Creativistic Philosophy: Exploring the Limits of Formalization, #7[1]—The Creativity Hypothesis

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(Breu the Elder, 1531)[2]

In installment #6, we have seen that an algorithm or formal theory cannot produce an external reference to itself as a whole. As a result, it cannot modify itself. What can be computed by it or derived within it, is fixed from the beginning. It does not develop. It is static. Such a system might be able to produce a reference to some sub-system of itself, but not to itself as a whole.

So, algorithms or formal theories (including all current algorithmic AI models) can be viewed as finite and fixed packages or bundles of knowledge. Of course, references to such bundles can be produced from the outside. From such an external

[2] The picture, by Jörg Breu the Elder, from the *Book of Emblems* by Andreas Alciato (1531), depicts the god Proteus, a deity of the sea from Greek mythology. Proteus was thought to be able to change his form (see below).

vantage point, they can be inspected, extended, or modified. Productive functions like the "negated diagonal" operation can be applied to them and they can be merged with other algorithms—for example, with the result of applying such a productive function. All of this can be done from the outside. But, as we have seen, the operation of creating an external reference is an operation that cannot be done from inside an algorithm.

It seems that this restriction does not apply to human beings. If this were the case, humans would be restricted in what they can perceive and understand. There would be some patterns which, although they are computable, would be systematically out of reach for human cognition. We would have systematic blind spots like the ones all algorithms have. Moreover, our knowledge is historically developing over time, with new domains of knowledge branching off and occasionally some domains, or sub-theories, being unified or merged. So it looks like the kind of limitations that apply to algorithms or formal theories seem not to exist for human beings.

In what follows, I will proceed from the hypothesis that such limitations do indeed not apply to humans, i.e., that humans are capable of breaking out of any formal or algorithmic scheme, i.e., that they are capable of cognitive operations that go beyond the capabilities of algorithms, i.e. Turing machines and the like. I follow Kurt Ammon[3] in calling this ability "creativity."[4] I therefore call this "The Creativity Hypothesis." This hypothesis is at the core of what I call "Creativistic Philosophy."

Let us assume that The Creativity Hypothesis is correct.[5] What would be the consequences? Here are some of them:

- The cognitive processes of human beings are not completely formalizable, i.e., any exact (formal or algorithmic) description (theory) of human cognitive processes is incomplete. For each such theory, there are possible cognitive processes of humans that move beyond that theory's scope.

- Mathematicians, logicians and programmers can perform operations—like producing a reference to their own cognitive processes as a whole and applying productive functions, or other operations to "get at" results without a pre-existing algorithm—that are not formalizable in the general case. So mathematical cognition

[3] See (Ammon, 1987).

[4] However, the use of the term "creativity" in this sense goes back much further. In an article written in 1941 but published only in 1965, Emil Post, mathematician, logician, and one of the pioneers of computability theory, wrote: " The Logical Process is Essentially Creative"; see (Post, 1941), p. 417. See also (Ammon, 2009), where this is also cited.

[5] Indeed, for the rest of this series, I am going to presuppose the correctness of The Creativity Hypothesis; hence the series as a whole is essentially about investigating the consequences of this hypothesis.

(which might also be called "performing computations") is not completely formalizable.

- The formal models of computation, like Turing machines, Lambda calculus, recursive functions, etc., are therefore not complete descriptions of the intuitive concept of calculation, but only of the formalizable part of that intuitive concept. Computation in the sense of these models is a true subset of "total computation" or "creative computation."

- If every formal theory about human cognitive processes is incomplete, then human cognition does not have a fixed form. Learning processes are not processes in which a fixed cognitive base structure is "filled" with knowledge, but they are processes of transformation in which the very way cognition works might change. Essentially, the unchanging core of cognition is empty or at least very small. While there might be an innate initial structure, most aspects of this initial structure may be modified in the course of development.

- If every formal theory about human cognitive processes is incomplete (although it might always be extensible), then every theory of human culture, civilization, society and history must be incomplete as well.

- If every theory about human culture, civilization, society, and history is incomplete in principle, then every science[6] dealing with these subject areas is necessarily incomplete at any particular moment, and every approach within these disciplines can only be partial. The formalizing approaches we are used to from physics and other "exact" sciences can therefore only be partially applicable in the realm of humans and their cultures, civilizations, societies and histories.

  This is indeed what we see in the "humanities" and "social sciences." Any attempt to turn them into exact or "hard" sciences has failed or is only valid for parts of their subject area. Moreover, they show a large and never stabilizing range of different and always partial methods and approaches. We can view this state of the sciences dealing with human beings as empirical evidence that The Creativity Hypothesis is indeed correct.

- Human level intelligence cannot be achieved with algorithmic AI. Such systems might be extremely knowledgeable, containing more knowledge than any single human being can hold, but they are uncreative in principle and always have systematic blind spots or gaps which they cannot fill by themselves. Every such

[6] I am using the terms "scientific" and "science" here in a wider sense, corresponding to the much wider German term "Wissenschaft", which does not have a direct equivalent in English and includes the humanities and social sciences.

gap can be closed by extending or modifying the system, but an AI model cannot do this by itself. Any learning algorithm that produces AI models also has systematic blind spots.

These topics, which are only hinted at here, will be investigated in more detail in further installments of this series.

According to The Creativity Hypothesis, human beings, their societies, cultures, institutions etc. are entities for which every formal description is incomplete in principle. Since "entity for which every formal description or theory is incomplete in principle" is a bit long, I have proposed the term "proteon" for such entities, with the corresponding adjective "protean."[7] Note that "proteon" is a term you will not (yet) find in the literature about computability theory. However, I am going to use it from now on in this series. Starting from the idea that human cognition does not have a fixed form, I derived the name "proteon" from the mythological figure Proteus, a sea god in Greek mythology who could change his form.[8]

Before I explore more of the philosophical questions (and answers) arising from The Creativity Hypothesis, I am going to discuss some additional mathematical ideas from computability theory in the coming installments in order to put together a more comprehensive toolkit for further investigations.

[7] See (Keller, 2019a).
[8] See (Keller, 2019b)

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