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Veröffentlichungsversion / Published Version

Sammelwerksbeitrag / collection article

### Empfohlene Zitierung / Suggested Citation:

Hountondji, P. J. (1987). On the universality of science and technology. In B. Lutz (Ed.), *Technik und sozialer Wandel: Verhandlungen des 23. Deutschen Soziologentages in Hamburg 1986* (pp. 382-389). Frankfurt am Main: Campus Verl. <https://nbn-resolving.org/urn:nbn:de:0168-ssoar-149164>

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# On the Universality of Science and Technology

*Paulin J. Hountondji*

## 1. On the margins of science

Let me start by a rather long, but significant quotation from a French biologist who partly studied at the university of Dakar, Jacques de Certaines:

“In the African universities where I was trained, there was a scientific teaching quite valid in the subject matters I had to learn, but it taught rather dependence than real science. I mean that, for three years, I was told how biology had developed through works implying the use of facilities which did not exist on the spot. Therefore, in order to do such biology, students would have to go abroad. Such and such scientific results were published in such and such journals, but these journals were European or American, and one had to read them abroad. In short, during three years, thanks to lecturers and professors who were good ones, and who were also African up to 60%, I received good teaching and learnt, at the same time – but for me this was, of course, not so serious as for my fellow students who were not to come back to France – I learnt that finally, all that I could do as a biologist in the future, I should have to do it under the dependence of American centres, American periodicals, with European facilities, and that all I could ever do at the university of Dakar was to repeat European works, or initiate small works to be submitted, for publication, to European journals. All this apparently good teaching only led to a feeling of dependence towards those places where science was really being done. I was told, in a way: here, you are working on the margins of science, but if you really want to reach the heart you will have to go. All my fellows of that time have continued doing biology, some of them became secondary school teachers, but those who wanted to do research actually left. How could such a dependent teaching lead to real development?”<sup>1</sup>

This is a remarkable testimony which points at the difference in quality between scientific training and, more generally speaking, scientific activity in a Third world country and in an industrial country.

Whatever his special field, the African scientist cannot shake off the unpleasant feeling that everything that matters in his discipline is taking place

elsewhere. It is elsewhere – outside Africa – that we find the fully equipped laboratories essential for the physicist, chemist or biologist wishing to pursue his research beyond a certain stage of precision or complexity; elsewhere, the best universities and research centres; elsewhere, the head offices and editorial teams, the human and material bases of the scientific journals that publish the most original and innovative works; elsewhere the scientific discussion and debate encouraged and disseminated by such periodicals, as well as the scientific and intellectual activity they foster; elsewhere again, are the libraries and publishing houses that make available the most important scientific books and treatises.

All this, in fact, is known to everybody. But the African scientist does not, usually, question it. He takes it for granted that scientific teaching in his country should be, so to say, provisional and subordinate, incapable of referring to the immediate environment and condemned to refer all along, in an allusive, abstract way, to alien, foreign realities. He takes it for granted that, being born and educated at home, he should start working “on the margins of science”, as our author puts it, away from the heart of the world scientific and technological activity, and should thereafter, due to some personal luck, step up from the periphery to the centre. The African scientist does not usually question this kind of stepping up, this progression from the abstract to the concrete, from the margins to the heart of knowledge, and moreover, he takes it for granted that this progression should be reserved, in Africa and the Third World, to the happy few that can afford to . . . “go”. He does not mind the fact that, in Europe and industrialised countries, the relationship to science is quite different, and that people do not have, precisely, to . . . “go”, to travel thousands of miles away from home, before grasping at real science.

This testimony by a foreigner is therefore most enlightening, because it highlights an abnormality which most of us tend to consider as normal, due to the force of habit. This being said, one should not be content with just a feeling of frustration, but go beyond it and analyse the objective structure which accounts for the specific shortcomings of scientific research in the Third World. To such analysis, I wish, in this paper, to contribute a hypothesis: scientific and technological research, in the form it takes in Africa today, is just as “extraverted”, as externally orientated, as economic activity; its shortcomings are, therefore, of the same nature, that is, not consubstantial to our systems of knowledge as such, but due to the historical integration and subordination of these systems to the world system of knowledge and know-how, just as underdevelopment as a whole is due, not

to any kind of original backwardness, but to the integration of our subsistence economies to the world capitalist market.<sup>2</sup>

## 2. A theoretical vacuum

Historically, science and technology, in the form they evolve nowadays in our countries, can be traced back to the colonial period. Let us call them, very approximately, “modern” science and technology, in contraposition to “traditional” knowledge and know-how. I do not intend, here, to question the nature and mode of existence of this traditional knowledge, yesterday and today. Let me simply observe that, in the process of scientific investigation, as understood in our times, the decisive stage is neither the collection of data which, in a way, initiates the whole process, nor the application of theoretical findings to practical issues, which is the final stage, but the most important is the middle term, that is, the interpretation of raw information, the theoretical processing, eventually through experimental machinery and methods, of the data collected, and the production, thereby, of those particular kinds of “things” that we call scientific statements.

Now, it should be noted that, in the whole process of scientific activity in the colonies, this intermediate stage, this central, essential operation of theorising, used to be missing. We only had the first and third stages: the data collection, the feverish gathering of all supposedly useful information, aimed at immediate export to the “mother” country, say, France, Britain or Portugal, for theoretical/experimental processing and interpretation, on the one hand, and on the other hand, a partial, occasional and limited application, to some local issues, of the result of metropolitan research, either directly (e.g. for teaching purpose) or indirectly (through the building up of original technical devices). The middle term, the intermediate stage of the whole process took place on the territory of the ruling country, outside the colony. The latter lacked laboratories and other facilities necessary for basic research, it even lacked universities, or when it had any of these, they were so little developed that they could at best allow, on the one hand, this kind of proto-theoretical procedures necessary to applied research even in its final stages, the only ones which eventually took place in the colony.

Thus science in the colony was characterised by a specific theoretical vacuum, the lack of those intellectual and experimental procedures which,

being the heart of the whole process, depended however on those infrastructural facilities which existed only in the ruling country.

Now, it should be noted that this theoretical vacuum was substantially identical to the industrial vacuum which, in the colony, used to characterise economic activity. I need not recall that, in the process of imperialist production, colonies were primarily sources of raw materials and eventually, markets for the finished products of metropolitan industry. The raw materials thus collected, through mine extraction or agriculture, were not used locally but exported towards the ruling country, which processed them in its factories, partly for its own consumption and partly for re-export as finished products. Colonial economy was, in this specific sense, extraverted, i.e., geared to an external impetus, organised in such a way as to respond to the demand of industries located elsewhere, and more generally, to the consumption needs of people in the ruling country.

My hypothesis, then, is that scientific research, at least in the colonies, went hand in hand with economic activity, and developed along the same lines. Laboratories were missing, just as industrial plants were. Theoretical vacuum was just as specific to colonial scientific activity as industrial vacuum was to economic activity.

Is this just an analogy? Am I imposing on things, different by nature, an artificial comparison which could entail the risk of dissolving their own specificities? If this was the case, how could we, then, explain that strange coincidence, whereby the missing stage in both sorts of process is precisely the same, that is, the stage of transformation, the only one to be really active, in contraposition to the other one, which are rather passive, the only one, therefore, where human creativity may fully express, and impose its mark on things?

My opinion is that we are not dealing, here, with a mere analogy, but with two forms of one and the same phenomenon: scientific activity appears to me, in the last resort, as a specific mode of economic activity in the wider sense, in the sense where economy means the process of human transformation of nature, as a whole, and not just agricultural, industrial and trade business. In this complex and many-sided process, economy in the narrower sense, i.e. as production and circulation of material goods, remains basic and plays a paradigmatic role vis-a-vis all other aspects. This means nevertheless that, first, the other aspects, or levels, of human productive activity – human economy in the wider sense – keep their own irreducible specificity, and, secondly, that they can most intelligibly be thought of and,

at least, externally characterised, in every given case, on the model of economy in the narrower sense.

In this respect, the introduction by the coloniser, in the overseas territories, of so-called modern science (i.e. a process of knowledge relatively new with regard to the "traditional" one), in the form, however, of just an impoverished science, an ersatz of science, deprived of the inner, constituent element, the intellectual activity which makes science science, is just a side-effect of the launching in these territories, by the same coloniser, of a so-called modern economy, i.e. market economy, capitalist mode of production, a mode of production basically new with regard to the traditional one, but deprived nevertheless, of that industrial activity, that sense of initiative, that propension to risk, which makes it productive in the coloniser's own country. The theoretical emptiness of colonial science is, in the last instance, but a side-effect of economic domination, forced integration into the world capitalist market, but to a subordinate place; a consequence of what Samir Amin calls the peripherisation of Third World economies.<sup>3</sup>

Let me stop, however, at this point and turn to the question, how far the situation just described has been changed by decolonisation.

### 3. New forms of scientific dependence

As is obvious to everyone, political independence has led, in former colonies, to an increase in the number, and sometimes, an improvement in quality of research facilities. We now have more and more universities, research institutes, libraries, scientific journals and publishing houses, we have, in some cases, better and better equipped laboratories, in short we have a more and more sophisticated scientific infrastructure, which does no longer allow to denounce, without further notice, any "theoretical vacuum".

We have to acknowledge, at least, that the periphery is no longer exporting raw, untreated data, but is increasingly trying to put them through a preliminary processing before exporting to the centre's laboratories. In some cases, the whole processing can even be achieved on the spot, in well-equipped laboratories and research institutes.

Despite this, however, scientific research remains, in our countries, basically extraverted, alienated and dependent. To go quickly, let me just mention a few manifestations of this.

First as far as equipment is concerned, not only the most sophisticated, but even the simplest technical facilities in our laboratories are made abroad, in the Centre. We do not even master, therefore the first link of the chain, the making of research instruments, the production of means of production.

Secondly, in spite of the recent development of libraries and scientific publishing houses in our countries, these facilities still lag, both in quantity and in quality, far behind those in industrial countries. I am not trying to minimise the important effort which has been made, nor the realisations achieved; I only want to point out that, due probably to the relatively small number of scientists in our countries, and their mass concentration in the Centre, even the scientific periodicals published in the South are likely to be better distributed in the North.

The Third world scientist is aware of this, and therefore, as he undertakes to write a publication, he is subject to the temptation of addressing issues that are primarily of interest to the Western public and relevant, in a way or another, to the state of knowledge in the West – because, if he does not, he may have no scientific audience at all. This is, up to our times, one of the most pernicious forms of extraversion: theoretical extraversion, in the fact that, being aware of this historical fate, that our scientific production is likely to be read and utilised more by a non-African than an African public, we are constantly tempted to let the very content of this production, the very questions we pose and the way we deal with them, pre-oriented, predetermined by the expectations of our potential readers. Resisting this temptation is, of course, possible. It is nevertheless difficult, and the very fact that *we*, and only we, scientists of the Third world, have to resist such a temptation testifies, once more, to the specific difficulty of research in our countries.

Third, the technical equipment which, as we have put it, has in many cases been increasing through years, actually has this sole effect, that theoretical processing of raw information is now partly transferred from the North to the South. This geographical transfer does not put an end to the traditional monopoly of theory by the North. It only so happens that scientists from the South get more and more involved in this process, and moreover, can more and more do it without leaving their own countries. But there is no organic link between these laboratories or research institutes and the society which hosts them, as is always the case in the North. The objectives and programmes they try to achieve have but little to do with the needs of the masses in the host-country, but are still dictated, on the one hand, by the theoretical needs of Western science, that is, the questions it is prompted to

pose, at a given time, by its state of theoretical development, and on the other hand, by the practical needs of the bourgeoisie in the Centre, which also happen to be the needs of the ruling classes in the periphery itself.

Fourth, in spite of the gradual implantation, in our countries, of research facilities, and all infrastructural conditions for theoretical and experimental science, the intellectual vacuum described above is far from being filled up. For, these facilities are used, most of the time, and in the minds of many should only be used for applied research, a form of research aimed at solving, by making use of theoretical results attained in the Centre, some of the innumerable practical issues encountered by the ruling classes of the periphery. There is still collective prejudice against basic research, which is deemed to be useless and, moreover, too costly for developing countries and therefore, appropriate only for the North. It so happens, then, that while we have more and more facilities for theoretical research, we refrain from doing it, out of conviction. The prevalent ideology in our countries, for this matter, is utilitarianism and pragmatism.

Fifth, it sometimes happens that, beyond all these forms of extraversion, scientific research appears to be directly in the service of economic extraversion: such is the case of agronomic research. In many of our countries, this particular branch commands very special attention on the part of governments, and is allotted much more human and material resources than most of other sectors. It appears, however, that this research was, till recently, almost exclusively devoted to searching the ways and means of improving export crops. It appears that, though new research programmes were recently initiated to deal with food crops (i.e. those crops necessary for mass consumption in the country itself), these programmes are not doing so well, up till now, as old ones devoted to industrial crops such as oil-palms, coconut and other oleaginous plants, cotton, pineapple, and other products intended for the centre's factories or, at best, for processing in local factories, partly for consumption by the indigenous ruling classes, partly for export towards the Centre. Thus, agronomic research appears to be directly in the service of a dependent economy, an economy intended at meeting the needs of the local privileged elite, allied and subordinate to the bourgeoisie of the centre.



## Conclusion

Let me now conclude, in two words.

Ideally speaking, science and technology, as cultural values, are not the property of anybody or any particular culture. They are universal, insofar as the search for truth and efficiency permeates every culture. We, in the Third world, have to remember this, and get rid of all sorts of inferiority complex vis-a-vis what some people tend to consider, abusively indeed, as “Western” science.

Yet, it would be a mistake, under the pretext of this universality, to let everything go as it does now, and continue lazily importing, in our countries, for application purpose, the results of a scientific research done in the West. Universality should not remain abstract. We must endeavour, here and now, to appropriate, or reappropriate, the existing legacy of science and technology throughout the world – a legacy of knowledge and know-how partly constituted out of materials drawn from our own countries – and develop an independent, self-reliant process of theoretical research, with a view to mastering progressively nature around us, our own history and collective destiny.

## Notes

- 1 Jacques de Certaines, in “Table ronde”, *Recherche, pédagogie, culture* (Paris), No. 38, Nov./Dec. 1978, special issue on “Scientific training”, p. 41.
- 2 I have already presented this hypothesis in a number of papers, namely P. Hountondji, “Recherche théorique africaine et contrat de solidarité”, *Travail et société*, vol. 3, No. 3-4. July/Oct. 1978, pp. 353-364; Id., “Science in the Third world: a facet of underdevelopment”, in *Culture for all peoples, for all times*, Unesco Press, Paris, 1984, pp. 61-73; Id., “Scientific dependence: its nature, and the way to overcome it”, in Klaus Gottstein, Götz Link, eds., *Cultural development, science and technology in sub-Saharan Africa*, Nomos Verlag, Baden-Baden 1986, pp. 109-113.
- 3 Cf. Samir Amin, *L'accumulation à l'échelle mondiale*, Anthropos, Paris, 1970.