liberating perspective. Bård Engen (Engen 1997) has called attention to this development in his thesis on "The Historical Development of the Internet in Light of Jürgen Habermas' Theory of the Public Sphere".

The Internet in USA is arranged into domains according to the kind of organization to which they belong. The first to be named were divided into six basic sections: government, military, educational, commercial, organizational and net (the section that ties the different networks together). What is interesting, as shown in the following figures, is the relationship between commercial (com) and the educational (edu) usage. From 1991 to the present the character of this relationship has changed. Edu, that was the largest domain has now been surpassed by com. Figs. 5.5 and 5.7 show this development.

Relationship between top-level domains in October 1991

USA

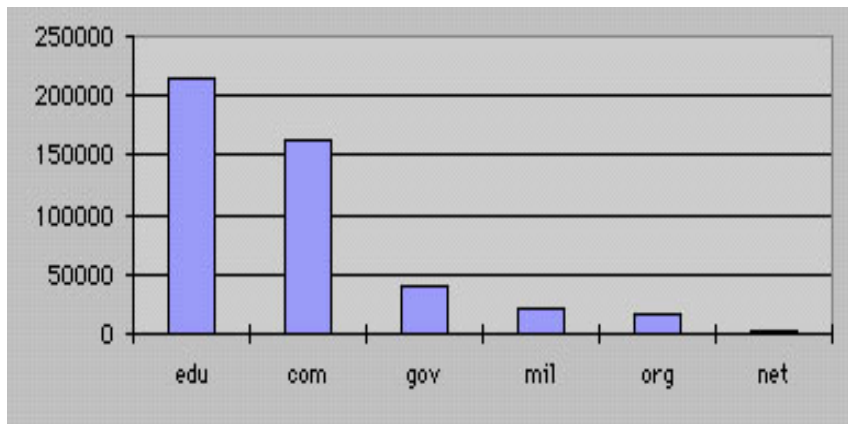


Fig. 5.5. (ftp.nw.com/zone/ : 9/10-95, Engen 1997)

The bar graphs show that the largest domain in 1991 was educational followed by commercial, governmental, military and net. The educational domain had ca 215,000 computers (215,062), while the commercial domain had over 160,000 (166,929). In July 1995, however, the commercial domain had grown larger than the educational and it is now the largest domain on the Internet. The educational domain had in July 1995 ca 1.4 million computers (1,411,013) while the commercial domain had grown larger with ca. 1.7 million computers (1,743,390).

Relationship between top-level domains in July 1995

USA

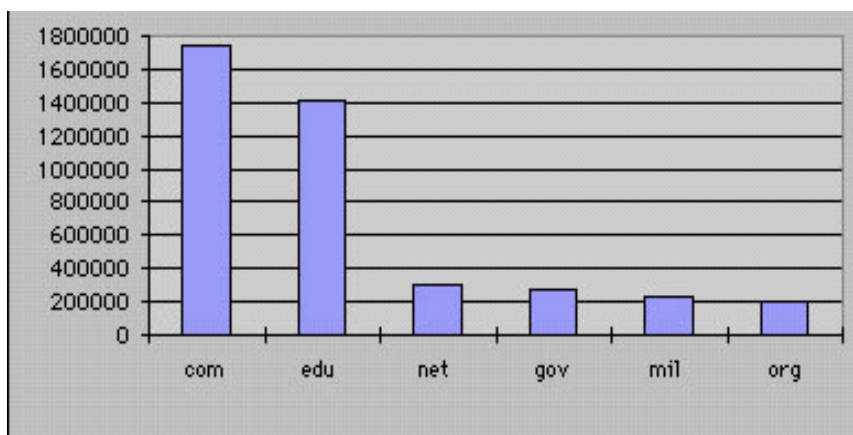


Fig. 5.7. (ftp.nw.com/zone/ : 9/10-95) (Engen 1997).

The development of the Internet is an example illustrating how purpose and choice lie at the bottom of a production process, how consumers through their choices can change usage and purpose, and how this in turn reverts back and changes the whole production process. Finally, these figures show how the capitalistic market more and more captures this sphere of life (the Internet) just as it captures other.

If one applies the insight garnered above to the relationship between technology and deafness, one understands that the development of technology in this field is not at all a natural process. There is reason to believe that certain types of technology are chosen while others are rejected. There is no reason to believe that profit and market play no role here. Turning to the technological problem inherent in the present case, the cochlear implant (CI), one could conceive of a culture in which CI has not been discovered. Imagine a culture where deaf people were considered holy, selected by the gods; CI would surely not have been invented there. Thus one can readily take a position against CI without being a technological pessimist. One could even be a technological optimist, but nevertheless favor the development of *another* type of technology, e.g., based on visual or tactile coding. Seen from another point of view, we must relate to the situation that, since CI has been invented, many parents will choose it for their child. If what was said above about technological development is correct, one must, however, deal with the question: Is there only one possible use of CI, and is only one specific educational program possible with children with CI? To answer that question it is necessary to consider the relationship between the scientific method and ethics.

Before discussing that topic, we should first deal with Per Fugellis' query whether we are on the way to a society that thinks all of life's questions can be reduced to medical technology. Are we moving in the direction of a medical cyberspace characterized by creative engineering, manipulation of genes, predictive tests, design of lifestyle, programming of health control, replacement of diseased or old body parts with healthy or artificial organs, and more and more high-tech health products as optimal substitutes for defective natural functions and organs? Are parts of the population in the process of experiencing loss of beauty, or less than 100% comfort, as an illness? Are we in a collective struggle for security in which people expect no risk of illness and injury? Are the good people overcome by a perfectionistic concept of the ability of medicine to perform? If so, are we on the verge of an increasing cultural- and social-psychologically based misuse of medical resources? (Fugelli, 1995). My answer is that if we believe the development must go in this direction, that could become a self-fulfilling prophesy. Seen from another angle, it is also not the case that we can choose freely in a socially abstract vacuum. The choices made at present are made in a society in which commercial and military interests dominate. Consider the development of the Internet. The same applies to medical technology. To understand physicians' point of view one must study the industry of health remedies and the producers of medical technology.

Even though the decisions are made in CEOs' offices, they are not unaffected by the needs of the consumers. Not all needs for medical remedies are created by their manufacturers. Furthermore, the historical possibilities of the day are to a large degree-but not exclusively- determined by the choices made yesterday. If we want to keep our automobiles, we can not choose to do away with highways. And if we want to maintain high speeds, we must accept a calculation of a correlated number of deaths and injuries. We will then also have many requests from the injured and their relations for wheelchairs, prostheses, rehabilitation facilities, and also for healing medicines rather than for prophylactics. The social conditions in highly developed capitalistic societies-e.g., the Norwegian- produce much suffering. But most of all harm and illness are caused by physicians and psychiatrists, the health remedy industry and producers of medical technology. Never before in history have people been so ill as today. And in such a civilization ever new implants will be invented as part of the production of medical technology.

The relationship between the scientific method and ethics

The first and last parts of the paper are based on a conception of the scientific method and the relationship between method and morality (ethics) as will be explained.

In sociology there have long been two suppositions about human nature. One is that a human being is a goal-directed being, the "rational man," one who maximizes utility -*homo economicus*. All human behavior can be interpreted on this basis. The other assumption is that human beings are controlled, not by goal-directed thinking, but by norms; they explain all human behavior. We play roles-*homo sociologicus*. I have never appreciated this kind of thinking whenever it becomes an either/or conception. My contention is that this either/or thinking, this dualistic conception and method are like a nightmare plaguing our society, politics and science. Instead of this conception and method I would propose the both/and method. The human being behaves both as a "rational man" and as one guided by norms. The spread of, respectively, utility-maximizing and norm-determined acts varies in different societies and groups. One investigation might show that one of these kinds of acts dominate. While this is what it shows, we must not assume that only this one type exists. However, the problem is that an either/or understanding can become true as a self-fulfilling prophesy. If we believe strongly enough that a human being is merely a utility-maximizing being, that can contribute to a development so that it will to a larger extent become that.

It is my contention that the these two methods-the either/or and the both/and-- correspond to certain ethics. As a methodological remark, if I were to say that one was the cause of the other, e.g., ethics is the caused by the method, or vice versa, that would be thinking according to the either/or method. It is an incorrect way of posing the problem. There is an internal relationship between method and ethics.

The either/or mode of thought accords with a collectivistic ethics. In this way of thinking one is either, e.g., deaf or not deaf, normal or not normal, you are a human being or non-human. Accordingly, the approach to the ethical problem then becomes: What is best for the deaf as a group? What is best for those failing in school? What is best for the group with behavior problems. For the blind?

This either/or method accords with a certain ethics, and that is also the case with the both/and method. That morality I will call individualizing.⁽⁴⁾ I prefer the both/and method for the same reason I prefer the individualizing ethics. It can be justified with an example from a group, the deaf, about which I have some knowledge. When I started working on the problem of deafness I knew so little that I thought those who were described as deaf did not hear. Then there were those who did hear more or less well; in other words, I had an either/or conception. I can therefore state straightforwardly that there is a connection between lack of knowledge and the either/or way of thinking. After some time I understood that some deaf had some hearing, some of them even without a hearing-aid, some with. Few hear absolute nothing. After still more study I discovered that there were in many ways an enormous difference between people who were prelingually deaf, often born deaf, and those who had become deaf after they had acquired a language. Further, when I studied the educational program for the deaf I discovered that the collectivistic ethics often had been domineering. In periods of history the deaf should only use sign; nothing else was necessary. In other periods of history they should only learn to speak, and sign language was, so to speak, made illegal. Today all instruction in Norwegian schools for the deaf shall be done in sign language (with exception for a little speech training). An individualizing ethic would be oriented toward the individual and accordingly ask what is best for just that one child. Given that understanding, the question regarding what is best for the group of deaf people becomes meaningless.

Medical technology and deafness

Which technological conceptions are the most dominant, most common, can be investigated. I have not done that. However, if I am right in my understanding of the relationship between technology and culture, about intentions, purposes, and choice in both the production and use of technology, and also that erroneous conceptions can become true as self-fulfilling prophecies, there will be great risks and challenges for the schools for the deaf and the deaf community in times ahead. The remainder of this paper will therefore be devoted to a strong warning against the either/or way of thinking and the collectivistic ethic. While different forms of deafness will continue to exist, extremist conceptions will threaten the very existence of the school for the deaf and the deaf community.

Let me illustrate this with the production and use of the cochlear implant. I have argued that it is not only a technical product but also a product of a culture causing pathology. Moral choice is at the base for its use and production. The driving forces

behind the production ought to be investigated. I have not done this, but I will not rule out that deaf childrens' parents are in the picture, although profit and professional interests have been the most important driving forces from early on. I am uncertain in my own mind whether I would have chosen research and then production going in this direction. Since the implant has been invented, its use is a choice with two essential facets. We must all take a stand regarding *who* ought to have the right to make the choice. For adults, the answer is simple, the deaf themselves. With respect to children - ought that not be the childrens' parents? Parents are usually the ones who has the greatest love for the child and would want to choose what is best for it. Furthermore, whether or not the operation should be undertaken is an ethical choice. In our culture, with strong interests in pathology and profit, a freely made choice would be difficult for those oriented toward what is best for the child. For this to become possible efforts must be made to establish a democratic public arena in which through discussion among parents, educators, and scientists solutions will be reached on an ethical basis. The need for production and use, or non-production and non-use, should be made in such a manner. As a researcher I see it as my task to contribute to the possibility that parents can make this choice on the basis of knowledge and insight, and to contribute to the development of an educational program based on this choice, whether one or the other is made by the individual.

For me, it is therefore sad to witness that basic choices are made with too little reliance on relevant, existing knowledge and insight necessary to protect the child's interests. Often the reason for the choice seems to be narrow professional interests, demagoguery, and extremism. We do find nuances in the opinions of both those for and those against CI. Nevertheless, in Norway both the discussion of whether to use it or not and the choice of educational program involve the either/or method and the collectivistic ethic. The schools for the deaf seem to have chosen an educational program in which teaching of all deaf children will be done with sign language as the foundation and mainly without sound. For such a school children with CI will be a large threat, because they obviously need instruction in which sounds plays a central role. Why else would one have an implant? It is hard to believe but the alternative presented to Norwegian parents is an educational program founded on pure oralism. The parents seem to perceive them as two mutually exclusive alternatives.

Either Or

Oral/aural instruction Instruction based on sign language

It is clear that CI is a great threat against the very existence of the school for the deaf, if it is to be a school without sound. A probable course of development is one in which more and more parents will choose this technology for their children. Already now there are many children in schools for the deaf who would benefit from more speech training. Will schools for the deaf meet this challenge, or will the

parents of the children with CI only have pure oralism as the only available alternative offered? That seems to be the situation in Norway today, that is, an either/or way of thinking coupled with a collectivistic ethic. This is nothing but a scandal. Beginning with the acceptance of sign language as the natural language for the deaf, methods have been developed from the point of view of the both/and method and the individualizing ethic. It could well be the case that only sign language is the best for some deaf children and that the best for some others spoken language. These, however, are extremes but could become the only institutional programs available for deaf children in Norway. Then I think the schools for the deaf would go out of existence.

What about the oral/aural educational program for children with CI? What are the research results regarding cochlear implants? I think the following still holds for those operated on as children.

1) The results are quite good for postlingual children, i.e., those who lost their hearing after they had acquired speech, i.e., children who became deaf from age five on or later. They can both understand speech and speak.

2) Regarding those who had the operation prelingually, the picture is not so clear. That is, these children lost their hearing before acquiring language, including speech. Among them it seems that those who were born deaf will have the greatest problem in development of speech production and comprehension of speech. However, there is also research showing that there is no large difference between those who are born deaf and those who lost the sense of hearing before language acquisition. I will not distinguish between these groups in what follows, that is, I shall deal with all prelingually implanted deaf. For them the length of time they have had the implant seems important for the effect. The longer the better. This ought to make one cautious, since there is very little research in which children have been observed over a longer period of time. Let me indicate some results. Rose, Vernon and Pool mailed a questionnaire to 64 boarding- and day-schools for deaf children and asked how many of the prelingually implanted children used the implant on a "regular basis," who did not use or did so only "irregularly." They received replies from 45 of the 64 schools with information on a total of 151 children with CI. Among them 71 (47%) no longer used the implant or used it only irregularly, while 80 (53%) did use it. Rose, Vernon and Pool think that the data clearly indicate that the CI was unsuccessful in 47% of the prelingually deaf children. There was also a good portion of unsuccessful cases among the 53% who still wore the aid, but the exact number was not ascertained (Rose et al., p. 260).

According to Mary Jo Osberger children who receive the implant many years after the deafness occurred had the least advantage of it, that is, showing poorer results than other groups. As it looks now, according to current research, she thinks that in time many of the prelingually deaf children who receive implants early will achieve good results with half of them becoming able to comprehend speech, and some of

them will be as able to do so as the postlingual children (Osberger, p. 256). Usually, this ability to "comprehend speech" is measured with single words, and consequently it may be debatable how well speech can be understood in, for example, a conversation. Palle Vestberg in Denmark states that the first results after years of daily use of implants are beginning to appear. The results have been better than those obtained with adults born deaf, but far from what was hoped for based on the experience of adults who lost their hearing. He refers to observations made at the Central Institute for the Deaf in St. Louis where nearly half of the schools ca. 90 students are equipped with with cochlear implants. Signs are not used at the school. All educational instruction is based on an oral/aural ideology, and all students receive daily a one hour individual instruction in hearing and speech and are corrected linguistically. There is no difference in the instruction received by students with CI and those with hearing aids. Vestberg refers to an investigation in which children were tested regularly for three years in order to compare the effects of hearing aids with those from cochlear implants. It is not clear whether all these children were prelingually deaf, but in any case it can be assumed that they had become deaf early. The investigation showed that the progress that could be measured with these students was very limited. It is certainly not the case, states Vesterberg, that impulses from the cochlear implants are comparable with normal hearing. The students are still deaf even if in certain respects they function as students with a little residual hearing. Two thirds of the students learning after a period of three years of daily instructions to understand speech not much better than deaf students supplemented with hearing aids, and possibly by vibrator (Vestberg, 1996, p. 3 (?)). However, one should add that it would be important if deaf children who do not have the advantage of a hearing aid obtain about the same benefit or more (with CI) than those who do have one. Other investigations seem to indicate this. That is probably one reason for the debate whether children with a large hearing loss between 100 and 105dB but with a certain benefit from hear-aid, also could be implanted (Osberger, p. 256). I have great confidence in Donald F. Moores who states that parents who believe that cochlear implants will provide deaf children with clear speech in the normal range, will be disappointed (Moores, 1996).

This is some of what research has shown. It seems that few of the prelingual children who have received cochlear implants have gone far either regarding their own ability to perceive speech or with respect to how well their speech is understood by others. Obviously, more research and assessment are necessary in this field. This applies especially to prelingually deaf children with implants. It is the information referred to above that leads me to the negative realization that oralism could become the educational program for all children operated for CI, if the either/or method and collectivistic ethic is allowed to dominate.

Enough is known from research results to conclude that a purely oral educational program will not lead to anything good for many of these children. We can not know in advance who among the children with implants will benefit. Precisely

because of that, beginning with what we do not know, a both/and method and the individualizing ethic will conclude that all children with CI also ought to learn sign language besides receiving training in speech. The same reasoning can be applied to deaf children without CI. We can not know in advance who will have the greatest benefit from speech or sign language, and, consequently, they should be exposed to both from the beginning.

I have studied the problems of deafness for 10 years. The studies have led to the knowledge that teaching and bringing up small deaf children without sign language, whether they have an implant or not, will result in a very deficient ability to communicate in these children.

The new technology will change the deaf community and culture. But the technology does not mean one defined usage, one understanding, and one definite culture. It is not the cochlear implant that threatens the deaf. It is the either/or mode of thinking and the collectivistic ethic that threatens both sign language, deaf culture, the school for the deaf, deaf instruction and deaf children's future.

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Footnotes

1. I thank Knut Arnesen, Arvid Fennefoss, and Aslaug Høye for many informative and educational conversations about problems pertaining to technology.

2. The present article is a slightly revised version of the lecture. The Internet edition is also slightly different from the publication in *American Annals of the Deaf*. The differences between lecture, Internet edition and the edition in AAD are insignificant.

3. The citation is used because it expresses the conception so clearly and not because as an isolated case it is that important what The Young Right thinks.

4. In the lecture on which this paper is based I called this ethics an "individualistic ethic." Subsequently I have come to think that "individualizing" is more to the point than "individualistic," since the latter often occur in relationships which do not cover what is meant here.