
Interdisciplinarity as a State of Mind: How Can Individuals and Societies Reach It?

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The necessity of an interdisciplinary approach to both research and education can today hardly be debated, especially when one thinks of the complexity and dynamics of changes in the human brain and behaviour related to digitalisation and informatisation. Real interdisciplinarity, however, has to be born within the individual, representing a kind of a particular state of mind. To achieve such a goal, reforms of both science and the educational system are needed, broadening the fundamentals of our knowledge. To support and elaborate this thesis, various ideas will be analysed related to one successful example of interdisciplinarity, represented, in the author's opinion, in the history of development of bioethics.

Introduction: The Age of Information and Digitalisation

In 2007, Hilbert and López estimated the world technological capacity of storing information to be 2.9×10^{20} compressed bytes, of the communication of this to be 2×10^{21} bytes, and of its elaboration to be 6.4×10^{18} instructions per second of an average computer. While the capacity of information elaboration has yearly grown at a rate of 58%, telecommunications at 28%, and information storage at 23%, the capacity of a one-way 'classical' information emission has contemporaneously grown at the rate of only 6%.¹

The growing body of information has imposed upon us selection and specialisation – equally in science, education and practice. The problem with information, however, is that its exponential growth has resulted in an unfortunate quantitative rather than a critical qualitative selection. In this way, information has become knowledge – right or wrong, thorough or superficial, essential or irrelevant. This awkward accumulation of 'democratic knowledge' has produced changes in human mental functioning and behaviour, not due to the significance of its contents but due to its formal features – its

hugeness, diversity, and changing velocity. What have been the major adaptations of the human mind to this continuous ‘shower’ of information? First of all, an increased confiding in technology: we do not trust any more that we are able to handle the quantum of information, so we reconcile ourselves to the same technology that has created or made available the information. The idea that the spirit had created technology, but that technology put back the spirit is an old one,² as well as that ‘technology terribly defeats human spiritual life, primarily emotional’.³ In terms of neurophysiology, technological progress lasts as long as the brain conceives and produces technology it controls and fully understands. At the moment the implications of a technological product surpass the brain – its informedness, its own memory or intelligence – within one or more functions, the ‘progress’ becomes doubtful or even dangerous. Moreover, man has projected onto technology all his shortcomings and lowest instincts: as Konrad Lorenz used to stress, by abstracting technology, man abstracted also the responsibility for its use, becoming more aggressive than he had naturally been.⁴

Among many cultural barriers opposing (technological) changes within society, George Foster mentions the possible endurance of motor paradigms (work, sleep, relation to one’s own body, etc.) which we use and which are exposed to changes, as well as the resistance caused by the (justified) fear of problems with communication or learning.⁵ Living in a particularly dynamic time of change, we have to ask ourselves: have we reached the biological limits of our own velocity of information elaboration? We are simultaneously exposed to three kinds of visual and auditory information while watching TV news; by planes and by television we travel distances greater than we are able to master cognitively and chronobiologically; we cannot identify ourselves with the contents of fresco paintings, like the peasants in Istria in the fifteenth century, or with a theatre play, like the poor people of London in the sixteenth century, or with a book, like our parents in the twentieth century: will holograms be able to satisfy us, once we will become bored by film? Harold Klawans claims that we have already made a mistake by subtitled films, since our brain is allegedly not able to follow the image and contemporaneously read the translation of conversation,⁶ while Sheena Iyengar, Angelika Dimoka, and collaborators found proof that the human brain, when exposed to excessive information, makes lower-quality decisions.⁷

From the above,⁸ it seems obvious that ‘disciplinarity’ (as opposed to interdisciplinarity) is an expected natural, social, and cultural phenomenon, and not (only) a human mentally-comfortable choice. The importance of interdisciplinarity, on the other hand, has been stressed many times, particularly when dealing with complex phenomena related to contemporary challenges and the future of humanity. Van Rensselaer Potter, the well-known American onco-biochemist of Madison-Wisconsin, started on his path of a concerned scientist precisely by advocating interdisciplinarity: the ‘path’ ended, as we now know, with the re-invention of bioethics.⁹

From Interdisciplinarity to Bioethics

By the end of 1957, Potter had been exchanging letters with the NIH director James Shannon, complaining of the spreading gap between science and society. Eventually,

he formed a group launching the ‘Interdisciplinary seminar on man’s future’. In 1967, the University administration turned to Potter’s group asking it to address issues such as the goal of higher education, the aims of the university and its departments, and the role of students and their organisations. Potter’s group provided the answers in accordance with Potter’s ideas on knowledge and wisdom, taking into consideration also Margaret Mead’s theses.¹⁰

In September 1962, based on his experience with the Seminar, Potter proposed the foundation of an ‘Institute for integrated studies of natural sciences and humanities’, advocating the broadening of horizons instead of ‘superspecialisation’ (which had been stressed also by Aldo Leopold¹¹). The approach would be historical, but not the methodology; recommendations would be prepared, and the Institute would be organised as a centre for post-doc education.¹²

According to Potter, ‘science is not wisdom, but scientific method can be used in the search for wisdom’: new science has to be combined with old wisdom (humanities), while wisdom should be defined as ‘knowledge on how to use knowledge for the improvement of human existence’. Potter’s understanding of the idea as the basic unit of cultural information (i.e. the ‘cultural DNA’) attracted the attention of Carl P. Swanson, the editor of Potter’s future book and the man who would eventually influence Rachel Carson.¹² In February 1965, Potter published an essay, entitled ‘Council on Future’, addressing a broader and non-scientific audience, in *The Nation*. Stressing the already well-known theses on ‘dangerous knowledge’, Potter this time focused on the responsibility of scientists toward society, and on the gap between those who *know* (scientists) and those who *use* (technologists, as Potter calls them). Criticising the leaning of American culture towards Pragmatism (‘if something is feasible and brings profit – let’s do it’), Potter speaks of the pressure upon scientists, and advocates something that later will be known (and in Europe accepted) as the *precautionary principle*. For Potter, the danger of new knowledge lies in its application, while the task of ‘strong action to monitor technology’ lies with politicians. In his often Utopian spirit of a sympathetic ambitious dreamer, Potter suggests a fourth branch of federal government (next to the legislative, executive and the judicial branches) – the ‘Council on Future’, which would gather natural scientists and humanities scholars, and would have an advisory role and a legislative initiative, considering the most important fields of scientific research. In February 1966, in a letter to the Vice-Chancellor of the University of Wisconsin, Potter sketches the fundamental philosophy of a new University ‘college’, which is to take into consideration the then ongoing Harvard debate on the necessity of re-introducing general contents into college education. According to Potter, ‘general’ content from the natural and social sciences and humanities should make up 80% of the curriculum in the first two years, and specialist content the remaining 20%.

Potter was not alone in his battle for bridging the gap between disciplines (or cultures, as Snow would have said). The anthropologist Margaret Mead influenced Potter with her book on the continuity of cultural revolution,¹³ and even more with an earlier paper on her vision of the university.¹⁴ Potter himself admitted that this paper had been the ‘trigger’ for his own spiritual transformation. In this paper,

Margaret Mead tries to bring closer together anthropology and the natural sciences, stressing the importance of utopias for our culture (including paradise, communism, etc.), as well as the three ‘more vivid’ utopias we should turn to – child imagination, ethnographic data on other cultures, and scientific discoveries. According to Mead, ‘universities should have *Chairs of the Future*, chairs for those who will dedicate themselves with all the necessary attention and scholarly meticulousness, to the development of science up to the full extension of its possibilities for the future.’

The Jesuit paleontologist, philosopher and ‘ecological theologian’¹⁵ Pierre Teilhard de Chardin was close to Potter in his efforts to reconcile science and religion. Teilhard de Chardin was French by birth but lived in England, Egypt and China, eventually settling in the USA. For most of his life he was a Vatican renegade, known for his original combination of Christian doctrine and evolutionism. According to Teilhard, consciousness is subject to evolution and requires ‘unanimitisation’, with a final goal (the ‘Omega point’) – actually: God.¹⁶ Potter knew de Chardin’s books, and even wrote a review of his *Future of Man*.¹⁷

Physician, philosopher, theologian, musician, and Nobel-Prize winner Albert Schweitzer claimed that we have to be pessimists by our experience, but that we have to hope by our faith. Schweitzer concluded that ‘our age discovered how to separate knowledge from thinking, with a consequence that we really have free science but not thinking science.’¹⁸

There are also sources Potter does not mention, but who may have had greater influence upon the development of bioethical thought than those mentioned. In the Spring of 1956, at the 41st meeting of the Academy of Science of South Dakota, Potter probably heard (or later read) the address of the president of the Academy, Frank W. Jobs, who spoke on the danger of American civilisation ‘playing one card’, i.e. turning toward science at the expense of neglecting the humanities and ethics.¹⁹ No wonder that, in the Autumn of the same year, in the Editorial of *Cancer Research*, Potter traced the main direction of his own Bioethical Credo: the growth of the quantum of knowledge, related to the pressures to produce, publish, and find finances, brings scientists to the point where they do not use their creative thinking anymore and do not interfere with the contents of their knowledge. Thus, Potter formulates the crucial quest of (his and general) bioethics: bridging the path from almost mechanical knowledge to long-lasting cultural wisdom. Potter even offers a solution: he advocates the formation of groups of scientists (*Advanced Study Groups*), who will be relieved from the existential concerns (stipends 1 + 1 year), and whose only task would be to ‘organise’ certain fields of knowledge, thanks to discussions, as the departing points for their own studies, extending into as many related fields as possible. The project would be long-lasting and provide results after some 5 to 10 years.²⁰

Whenever he noticed a ‘de-interdisciplinarianisation’ of the discipline he had conceived, Potter reacted. In 1975, while addressing the American Association for Cancer Research, Potter condemned the ‘Georgetown interpretation of bioethics, narrowed down to the ethical issues around the right to live, artificial life support, dignified death, and experiments on humans – the ethical decisions concerning

wisdom when to act, and when not to interfere' and pointed out that his vision of bioethics had been far broader and demanding the understanding of biological and cultural evolution, as well as developing environmental bioethics.²¹ While reviewing the Hastings Center publications in 1981, Potter objected that the Center had ignored the work of Aldo Leopold and that its lack of experts in the social sciences and humanities risked failing to recognise or gauge the need to take into account the environmental aspect of bioethics.²²

What is to be Done?

Today, when we talk about 'interdisciplinarity', we will find hardly anyone opposing the basic idea of collaboration between disciplines. However, what each of us understands by 'interdisciplinarity' may seem so different that it becomes difficult to reach any kind of consensus. For the sake of a better mutual understanding, before entering into any discussion on the reforms necessary for the development and promotion of interdisciplinarity, we should first stress that the essence of interdisciplinarity cannot rest in connecting people but lies in combining knowledge. If interdisciplinarity meant just networking persons of various interests and training, this could easily result in segregating 'fact producers' from 'fact interpreters', strengthening the usual omnipresent tension between natural sciences/scientists and humanities. Real interdisciplinarity has to be born *within* the individual, with a particular state of mind. In other words, interdisciplinarity is not a mechanical process of putting together different knowledges and perspectives: this is just team work. Instead, the opening of an individual mind to different perspectives should be one of the most important aspects of interdisciplinarity. Among probably many attempts in human intellectual history, we would like to stress two since they demonstrate – in our opinion – that, once again, bioethics and bioethicists have been particularly alive to such openness.

In his paper, 'Gesinnungsdiktatur oder Gedenkfreiheit? Gedanken über eine liberale Gestaltung des Gesinnungsunterrichts' (Dictatorship of worldview or freedom of mind? Considerations on the liberal shaping of worldview education),²³ published in 1930 in *Die neue Erziehung: Monatschrift für entschiedene Schulreform und freie Schulpolitik* (*New Education: Monthly Journal for a Resolute School Reform and Liberal School Policy*), which appeared in Jena from 1926 until 1932, Fritz Jahr, in a surprisingly free-thinking way, advocates the ten principles of 'liberalism' and 'democratisation' in developing worldviews in schools. Starting from the thesis that a worldview is based on moral judgement, Jahr does not deny the importance of science in its formation, although he stresses that subjective, individual interpretations and conclusions are frequently drawn from 'objective' scientific facts. For our considerations, the most important of Jahr's ten principles is that one should always consider different worldviews and attitudes (*Gesinnungseinstellungen*).^{24,25}

In Fritz Jahr's time, the 1920s, (hyper)specialists (eventually to be named '*Fachidiot*', geek or nerd) were not an issue, but rather the intolerance toward different approaches and opinions. From a partly similar motivation, but also

fighting against the simplified views of ‘evidence-based’ science, the Croatian philosopher Ante Čović, 80 years after Fritz Jahr, stood for a ‘philosophisation’ and ‘Europeanisation’ of bioethics,²⁶ insisting upon abandoning ‘new medical ethics’ and promoting ‘integrative bioethics’ as a discipline starting from an open debate between various scientific and non-scientific perspectives (‘pluriperspectivism’) and resulting in an integrated platform of ‘orientational knowledge’.²⁷ ‘Europeanisation’ would bring bioethics closer to European values and tradition, while medical aspects would be expanded by their systematic ‘philosophisation’. ‘Orientation(al) knowledge’, recalls Juergen Mittelstrass’ concept of value-based knowledge, is opposed to fact-based information knowledge.²⁸ The references to orientation (in both Čović’s and Mittelstrass’ sense) may seem passive and hesitant; but could not wisdom be defined as buying time until more profound knowledge is gathered? Is not this precisely the precautionary principle, anchored in European traditional values?

Now, if we agree that some kind of interdisciplinarity is necessary and that it should originate with the individual, we certainly have to ask ourselves how such a goal is to be achieved. Obviously, reforms in both scientific research and educational systems are needed. However, should these reforms begin by introducing a kind of ‘instant interdisciplinism’ (and then who is going to teach it?), or by broadening the foundations of our knowledge? And then, is interdisciplinarity something everyone should be taught, or it is reserved only for those who will need and practise it? The conception, planning, and implementation of education for future scientists nowadays seems as oriented toward acquiring skills and specialised knowledge as the curricula of any profession based on routine and paradigms.

The idea of *starting* from ‘interdisciplinarity’ somehow recalls the ‘problem-based approach’ to medicine, abandoned in all medical schools but a few (Maastricht, Beer Sheva, etc.). So, we shall rather stick to the more logical presumption; that is, that the solution for the alienation resulting from specialisation may be in returning to the ‘common knowledge’, including the basic facts (‘ABCs’) of major disciplines (both natural sciences and humanities). After all, as the Indian innovation scholar Anil Gupta says, ‘intelligence is nothing but connecting the unconnectable.’ The examples of Jahr and Čović advocating pluriperspectivism actually represent nothing else but learning facts, methods, and approaches from various perspectives. Whether we do it as Potter suggested by making a college education consist of 80% general content matter, or forsake specialisation at all levels until graduate school, seems less important, although certainly worthy of profound study.

Beyond Interdisciplinarity – A New discipline?

As we have seen, interdisciplinarity was recognised as a prerequisite for any serious scholarly approach long ago. However, what if combining knowledge and methods of various existing disciplines does not prove sufficient to follow the dynamics of a new problem? Would it then be justified to think of a new discipline? Such was the case with bioethics (in two different time frames and with different ambitions). Maybe it is time to launch something we might call ‘epharmology’ (Greek

epharomoge = adaptation/*epharomoein* = to adapt)? What should this new discipline study and how might it help improve modern human society and individual life quality? First of all, the new discipline should study changes in the human brain and mind due to informatisation and digitalisation (the influence of the internet, typing, mobile-phonng, SMSing, using Windows-like software, etc.), and then measure and evaluate the new range of capacities resulting from those changes (attention span, actions per minute, hyperactivity, etc.). Based on those studies, it should foresee further changes in the brain and, if negative, prevent them, while, if positive, suggest how to adapt to them. An optimal human biological profile should be established, suggesting standards to improve the quality of life – how much to sleep or to watch screens per day; should movies be subtitled or post-synchronised; what is the best way of ‘using’ books or music, etc. Finally, a programme for a radical reform of the educational system should be suggested – both in content and in method – adapted to follow the changes in brain, mind, and behaviour in a maximally flexible and anticipatory way.

New disciplines do create a certain degree of confusion and overlapping (as bioethics has done), but always stir up fresh ideas. Those new disciplines, combining old knowledge and methodologies, actually are new interdisciplinaritys. And that makes all the difference.

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