COOPERATIVE KNOWLEDGE. THE LOGICAL BASIS OF NETWORKING

Jacques Jacques-Paul Dubucs

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1. Plato's Dogma

Western tradition has from the very start put forward a demanding definition of knowledge. To know, having a true belief is not enough. Of course, true belief is a part of the story, but something else is requested. One wants, for example, to avoid to say that knowledge of the time could arise from the lucky observation, at midday, of a brocken clock whose hands are blocked on twelve o'clock. Beyond true belief, good reasons for having such a belief are requested to be considered as possessing knowledge. Plato's claim, in *Meno* 96c, is that others' testimony should not be counted among these good reasons. Knowledge requires impact of the known on the knower and others' help cannot replace that impact : to know Larissa's way, I have to experience that at first hand by travelling this way. The transmission of the information by people who have that experience doesn't provide knowledge. In short, second-hand knowledge isn't properly knowledge. This assertion raises obvious problems on the way of understanding scientific knowledge in the frame of contemporary digital networks.

The aim of this paper is, neither to contest Plato's claim – Plato has visibly put the finger on an important distinction -, nor to solve the problem it raises, namely to propose an original solution for the equation Knowledge = True Belief + X. I just want to argue that the exclusion of other's contribution is unrealistic, should knowledge be considered as

humanly attainable : human life is too short for Platonic, solitary knowledge. I'd like also to establish that cooperation, in the domain of knowledge, has two specific features that make it both achievable and productive : on one hand, it escapes the well-known difficulties raised by the Prisoner's dilemma, on the other hand sharing knowledge is more creative than any other sort of sharing.

2 The feasibility of epistemic cooperation

2.1 The general difficulty of cooperation has its roots in the link between two propositions :

(i) Individuals clearly recognise the benefits they can gain from cooperation, which is *prima facie* a recommandable attitude

(ii) They also realise that they could receive those same benefits by refraining from cooperating themselves, so that they have good reasons for defection

In short, people feel inclined to be defectors while they perceive the interest of cooperation and this situation tend to make cooperation impossible, though desirable.

For the sake of concreteness, the following example can be proposed to explain the problem, which has been exposed in formal terms by A.W. Tucker back in 1951. Two cars are crossing at night and the drivers have the choice between keeping strong lights (☀) and moving to weak lights (★). Reasoning from the viewpoint of the first driver :

(i) Better to be offensive than been betrayed, for I'll see better this way : (☀,☀) > (★,☀)

(ii) For the same reason, better to betray than to cooperate : (☀,★) > (★,★)

In any case, the rational choice is to keep strong lights, hence the following gains table :

	☀	★
☀	0/0	2/-1
★	-1/2	1/1

One that basis, the actual choice of both drivers will be to keep strong lights, while each of them would win more if they cooperate by moving both to weak lights, which is the social optimum, ie the maximal gain for the group : (☀,★) > (★,★) > (☀,☀) > (★,☀)

2.2 Things are different with epistemic cooperation, namely information exchange. That difference rests on the fact that information is a good which is kept when it's given. Give an euro, you don't have it longer. Give a piece of information φ, it is still available to you. That constrat feature has two tremendous consequences :

    (i) The silence of the defector is at no cost for the cooperator : (☹,☹) ⊁ (☹,φ)

    (ii) Nothing is gained by informational treason : (☹,ψ) ⊁ (φ,ψ)

Thus, whatever the other decides, the choice of opening him the data one possesses is not irrational. For information sharing, the gains table is this :

|	☹	ψ
☹	0/0	1/0
φ	0/1	1/1

That means that, in the realm of information, social optimum is reachable. Epistemic cooperation is *easy* :

    (☹,ψ) ≥ (φ,ψ) > (☹,☹) ≥ (φ,☹)

3 The productivity of epistemic cooperation

A general property of sharing is this : every item possessed by the group after the sharing is an item that some member of the group possessed before the sharing. Information

sharing does better: the cooperative group knows more than any of its members before information exchange : if *a* knows that φ and if *b* knows that $\varphi \rightarrow \psi$, then they know together that ψ, while none of them got this information before the exchange. By reference to mathematics, in which this kind of cooperation is of constant use – real mathematics are typically a typically *non-Platonistic* activity, for never start from axioms, but we use freely the results of our predecessors as lemmas -, I suggest to call that « lemmatic productivity ».
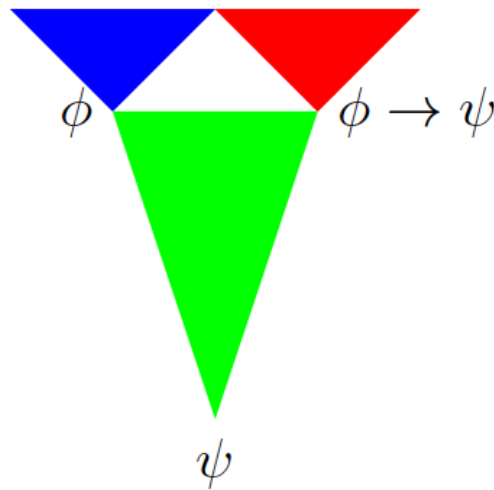
Well-known results in contemporary proof theory (Gödel, Boolos) shows that this use of lemmas, namely this use of cooperative knowledge among mathematicians, results in a huge speed-up : there are direct (« solitary », Platonistic) proofs that are longer by a factor of a tower of exponentials that team, lemmatic proofs. In other words, there are pieces of mathematical knowledge that weren't available to human beings if they would process according to Plato's standards.

To summarize, cooperative knowledge is both feasible and productive. Its rejection,

following Plato's analysis and requirements, would mean a drastic cut in the actual performances of human epistemic achievements. The objective of philosophy and social sciences should be, rather than the pursuit of epistemic ideals that are clearly beyond the reach of finite creatures, to reflect on the concrete modalities of accomplishment and improvement of that cooperation in actual societies and organisations, especially to understand the contemporary move of opening the data.

References

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