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# Heinz Zemanek's almost forgotten contribution to the early Philosophy of Informatics

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## Abstract

This paper recapitulates some of the most important thoughts and aspects of the early and almost forgotten computer- and informatics-philosophy by the Austrian computer pioneer Heinz Zemanek (1920-2014). From a practical perspective, this remembrance has the two important purposes of preventing our contemporary discipline of computer-philosophy from the unnecessary 're-invention of the wheel' in many of its ongoing efforts, and of providing opportunities for Zemanek-inspired conflict resolutions in some cases where contemporary informatics-philosophical disputes appear to be 'stuck'.

**Keywords** Philosophy of Informatics, History of the Philosophy of Informatics, Heinz Zemanek, Ludwig Wittgenstein.

## 1 Introduction and Motivation

Whereas philosopher-scientists are and have been well-known throughout the history of ideas, philosopher-engineers were always lesser-known and have been standing (so-to-say) somewhat 'in the shadow' of history. For example: one of the most famous philosophers of the 20th century, the Austrian *Ludwig Wittgenstein* (1889-1951), is hardly remembered as the engineer and architect which he also was. Vice versa, the German and Austrian computer pioneers *Konrad Zuse*, 1910-1995,<sup>1</sup> and *Heinz Zemanek*, 1920-2014,<sup>2</sup> are widely recognised as (computer)-engineers, whilst considerably less is publicly known about their (computing)-philosophical thoughts and activities. As far as the public reception of their computer-philosophical legacies is concerned, it seems fair to say that Konrad Zuse is still 'better off' to-date than Heinz Zemanek, because Zuse always had a strong history-political lobby (particularly in Germany) promoting and defending his pioneering legacy against an Anglo-centric history 'written by the victors' after WWII. For these reasons it was never forgotten that Zuse had not only built the very first electro-magnetic-mechanical computer which was fully and freely programmable, but also laid the foundation of the metaphysical doctrine of *pan-computationalism* with his essay on *Rechnender Raum* –i.e.: 'computing cosmos/space'– (Zuse 1969) (Zuse 1982), which he claimed to have conceived mentally already during the 1940s more than twenty years before its printed publication. Pan-computationalism is nowadays a thriving metaphysical ideology particularly in the field of 'natural' or 'nature-inspired' computing. Less known –though philosophically more salient– than Zuse's metaphysical speculations about a computing cosmos are Heinz Zemanek's early contributions to the philosophy of computing, because Zemanek was –as far as I know– the first philosopher-engineer who had fully grasped the computer-philosophical relevance of the logical language-philosophy designed by his famous compatriot, *Ludwig Wittgenstein*.

As far as I can see, the 'rediscovery' and recapitulation of some four-decades-old Zemanek-papers, which is the purpose of this survey contribution, is important for at least the following two reasons.

- First of all: if the historic roots of the philosophy of informatics are falling into oblivion, then we are in danger of wasting time with 're-inventing the wheel' – see, for example, the recent (Böll/Cecek 2015) paper and its many Wittgenstein'ian concepts without any reference to Zemanek's quite similar earlier thoughts.
- Secondly: it is my personal impression that the current philosophy of information/informatics has in some of its sub-branches run into a stalemate situation – see, for example, the *Fetzer-Floridi dispute* on the essence of what is 'information' (Oberholzer/Gruner 2016). In such a stalemate situation, a 're-boot' of the entire scholarly dispute, by setting it back to its earliest historic point of departure, might help our growing discipline of philosophy of informatics to find interesting new options and paths which were not yet sufficiently explored.

For this reason, the remainder of this review is focused on Zemanek's *early* philosophy. To this end I briefly recapitulate his main train of computer-philosophical thought –especially from those of his German language publications which are hardly available for a wider international audience– whereby I also point to some interesting questions which Zemanek's early computer-philosophical publications have left un-answered for future treatment. A comprehensive 'history of literature and ideas' about Zemanek's contribution to the philosophy of computing is, however, outside the scope of this review and must be left as a task for the professional historians from the faculty of the humanities.

## 2 Scope of this Informatics-Philosophy-Historical Review

Heinz Zemanek had been a prolific writer (Hellige 2014) until his old age, such that some selection is necessary for a review (such as this one) with a well-defined focus. In order to 'prove' the often-forgotten point that the philosophy of informatics is actually considerably older than it is widely believed to be, I have chosen the year 1975 as the 'cut-off' date for the recapitulation and discussion of Zemanek's philosophical thoughts. Still the question remains: which ones of Zemanek's many works from before 1976 should be chosen for this purpose? In one of his later computer-philosophical essays, namely (Zemanek 1993: pp. 88-89), Zemanek himself had indicated in hindsight which ones of his own early philosophical writings he still regarded as noteworthy and relevant: they are listed in Table 1 below.

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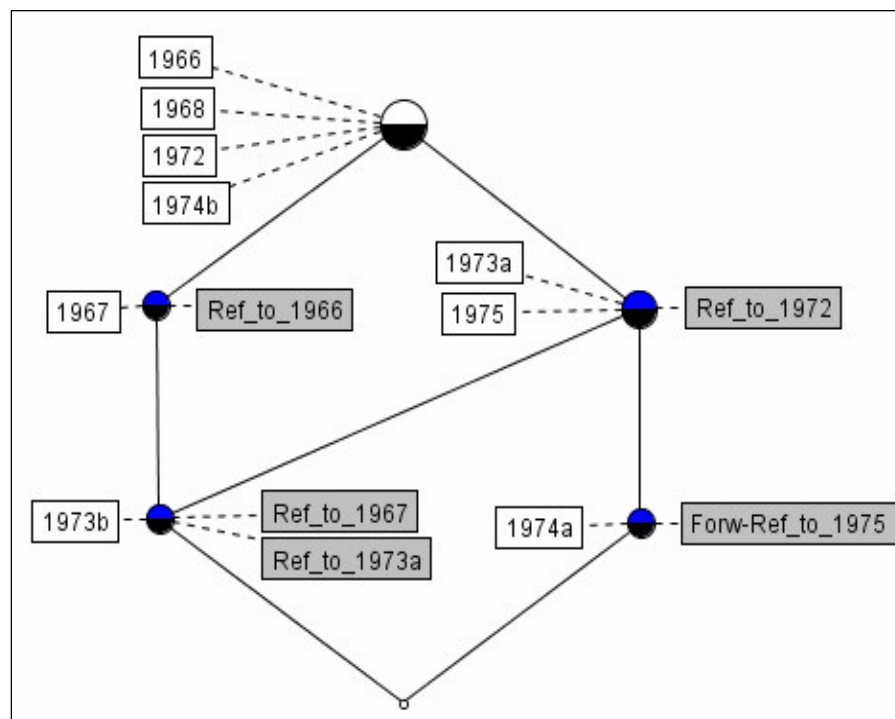
<sup>1</sup> <http://www.konrad-zuse.de/>

<sup>2</sup> <http://www.zemanek.at/>

<b>Reference</b>	<b>Retrieved ?</b>
(Zemanek 1966)	√
(Zemanek 1967)	√
(Zemanek 1968)	√
(Zemanek 1970)	-no-
(Zemanek 1972)	√
(Zemanek 1973a)	√
(Zemanek 1973b)	√
(Zemanek 1974a)	√
(Zemanek 1974b)	√
(Zemanek 1975)	√

**Table 1.** *Early Computer-Philosophical Contributions by Zemanek before 1976 according to (Zemanek 1993). The retrieved references define the scope of this review.*

Altogether those papers have a text volume of approximately 120 pages, and also contain a broad variety of noteworthy 'little' details which cannot all be recapitulated in this philosophy-historic overview paper. Though –as indicated in Table 1– I was not able to access all of those old sources, the sources which I was able to retrieve cover indeed all the most important aspects of Zemanek's early philosophical thoughts. This claim can be supported by comparison against Zemanek's later hindsight-contributions, such as (Zemanek 1993).



**Figure 1:** *Concept lattice of bibliographic cross-references amongst Zemanek's early computer-philosophical publications which are recapitulated in this review. Two main 'threads' are intuitively visible in this diagram: They correspond to Zemanek's thoughts on the essence of the computer on the one hand, and Zemanek's Wittgenstein-related language-philosophical thoughts on the other hand.*

### 3 Topics in Zemanek's Early Informatics-Philosophical Thoughts

It is appropriate to state that Zemanek's philosophy of informatics consists of a rather small number of conceptual 'modules', which have been used, re-used, and re-combined (in shorter or larger length) in all his early philosophical writings represented in Table 1 and Figure 1. Those few philosophical 'modules', which Zemanek recombined again and again until as late as (Zemanek 1993), will be highlighted as clearly as possible in the subsequent recapitulations of these papers. This situation is nicely characterised by means of an aphorism by *Henri Bergson*, according to whom every genuine philosopher pursues throughout his entire life only one thought, which he tries to reformulate anew again and again (Bergson 1934). Those main computer-philosophical 'modules' of Zemanek are:

- the essential *difference between the human and the computer*,
- the *informational relationship* between the human and the computer,
- the *characteristics of 'information'* in the computer and in the human mind,
- computer-related aspects of *semiotics*,
- computer-related aspects of *Ludwig Wittgenstein's philosophy* of language, as well as
- computer-related aspects of the *Viennese Circle's philosophy* of science.

For the sake of conceptual clarity and historical accuracy the following subsections are all *paraphrased in close lexical proximity* to Zemanek's original texts. As Zemanek's early philosophical texts are themselves 'overlapping' to a considerably large extent –see Bergson's aphorism– I have grouped them appropriately into 'clusters' in such a manner that I can recapitulate a whole 'cluster' of Zemanek's texts in each sub-section of the remainder of this section. In all these cases (and sub-sections) I consider it legitimate to *speculate* that Zemanek's entire philosophy of informatics was also influenced (at least subtly) by his standing as a *Catholic intellectual*,<sup>3</sup> which ultimately enabled him to receive the Austrian *Cardinal Innitzer Prize* in the year 2003.

#### 3.1 The Late 1960s: Early Papers (in Austrian-German) on Philosophical Aspects of Computer-Programming

Already in the late 1960s Zemanek had been aware of *Wittgenstein's relevance* for the field of programming and programming-languages. In his paper on *abstract objects* (Zemanek 1968), for example, Zemanek noted in Wittgenstein'ian terms that the sentences and words of natural languages are determined by their usage, such that every artificial definition and every formalised treatise of them are in danger of getting 'falsified' by common usage. Hence, all linguistic models are limited in their validity, due to the different 'degrees of abstractness' in different contexts of usage. In formal languages, such as programming languages, words and sentences are artificially constructed whereby their usage is subject to very strict rules. Nevertheless, formal languages –such as their natural counterparts– are not able to express everything; there are semantic 'gaps' which those languages cannot fill. A Wittgenstein'ian approach to *formal language design*, according to Zemanek, must thus clearly point out where are the 'border lines' of those 'open spaces' – i.e.: the methods of definition must allow us to proceed from the general rules to the specific cases as well as vice versa (Zemanek 1968: p. 208).

In a paper on *philosophy and programming*, (Zemanek 1967) stated that there are many different ways of world-description, of which the naive everyday language is the primordial one. Its 'condensation' moves into two directions: the *poetic* one on the one hand, and the *scientific* one on the other hand – in other words: focusing and concentrating on what is *subjective* on the one hand, and concentrating on what is *objective* on the other hand (Zemanek 1967: p. 413).<sup>4</sup> Through *formalisation* the objective descriptions lead directly towards the *automaton*, though the object of such descriptions is our knowledge *of* nature – *not* nature itself as such. Exact scientific knowledge is organised and objectified in the form of *models*, whereby the most advanced models are now *dynamic* – no longer merely static. Therefore the electronic computing machine has radically enhanced our possibilities of

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<sup>3</sup> For a wider spectrum of comments and remarks concerning the role and status of Catholic intellectuals in West-Europe and North-America during the early and mid-1970s –i.e.: the era of Zemanek's early computer-philosophical essays– the reader is referred to a noteworthy collection of culture-philosophical essays in a 1975's special issue of *CONCILIUM* (Greeley 1975).

<sup>4</sup> In the German language, the word '*dicht*' is related to three different meanings: *dense, sealed, poetic*. This ambivalence should be kept in mind were Zemanek used the technical term '*Verdichtung*' in the context of above; possibly he played a subtle pun at that point.

constructing and animating those models: the *programming language* thus allows for world-descriptions which are much 'better' than ever before (Zemanek 1967: p. 413). However, the science-philosophical implications of this observation are not far away. For example: is it right and appropriate with regard to *mathematics* (as we know the discipline historically) to regard a 'variable' merely as a reserved storage space, or are there deeper differences between classical and computational notions of the same term (Zemanek 1967: p.414)? Now, since we have the computer, it seems possible that the *technical mechanism* yields a definition of the concepts which the 'living' mathematics can then adopt ex-post-facto. This example seems to be typical for our situation of nowadays, namely: that *mechanisms can now yield definitions* of concepts which we had held merely intuitively so far (Zemanek 1967: p. 414). Similarly, the classical notations in *algebra* presupposed a human reader, whereby problems and the paths to their solutions were not completely precisely/exactly determined. The automaton, however, needs exactly defined process descriptions. Thus, whilst the programming language must begin to resemble the classical notations of algebra, also the classical mathematical ways of thought and notation will have to begin to accommodate the automaton (Zemanek 1967: p. 415). The programming language is thus a language of a very peculiar kind. As its first purpose is the instruction of automata, we must regard it first of all as a means of communication from humans to the machines. A programming language is thus *both* a living language *and* a mechanical language, whereby this double characteristics puts the programming language into the position of a 'hinge' between man and machine (Zemanek 1967: p. 416). At this point, however, another philosophical question arises, namely: is it right and appropriate to consider programming languages as '*languages*'? Where are the limits and border lines of language, and what is, in general, the essence of language (Zemanek 1967: p. 416)? As the classical theory of *semiotics* –with syntax, semantics, and pragmatics– was originally developed for natural languages and intentionally acting humans, semiotics in its classical form *cannot* be easily transferred and applied to computing machinery (Zemanek 1967: p. 417). From one particular perspective, machine code appears to be a primitive 'language', but at a second glance we will soon recognise that merely one sort of words occurs in this 'language', namely: instructions. On the one hand it is possible to *express thoughts* –albeit only mathematical-logical thoughts– in a programming language (as it is possible to express thoughts in any natural language), such that the creative activity of programming has its very own *poetic* aspects. On the other hand, and unlike classical poetry, such 'poetry' becomes part of the *technical real world*,<sup>5</sup> namely as soon as such 'poetry' has 'run through' the computational machine. Those considerations show the limitations and shortcomings of classical semiotics as far as the domain of programming languages is concerned. Thus the theory of semiotics had to be joined with formal logics before it could reach its highest significance for the domain of computing machinery, and it was *Ludwig Wittgenstein* who achieved this unification (Zemanek 1967: p. 417). In Wittgenstein's early '*Tractatus*' the entire 'world' unravels itself in yes-no-decisions very much like the 0-1-events are happening inside the digital computing machine. Only many years later did Wittgenstein grasp that such a yes-no-description of the world is far too simplistic – a completely logical and consistent language would be appropriate only for a static universe in which no progress and no surprises are ever possible (Zemanek 1967: p. 418). Hence we also do *not possess any 'closed theory' of programming*: all we can hope to achieve is to apply the available logical mechanisms intuitively, and to find some additional stepwise support by studying the relevant philosophical literature (Zemanek 1967: p. 419). Thereby, *human intelligence* reveals itself at its best where mechanised algorithmic solutions are not yet available (Zemanek 1967: p. 420). From that point the step to *conversing* automata is only small: where perfect algorithms are lacking, it is for the humans to provide the automata with advice and instructions. Some people naively imagine those man-machine-conversations to happen in natural language – in contradiction to Wittgenstein's early principle: to speak either clearly, or to remain silent. In free speech humans do not speak very precisely, whilst it is well possible to let the machine speak as precisely as it is needed. If we generalise this train of thought we can reach the conclusion that *logical positivism* should be applied in the scientific-technological domain wherever such logical positivism can be successfully utilised. At the same time, however, the genuine human should also find his place in the centre of our life-world again, where the genuine human deserves to be: this human, who has not yet become a victim of automation, this human, who is not an automaton himself: this human, who's existence is from the *spirit* (Zemanek 1967: p. 420).

Similar thoughts –including references to Pierce, Carnap, Schlick, (etc.)– were expressed by Zemanek already a year earlier in an ACM paper *on semiotics and programming languages* (Zemanek 1966). Since even very old ACM papers have become widely accessible again,<sup>6</sup> it is not necessary at this point

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<sup>5</sup> German for 'real world': *Wirklichkeit*, which contains the stem 'wirken', i.e.: *working*, being effective.

<sup>6</sup> <http://dl.acm.org/>

to recapitulate the finer details of (Zemanek 1966) here. Most importantly also (Zemanek 1966) was brought to conclusion with some Wittgenstein'ian remarks concerning the best possible manner of future man-machine-conversations: "*Since we know that it is the computer which we can make speak arbitrary clearly, we possibly should try to let the computer speak more and more and to restrict the human user in the practical situation to point at YES or NO, or some more equally simple choices, while the computer talks*" (Zemanek 1966: p. 143). Such silent 'pointing' of man (to computer-provided choice-options) wherever clear and precise speaking is no longer possible for man is an immediate consequence of the early Wittgenstein's 'mysticism of pointing' *beyond* the final sentence of the Tractatus Logico Philosophicus by which the early Zemanek was deeply moved.

### 3.2 The Early 1970s: Papers (in Austrian-German) from the Wittgenstein'ian Theme to Culture-Philosophical Considerations

In an article on *Wittgenstein and the computer* for the popular Viennese newspaper DIE PRESSE (Zemanek 1973b), Zemanek stated that Wittgenstein was *the* philosopher of information processing although Wittgenstein had probably never seen an electronic computer with his own eyes. At the time of writing (Zemanek 1973b) it was 'daring' to speak about something like 'computer philosophy', as there was nobody in those years with sufficient knowledge in both fields (philosophy and information processing) to provide a clear and comprehensive overview of the topic. According to Zemanek, philosophers are always in search for some fundamental *principle* by means of which the world can be explained *rationally and reasonably*,<sup>7</sup> and since several hundred years it was *mechanism* which was regarded as such a principle. Since then, acceptable 'explanations' were expected to be of mechanistic type, which ultimately lead to a *philosophy of perfection* (Zemanek 1973b). Accordingly, everybody believed in the perfect and precise description of Nature by means of logics and mathematics – thereby strongly overestimating the quality of initial data, the trustworthiness of the formalised natural law statements, as well as the significance of the such-obtained results. In that context, according to Zemanek, it was *Wittgenstein's* contribution to have first driven this world-view to its extreme form, and then to have eventually refuted it (Zemanek 1973b). Contemplating a sketch about the occurrence of a road traffic accident, Wittgenstein realised that a 'clean' scientific language had to provide an abstract image of reality in such a form that the same *logical relations* must hold between the describing sentences of the language and the described facts of reality. Subsequently, Wittgenstein's famous Tractatus Logico-Philosophicus provides a precise *recipe* for the construction of such perfect descriptions. This recipe is of ideal clarity: First of all, find all possible elementary sentences and form all their possible logical combinations. Then, check in reality –as far as necessary or possible– whether those sentences are true or false, and keep the true ones in a repository. Repeat this procedure often enough, and out comes –stepwise– a perfect description of the entire world, whereby anything which cannot be so represented must not be addressed at all in the language of science – see *Hauptsatz §7* of the Tractatus (Zemanek 1973b). Thus, the philosophy of Wittgenstein's Tractatus is the 'highest peak' of the philosophy of perfection. If its tacit presuppositions would be true, then the Tractatus would have been the final termination of all philosophy, because its internal logic is indeed correct and consistent: hence, sooner or later, a *computer* would have been able to carry out the *algorithm* which Wittgenstein's Tractatus implicitly contains. By its binary-logical design, the digital computer has indeed technically implemented the mechanisms which the Tractatus had philosophically specified. Without having ever seen a digital computer, Wittgenstein has thus contemplated the 'world of the computer' to its ultimate extreme. Moreover, Wittgenstein has also anticipated philosophically the *methods of design* which have become so relevant only recently, namely: the design of *abstract structures* in a *top-down* fashion. From a structural point of view, the Tractatus started with the entire world by-and-large, and ended with a recipe for the ordering of all its finest logical details as per *Hauptsatz §6* (Zemanek 1973b).

In the year 1933, however, Wittgenstein began to realise that something about his Tractatus was wrong because *all* its so-called 'elementary sentences' turned out to be actually *non-elementary*: linguistic 'atoms' exist only in artificially constructed logical languages,<sup>8</sup> however *not* in the living everyday languages which we naturally use. Moreover: not only the presupposition of elementary sentences was wrong. According to Zemanek, Wittgenstein's *Russell*'ian logic is a logic of *eternal* truths – whereas *information is a function of time*.<sup>9</sup> Even in the application of timeless logics we need time to proceed stepwise deductively from insight to insight (Zemanek 1973b). In fact it was Wittgenstein's Viennese

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<sup>7</sup> in German: *vernünftig*.

<sup>8</sup> such as the ones which already *Frege* had planned in his famous *Begriffsschrift*

<sup>9</sup> See for comparison the Fetzer-Floridi dispute on the characteristics of information (Oberholzer/Gruner 2016).

friend Kurt Gödel who had revealed the imperfections of the axiomatic method which had hitherto been considered as perfect – and this revelation, which forever shattered the dream of perfection, was nothing less than a revolution in the history of ideas (Zemanek 1973b). What then, is the relevance of late Wittgenstein's *post*-Tractatus philosophy for the technical discipline of information processing? Like the meaning of a word depends on the *Sprachspiel* in which that word is spoken, so does the *semantics* of automatically processed information depend on the '*information processing game*' which the computer is 'playing' in a particular situation according to the pragmatic needs of the computer user (Zemanek 1973b).<sup>10</sup> Thereby, however, *not* all games are actually playable: there remains forever a 'gap' between the realm of the computer-based logical switching circuits in analogy with the Tractatus and the real world outside the computer. To fill this gap will forever remain, according to Zemanek, the privilege of the human being who needs to plan the computer's architecture, program its software, *interpret* the data, and determine the *pragmatic usage* of the computed results. In summary, according to Zemanek: the early 'Wittgenstein of the Tractatus' had made decisive contributions towards our understanding of the scientific-technological mode of thought and its culmination in automated information processing, whereas the late 'Wittgenstein of the *post*-Tractatus' had opened the door for the insight that physics and the computers can neither explain nor replace the human being in all his humanity (Zemanek 1973b).

Zemanek's paper on the *philosophy of information processing* (Zemanek 1973a) is to a large extent similar with his above-mentioned popular newspaper article (Zemanek 1973b). In (Zemanek 1973a), too, the main theme is the 'gap' between what is formal and what is informal in and around the digital computer – in other words: the relations between the machine and its environment, or between mechanisms and live reality (Zemanek 1973a: p. 384). Because the computer is not merely a calculator but the *universal* machine for the implementation of any kind of mechanism, the computer has as its potential field of application the entire 'universe' of mechanisms and processes which have been conceived and which can ever be conceived in future. In (Zemanek 1973a), Zemanek therefore tried to excavate the *foundations of all information processing*, i.e.: its philosophical presumptions and presuppositions. How do we, in the epoch of information processing, need to behold ourselves as humans in order to understand the computer properly (Zemanek 1973a: p. 384)? Thereby we must also take a particular disciplinary mismatch into account: *What the philosophers are writing is usually not acceptable for the informaticians, and vice versa* (Zemanek 1973a: p. 385), although the philosopher Ludwig Wittgenstein can be considered as the bridge between those two domains (Zemanek 1973a: p. 388). On the basis of Wittgenstein's writings we can –for example– understand why it will never be possible to automatically translate from one natural language into another one with perfect precision. Hence, the borderline between the natural reality and its dynamic computer models is likely to be pushed away from the machine towards the human realm in the future (Zemanek 1973a: pp. 388-389): The model will not merely be a simple program system, but rather a high-level *logical* model of the enterprise or institution within which information processing structures shall be deployed. Consequently, every educated citizen of the future ought to be able to master a *formal artificial language* which shall not merely be used for purposes of programming, but for exact descriptions within the wider scientific-technological domain in general. In such a manner the scientific-technological realm could be distinguished already by virtue of its own language, such that several merely *language-induced pseudo-problems* would vanish. This would then be a 'computerised' version of the universal logical language which the members of the Viennese Circle, especially Otto Neurath, had in mind (Zemanek 1973a: p. 389).

The third Zemanek-paper recapitulated in this section, namely (Zemanek 1974a) on *formal structures in technics, arts and society*, dealt with computers and informatics from a rather *culture-philosophical* perspective. It dealt with a 'borderline topic' (Zemanek 1974a: p. 533), too, namely the 'old battle' between the mechanistic world-view and the 'living spirit' (Zemanek 1974a: p. 534). According to Zemanek, hardly anybody is aware of the *duality* within our own approach to nature. Beheld scientifically, we see a confined logical-mathematical image of nature within the mechanical laws of which no exceptions occur. However, if we experience nature outside the scientific framework, then nature appears as the very opposite of something mechanical, with properties of life that differ very strongly from the properties of machines. The daring idea of *cybernetics*, namely to *unify* both those aspects on the basis of *information processing* –and thus to reduce 'spirit' ultimately and forever to a nature-scientific 'function'– was spectacular, but was not able to reach its goal. Outside of its well-defined normal scientific framework, the 'explanations' provided by cybernetics turned out to be overly simplistic. The reason is that the perfection of computers is valid only within its formally constructed

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<sup>10</sup> Without reference to Zemanek a recent paper by Böll and Cecez-Kecmanovic has described similar insights (Böll/Cecez 2015).



models, whereas the constructed model itself will always differ strongly from nature as such. On the one hand, the mechanistic world-view of perfection, which was suggested to us by the discipline of physics, did not withstand rational scrutiny and does not provide us with ultimate answers. On the other hand, the computer as a perfect Wittgensteinian machine in the sense of the *Tractatus Logico-Philosophicus* is doing only perfect symbol-replacing information processing, and where these symbol replacements are not perfect there is no computer-based information processing at all. This dilemma must lead to the insight that the pragmatic *relations between humans and technics*, and also between humans and the natural sciences, are obtaining fundamental new qualities via the advent of the digital computer (Zemanek 1974a: p. 535). Due to its very own characteristics, according to Zemanek, the computer will soon reveal itself as a powerful tool in the hands of many mediocre users, and will thus strongly propel the far-and-wide spreading of a 'mentality of mediocrity'. According to Zemanek, this business will flourish all the better the more primitive the so-processed information is. For example: under the protection of excuses with regard to 'the computer system', which will simply be taken for granted, our public administration will soon begin to commit acts of infringements and arbitrariness which they would never be tolerated in a purely human apparatus of bureaucracy (Zemanek 1974a: p. 536). Also in the domain of the fine arts, particularly music, the increasing availability and applicability of the computer can lead to qualitatively poor results wherever the computer-supported 'mentality of mediocrity' is gaining the upper hand (Zemanek 1974a: p. 537). Thus it becomes an increasingly important *culture-philosophical* task to criticise this computer-supported 'mentality of mediocrity' wherever it appears (Zemanek 1974a: p. 538).

### 3.3 The IFIP Keynote Lectures

In his role as IFIP president Heinz Zemanek had to speak several presidential addresses and keynote lectures (in the English language) to the audiences of the federation's various conferences. The book chapters (Zemanek 1972), (Zemanek 1974b), (Zemanek 1975) contain the official transcripts of three such keynote lectures which Zemanek had presented internationally during the first half of the 1970s. All of them contain more-or-less similar variations of the same philosophical themes which Zemanek had already outlined in his shorter papers which I have recapitulated in the preceding sections of this review. As those IFIP keynote speeches had been given and published in English (not in German) I may safely assume that they are still quite widely available – although it was no trivial task for me to import a copy of (Zemanek 1974b) from Australia to South Africa. For this reason (i.e.: reasonably wide-spread availability in the English language) it shall suffice to finish this review of Zemanek's early computer-philosophical writings with some only very short summaries of those three IFIP lectures (Zemanek 1972) (Zemanek 1974b) (Zemanek 1975) in the following few paragraphs.

Zemanek's later-published IFIP lecture of the year 1970 (Zemanek 1972) was given on the assumption that "*information processing is closer to the world of philosophy than any other branch of science or technology and consequently can profit most from philosophical insights*" (Zemanek 1972: p. 122), although "*computer people are not used and not willing to accept what philosophy offers to their profession*" (Zemanek 1972: p. 114). With its more than 40 pages, (Zemanek 1972: pp. 93-139) cannot be adequately summarised in this short review, because (Zemanek 1972) touches cursorily upon a wide variety of computer-philosophical topics, some of which I have already recapitulated in the preceding sections – others, however, not yet: for example the classical topic of AI-philosophy on the relationship between brains and computers or minds and machines (Zemanek 1972: pp. 95-96). With regard to some recent disputes concerning the 'essence' of information –see for example (Böll/Cepek 2015) (Oberholzer/Gruner 2016)– I want to point out in this paragraph only the specifically *information-philosophical* considerations in (Zemanek 1972), to which Zemanek had come via classical *semiotics* (Zemanek 1972: sect. 2: pp. 100-104). Under the sub-title "*form and content*" –please note the occurrence of the stem 'form' (which also occurs in the classical Aristotelian and Scholastic notion of a '*causa formalis*') within the term 'information' (Oberholzer/Gruner 2016)– Zemanek distinguished "*five kinds of information*" (Zemanek 1972: sect. 3), namely: "*numerical*", "*physical*", and "*formatted*" information, as well as "*natural text*" and "*formal text*". With an obvious nod to the late Wittgenstein's '*Sprachspiel*' considerations, Zemanek noted that "*the same form does not imply the same content*", because within the computer "*the same sequence of bits may represent different symbols depending on their position*" (Zemanek 1972: p. 104). In summary: "*The present practical difficulties with data acquisition and with data interpretation appear as predicted and explained by semiotic theory and as part of a more general problem: conservation of meaning in information processing*" (Zemanek 1972: p. 133), whereby "*conservation of meaning in information processing will demand an increasing precision in the use of terms*" (Zemanek 1972: p. 136). However (as mentioned above), the limits of such 'increasing precision' in the 'use of terms' are the same limits which Wittgenstein himself

had found while critically reflecting upon his *Tractatus Logico-Philosophicus* (Zemanek 1972: sect. 7: pp. 129-133).

Zemanek's Australian lecture on *the computer as a mechanical device in a live environment* (Zemanek 1974b) contains most of the motifs and thoughts of (Zemanek 1972) and (Zemanek 1975), such that I need not recapitulate (Zemanek 1974b) in very much detail at this point. Particularly interesting about (Zemanek 1974b) is its long and sub-sectioned conclusion (Zemanek 1974b: sect. 4: pp. 907-909), in which Zemanek offered his remarkably visionary culture-philosophical insights about some human aspects and future computer-induced societal problems which have since then become our daily reality. Zemanek grouped those culture-philosophical issues into three categories, namely "*information as merchandise*" (Zemanek 1974b: sub-sect. 4.1), "*system complication*" (Zemanek 1974b: sub-sect. 4.2), and "*a contradiction to be solved*" (Zemanek 1974b: sub-sect. 4.3). Their elaboration included topics such as *cyber-crime*,<sup>11</sup> *information oversupply*, *intelligent information-filtering*, chaos and a dangerous *lack of predictability in highly complex computer systems* even under perfectly 'normal' operational circumstances, as well as the problematic mismatch between the rapid velocity of our technological innovations and the slowness of our biological brains' natural evolution.<sup>12</sup>

Last but not least in this review of Zemanek's early computer-philosophical work I briefly recapitulate Zemanek's IFIP lecture (Zemanek 1975) spoken in his home-town Vienna where Zemanek intended "*to combine a set of selected aspects with a modern view of man and machine, of the human being and the automaton*" (Zemanek 1975: p. 4) once again. As Zemanek had already noted elsewhere, modern scientists lead –so to say– a 'double life' whereby "*they apply certain levels of scientific analysis to some of their actions, but they disregard science in many practical actions and they disregard daily life in their scientific or quasi-scientific general views*" (Zemanek 1975: pp. 4-5). Thereby "*the computer aggravates this situation, because as a rule the computer treats scientific –mostly mathematical– relationships between physical objects, but the human interpretation before and after information processing, full of confidence about the perfection of the electronic tool, often relates input and output information to the natural meaning*" (Zemanek 1975: pp. 5-6). Consequently the availability of an electronic computer "*does not remove the burden of choice, of making decisions from us, the choice between the human and the formal parts as well as the many alternatives between scientifically unknown possibilities*" (Zemanek 1975: pp. 7-8). On the contrary: "*The computer creates by its existence and by the growing number of applications a world of human decisions and choices which did not exist before*" (Zemanek 1975: p. 10). Those considerations also lead to a philosophical critique of the conceptual design and underlying presumptions of the notorious *Turing Test* (Zemanek 1975: p. 17) on the basis of the classical theory of semiotics as well as –once again– the language-philosophy of the late Wittgenstein after his *Tractatus Logico-Philosophicus* (Zemanek 1975: pp. 17-19).<sup>13</sup>

## 4 Summary and Outlook to Future Work

At the end of this computer-philosophy-historical review I first repeat, for the sake of clarity, why and for what purpose I went through the efforts of 'rediscovering' and recapitulating some four decades old Zemanek-papers. Thereafter I will briefly hint at a few more current philosophical 'construction sites' on which Zemanek's early computer-and-information philosophy could once again prove its value and fruitfulness.

- First of all it should be recalled into mind that if the historic roots of the philosophy of informatics would fall into oblivion we would be in danger of wasting precious time with 're-inventing the wheel': see, for example, the recent paper (Böll/Cecek 2015) including all its Wittgenstein'ian concepts without any reference to Zemanek's quite similar earlier thoughts.
- Secondly we have seen at least one example, namely the notorious *Fetzer-Floridi dispute* on the essence of what is 'information' (Oberholzer/Gruner 2016), in which an information-philosophical dispute got 'stuck' in a 'cul de sac' without any satisfying solution. In such a

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<sup>11</sup> The first proceedings of the IFIP *Working Group 11.9 on Digital Forensics* were published in (Pollitt/Shenoi 2005), more than thirty years after IFIP president Zemanek had mentioned cyber-crime in (Zemanek 1974b).

<sup>12</sup> For comparison please recall the well-known aphorism by the Austrian philosopher and poet Günther Stern a.k.a. Günther Anders: "*wie verstörte Saurier lungern wir inmitten unserer Geräte herum*" (like perplexed distraught dinosaurs we are hanging around in the midst amongst our devices) in (Anders 1956: p. 16) of which Zemanek was possibly aware: both Anders and Zemanek had been citizens of Vienna during the second half of the twentieth century, and Anders' conjectures were controversially discussed in public during those days (Anders 1956: pp. 3-5).

<sup>13</sup> For comparison see (Kary/Mahner 2002) –without any reference to Zemanek– on this topic.

situation, a 're-boot' of the entire scholarly dispute (by setting it back to its earliest historic point of departure) might help our emerging discipline of computer- and information-philosophy (Floridi 2016) to find interesting new options and paths which were not yet sufficiently explored.

In particular with regard to the most recent concept of so-called '*virtual information*' (d'Alfonso 2016), which is related to the question of what (if anything) can be 'learned' by means of strictly logical deductions from axiomatically given premises plus some additional tacit assumptions, Zemanek's Wittgenstein'ian philosophy of informatics can become relevant once again, too: when –in the context of '*virtual information*' (d'Alfonso 2016) the application of a strictly logical deduction step *S* makes a hitherto implicit ('invisible') theorem *T* explicit ('visible'), then it is indeed possible to attribute some 'growth' of information to the application of *S*, because –according to Zemanek– *information* is also inherent in (the change of syntactic) *forms*, not only in those forms' mathematical-logical contents (semantics). Much philosophical confusion in the context of (d'Alfonso 2016) can indeed be avoided as soon as the various different *types of* (computer-supported) '*information*' are no longer conflated but rather distinguished properly from each other – similar to what Zemanek had proposed and explained already several decades ago.

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<sup>14</sup> [https://www.researchgate.net/publication/299253865\\_The\\_Notion\\_of\\_'Information'\\_Enlightening\\_or\\_Forming](https://www.researchgate.net/publication/299253865_The_Notion_of_'Information'_Enlightening_or_Forming)

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