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With Aristotle Towards a Differentiated Concept of Information

1. The Predicament of the Concept of Information – and a Possible Way Out

Each and every science should have basic concepts which are clear-cut or at least uncontested. This, however, does not seem to be the case concerning information science, for there is an on-going fierce discussion on the concept of information (see e.g. the concerning sections in the journal *Ethik und Sozialwissenschaften* 9, 1998, # 2 and 12, 2001, # 1). Part of this discussion is about the question how many different meanings this concept has and how these meanings are connected to one another. If we suppose that concepts are individuated by their meanings, then this discussion raises also the question how many concepts of information there are and if they form some kind of conceptual structure.

These questions pose a serious predicament for “the” concept of information. This predicament is formulated in the so-called “Capurro Trilemma” (cf. R. Capurro et al. 1999; P. Fleissner / W. Hofkirchner 1995). This trilemma threatens the usability of the concept of information with the following horns:

- a) There is only one meaning of the concept of information, resp. there is only one concept of information. This seems to be implausible since so many different things are called ‘information’, as e.g. traffic signs, distributions of molecules, contents of propositions etc. The problem is even harder as the inventors of the Trilemma have put it, since nowadays ‘information’ is used in mutually exclusive ways, with mutually exclusive meanings (cf. L. Qvortrup 1993): On the one hand, it is used to refer to objects which just are there in the world – one could call this the objectivist concept of information –; on the other hand, it is used to refer to constructions of certain cognitive systems, which can be called the constructivist concept of information. In our ordinary language use of ‘information’, one could suppose that we are caught somewhere in between these extremes.
- b) There are several totally different meanings of the concept of information, resp. there are many concepts of information. This does justice to the plurality of usages of ‘information’ observed in a). It leaves us puzzling, however, why and how the usage of only one term is legitimate in all these and many more cases. It also leads to the question whether there just are many different sciences of information each of which is based on a different concept of information. If it were so, talk of information in science just would mean conceptual confusion which should be avoided.
- c) There are several meanings of the concept of information, or several concepts of information, but there is a certain kind of relation between them which can be called “analogy”. This ‘third way’, however, is not really a way out of the predicament according to the inventors of the Capurro Trilemma, since, in their view, analogy implies that there is one focal meaning (or concept) around which all other meanings (or concepts) are centered. The classical, Aristotelian example for this is the term ‘healthy’ which can have many different meanings (think of a healthy living being, healthy food, healthy walks etc.), but all these meanings are centered around what it means to be healthy for a living being, which means a certain state of this living being. All other meanings refer to something which contributes to such a state (cf. G.E.L. Owen 1960). So we fall back to horn a): If the objectivist concept of information is the focal meaning, the constructivist object is excluded, and vice versa.

Even the very many attempts to define information which we encounter cannot solve this trilemma, since they are also affected by it. If we take one of the most general definitions - Gregory Bateson's famous dictum "information is a difference which makes a difference" (G. Bateson 1972, 459)- we are left to puzzle whether "difference" here is to be understood in an objectivist or in a constructivist sense or whether from time to time there is an equivocation between these possibilities. At least in the case of information, the definitional explanation shares the ambiguity of the explanandum.

Is there really no way to overcome this trilemma – or even to endorse one of its horns by showing that its consequences are not as fatal as its authors think they are? A positive answer to this question could mean that there just is no such thing as a concept of information and, hence, that there cannot be such a science as information science. My thesis is: We can endorse the third horn but, when doing so, we should take into consideration that there is more than one meaning also to the term 'analogy' (cf. P. Kunzmann 1998). Analogy understood as focal meaning does not solve the problem, this is true. There is one meaning of 'analogy', however, that can do the job, and this meaning leads to the – also Aristotelian – concept of ordered series. To say it in a nutshell and in a more systematic way than Aristotle himself: An ordered series is a certain sequence of concepts. In such a sequence, there are three types of concepts: one basic concept which does not contain other concepts of this sequence; higher concepts which form an ascending scale by containing the basic concept plus n additional conceptual elements; and one general concept which is unsaturated so that, by saturating it in different ways, all the other concepts of the ordered series can be generated. The conception of the ordered series is used by Aristotle especially in his writing *On the Soul*. Here he uses it to solve the puzzle of conceptual unity concerning life and soul. So we have to take a look at this book to see how that conception works.

2. The Concepts of Life and Soul as Aristotelian Test Cases

When I refer to Aristotle in order to find a solution for the Capurro Trilemma of the concept of information, I do not presuppose that Aristotle himself already had a concept of information equal or similar to ours. Especially, I do not assume that the Aristotelian concept of form has an affinity to the modern concept of information. These two concepts are separated by too many and too significant cultural, philosophical and scientific chasms and changes to be that close (cf. L.W. Rosenfield 1971; for some interesting intersections, however, see U. Voigt 2008a). What I do assume is, however, that Aristotle faced conceptual problems similar to our problem with the concept of information, and there is evidence that the way Aristotle solved these problems can be useful even today. This evidence can be found in *De anima (De an.)* resp. *On the Soul* (all following translations are mine; references are given according to the Bekker-edition).

In this writing, Aristotle starts with the common conviction of his time that the soul is the principle of the living beings (*De an.* I 1, 402a6-7). That means: There is a difference between living beings and other beings of a higher class which comprehends living beings and those other beings, and soul is what makes this difference in the first place (*ibid.*, II 2, 413a21-22). As living beings differ from other beings by living, soul is what makes a being a *living* being. Because living beings – at least the ones we know by experience – are *corporeal* living beings, soul can be determined more precisely as that what makes a body a living body. So the concept of the soul, which Aristotle is about to investigate in his according writing, is closely linked to the concept of the life of a body, namely of a body of a living being (*ibid.*, II 1, 412a13-412b1).

Here, however, the conceptual problem begins. There are many different types of beings which we call "living" (*ibid.*, II 2, 413a22-25; II 3, 414a29-32; cf. G.B. Matthews 1992), and

the life we speak of in the single cases does not always seem to be the same (De an. II 2, 413a22). Beings which grow and decay in a certain way, preserving their specific form by nutrition and excretion; beings which perceive and are able to react to their perceptions; beings which are able to think discursively and to utter their discursive thoughts in language – all these beings can be called living beings according to the linguistic intuitions which Aristotle can draw upon and which still seem to be quite plausible. Moreover, there seems to be one concept of life, the life of a separated, divine mind, which is not attached to a body at all (ibid., I 4, 408b18-29; II 2, 413b24-27, III 5, 430a10-25; cf. U. Voigt, yyy). So there seem to be many different concepts of life.

By taking the plurality of these concepts serious, Aristotle is able to put a question which his predecessors even were unable to ask: How can the concept of the soul be one, given that there are so many at least seemingly different concepts of life (De an. I 1, 402b1-5)? The Greek concept of life, and together with it the Greek concept of soul, is facing a trilemma which is strictly parallel to the Capurro Trilemma: Either there is one and only one concept of life and of soul, which flies in the face of the observed plurality; or there are many unrelated concepts of life and of soul, which would leave the searched science of the soul without unity; or there are many but mutually related concepts of life and of soul, and the task is to determine the way they are related. Aristotle endorses the third option and determines it as the way of the ordered series.

In order to show what an ordered series is and how it works, Aristotle gives an example from the realm of mathematics (ibid., II 3, 414b20-24). Here one can find a similar concern for the conceptual unity of closed plane figures as triangles, squares, pentagons and so on. In this case, the different referents of the concepts contain one another, since squares are constructed with the help of triangles etc. Because of this inclusion, the several kinds of those figures do not form species contained within a common genus, because they are conceptually interrelated. (Whereas the different kinds in a common genus are related not to one another but to the genus via the specific differences, according to Aristotle's concept of definition.) The same circumstance which precludes definition, however, leads to another, more differentiated kind of conceptual unity: the unity of an ordered series. This unity consists in the fact that the concepts of the different kinds of planes contain each other, in a certain sequence, and only potentially. The concept of a square is not the concept of two triangles. But the concept of the square is so that it implies that a square is to be constructed by - and can again be divided into - two triangles. Accordingly, the concept of a closed plain figure in geometry is something like this: "a triangle or a figure that can be constructed with the help of triangles resp. that can be divided into triangles". This concept, however, does not refer to something besides the different types of such figures. It does not even refer to their common genus, since it contains one concrete basic type from the very start. It is - and cannot be, and does not need to be, either - abstract enough to be a generic concept.

Now, the concept of life has to be formed accordingly: The life of every living corporeal being consists in *some* kind (I 3, 407b23-24; II 2, 414a22-25) of corporeal self-preservation by the vegetative actions of taking in nourishment, growing and maintaining oneself even in decay (ibid., II 1, 412a14-15). Plants, in the view of Aristotle, do just this - and prolong their limited individual self-preservation by generation - (ibid., II 2, 413a32-33; II 3, 414a33; II 4, 415a16-17, 26-415b2); animals can do more than this, for they can perceive and desire (ibid., II 3, 414b1-16) and at least some of them can move (ibid., II 3, 414b16-17); some other beings, like human beings, additional to that can think discursively and reason (ibid., II 3, 414b18-19; II 4, 415a7-11). It is not necessary here to discuss Aristotle's underlying hierarchic conception of biology which no longer seems to be tenable in some aspects. It is sufficient to see that Aristotle gains a concept of life which is multiple and still connected: Animal perception and motion is based on certain acts of vegetative self-preservation; and human speaking and thinking is based on the human abilities to perceive and to move. Above

the level of the plants, every other concept of life has some content of its own, but this content is a further specification of the general, unsaturated concept: life as the vegetative self-preservation of a living body of a certain kind. As in the case of the figures, this is no generic definition, yet it is sufficient to provide a certain unity for the concept of life and, thereby, for the concept of soul as the principle of life, i.e. of souls as the principles of certain kinds of life. Excluded from this relative unity remains the unembodied life of the mind; the according concept of life, however, does not play a central role in Aristotle's treatise on the soul. It stays a *Grenzbegriff* while the inquiry is proceeding on the known side of reality.

3. Perspectives for a Differentiated Concept of Information

What could be the relevance of this Aristotelian test case for the mentioned predicament of the concept of information? In my view, at least, here we find a way towards a differentiated concept of information. In such a concept, or in such an ordered series of concepts, we would have one basic concept of information which is somehow also contained in all other, higher concepts of information ("higher", it should be noted here, is to be understood without any evaluative connotation; it just serves to denote the respective logical level). All these concepts could be relatively unified by one concept which is not in a classical sense generic but which shows how the basic concept is to be modified in order to reach the higher concepts. One question would remain even if this way is viable, however: Is the basic concept an objectivist or a constructivist one? Theoreticians from different camps will give different answers to this question. Which answer is the right one? As formal analyses in general, also this study cannot answer such questions which are decided on the background of the respective basic intuitions. But our study can - and as I hope, already has done so - clarify the common logical pattern the conflicting parties share. The objectivist-constructivist debate on the concept of information is a debate on the kind of basic concept of information we should chose. To put an end to this debate would mean to break the general stalemate between objectivists and constructivists. This is not the aim of this paper. It has been the aim of this paper, however, to show that any possible outcome of this debate, or even the concept of information given the on-going debate, is not threatened by the Capurro Trilemma, thanks to the conception of the ordered series.

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