Philosophia Scientiae

Travaux d'histoire et de philosophie des sciences

18-3 | 2014

Logic and Philosophy of Science in Nancy (I)

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Electronic version

URL: <http://journals.openedition.org/philosophiascientiae/1001>

DOI: 10.4000/philosophiascientiae.1001

ISSN: 1775-4283

Publisher

Éditions Kimé

Printed version

Date of publication: 1 October 2014

Number of pages: 167-175

ISBN: 978-2-84174-689-7

ISSN: 1281-2463

Electronic reference

Delphine Blitman, « What Linguistic Nativism Tells us about Innateness », *Philosophia Scientiae* [Online], 18-3 | 2014, Online since 19 January 2015, connection on 02 November 2020. URL : <http://journals.openedition.org/philosophiascientiae/1001> ; DOI : <https://doi.org/10.4000/philosophiascientiae.1001>

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What Linguistic Nativism Tells us about Innateness

Delphine Blitman

Laboratoire d'Histoire des Sciences et de Philosophie –
Archives H.-Poincaré – Université de Lorraine –
CNRS (UMR 7117) (France)

Résumé : La question de l'innéisme reste un sujet de débat actuel dans le domaine des sciences cognitives. Cela vient du fait non seulement que les thèses innéistes restent controversées, mais aussi de ce que, à un niveau conceptuel, la manière dont la notion d'innéité doit être définie n'est pas claire. Le programme de recherche de Chomsky a joué un rôle fondateur, en montrant la portée méthodologique que pouvait avoir une perspective innéiste pour l'étude des facultés mentales et en particulier du langage. Le but de cet article est de clarifier la signification qu'on peut attribuer à l'innéité de la faculté de langage dans la théorie de Chomsky, et de montrer que cela éclaire plus généralement l'usage de cette notion dans le champ des sciences cognitives.

Abstract: Nativism is still a highly controversial topic in cognitive science. Not only because nativist claims remain controversial, but also because, it is not clear how innateness has to be defined as a concept. In cognitive science, Chomsky's research program played a foundational role. Chomsky showed the methodological contribution of a nativist perspective for the study of mental faculties and particularly language. The aim of this article is to investigate what meaning can be given to the innateness of the language faculty in Chomsky's theory and to show how it contributes to clarify the notion of innateness as used more generally in cognitive science.

1 Introduction

The nature/culture debate is still a hot and much debated topic in cognitive science. However, the notion of innateness is a big issue in itself, which affects the entire nature/culture debate.

Nativism is a highly controversial topic in cognitive science. Nativist programs, such as, perhaps first of all, Chomsky's in linguistics, but also Fodor's in philosophy, evolutionary psychology or the so-called core knowledge research program, have been and still are of great importance for cognitive science.

However, the way innateness has to be defined as a concept is not clear at all. This confusion leads a number of philosophers and cognitive psychologists to criticize the notion of innateness and to claim that it is more harmful than useful and must be eliminated.

This contrast constitutes a kind of paradox, which has to be solved. Actually, the problem is that if nativist debates are genuine empirical scientific debates, a way should be found to give sense to the notion of innateness, on which those debates rely.

My aim in this paper is to propose a scientifically satisfying way to use the notion of innateness. To do so, I will rely on the example of a nativist claim in cognitive science, namely Chomsky's theory of language (often called "linguistic nativism").

I have chosen the linguistic nativism debate as a case study because Chomsky's research program played a foundational role in cognitive science. Against empiricism and behaviorism, which were dominant at the end of the 1950s in philosophy, and American psychology as well, Chomsky showed the methodological contribution of a nativist perspective to the study of mental faculties and language in particular [Chomsky 1975, 1986]. His research program has been used as a model to study other cognitive functions. For this reason, it constitutes a crucial case study to clarify the notion of innateness. I would like to investigate what meaning can be given to the innateness of the language faculty in Chomsky's theory and to show how this analysis contributes to clarify this notion as it is used more broadly in cognitive science.

First, I will explain the main difficulties raised by the notion of innateness. Then, I will defend a particular use of the notion of innateness based on an analysis of the linguistic nativism debate and in comparison with other debates which involve the innate/acquired opposition. Finally, I will briefly sketch out the implications for the understanding of both the linguistic nativism debate and the notion of innateness itself.

2 The difficulties raised by the notion of innateness

As I mentioned before, for ten years or so now, the notion of innateness has been much criticized by certain philosophers of biology and cognitive science.

In the field of developmental psychology and biology, researchers have criticized the understanding of innateness in terms of instincts or of genetic determinism for a long time. There are no instincts, in the meaning the term could have in behavioral ethology at the beginning of the 20th century, particularly in the first works of Lorenz: in each behavior, the environment and the history of the animal play a role. Development is a process in which the innate and the acquired are intricately interwoven at each stage and do not simply add up, thus implying that they can be maintained separately.

In a developmental approach, development can't be studied by separating the innate from environmental factors. The purpose of such a developmental study is the process of their interactions in itself. Hence, developmental psychologists voiced a strong criticism of the innate/acquired dichotomy.

According to the developmentalist tradition, the notion of innateness applied to any phenotypic trait of an organism seems not only useless but also conceptually unjustified. This leads some authors like Griffiths and Machery [Griffiths & Machery 2008] to adopt a deflationary position and to consider that the notion is pre-scientific, and that it must be abandoned.

The main source of difficulty, may lie in what is called "interactionism". Interactionism refers to the idea that the interaction of genes and environment is constant and omnipresent in the development of each trait of a living form. So it is difficult to claim that any cognitive faculty, or simply any organic trait, is innate or acquired, because every trait is the product of both genes and environment. Almost all the biologists and the philosophers of biology accept this idea today, so that Sterelny & Griffiths speak about an "interactionist consensus" [Sterelny & Griffiths 1999].

Hence, interactionism rejects both the *tabula rasa* and genetic determinism models. Nothing is fully acquired and nothing is fully innate. On the one hand, the cognitive revolution finally outdated the conception of the human mind as a *tabula rasa*, as human babies are born with a brain equipped with a number of capacities and competences. On the other hand, there is a cascade of numerous and complex interactions from the synthesis of a protein to a behavior, so that it is impossible to look for a direct causality from the genes to a competence, a behavior, or more generally any phenotypic trait in an organism.

Interactionism has at least one direct consequence when one comes to define the notion of innateness. Since each trait is both innate and acquired, the definition of innateness cannot be absolute; it must be relative, that is, it must take into account the fundamental facts of interactionism. You may

say that a phenotypic trait is innate, but this does not exclude the role of environment in the development of that trait.

Thus, interactionism is the main source of the difficulties, when you seek an acceptable definition of innateness. Even if you are not inclined, like developmentalists, to a final rejection of the notion, defining innateness is no easy task. The topic being much discussed among philosophers of biology, many different definitions have been proposed. I will not present here each proposal, nor will I give the objections formulated against each of the proposed definitions. (I have done this work elsewhere, see [Blitman 2010].) Let's assume here that among all the definitions that exist in the literature none is really satisfying. To my knowledge, no definition succeeds in proposing such a relative definition of innateness.

From this point of view too, it is questionable that the notion is conceptually well-founded, as Mameli & Bateson point out: it is not clear if the notion is a “clutter”, namely a set of different properties which do not constitute a hole, or a “cluster”, that is, a set of properties which are linked together by some underlying causal processes [Mameli 2008], [Mameli & Bateson 2011].

3 A defense of the notion of innateness based on the analysis of the linguistic nativism debate

There seems to be some reason why all the definitions of innateness found in the literature fail: all of them are attempts to find out a *general* definition of innateness. A distinction must be made here: absolute, as opposed to relative, is not the same as general, as opposed to particular. Absolute means that the environment plays no role in the development of an innate phenotypic trait. General means that the definition applies to any phenotypic trait, whatever it is. If interactionism makes any absolute definition of innateness impossible, my point is that no general definition can work either.

My proposal is to use, instead of a general, and impossible notion of innateness, a series of particular definitions, specific to each debate. For each case or each type of cases considered, the notion of innateness must be given a particular definition, whose role is to make clear what is meant by the innate/acquired opposition in the particular debate at stake.

My line of argumentation consists in comparing the meaning the notion of innateness has in the linguistic nativism debates to other debates which also concern the innate and the acquired.

To begin, the main lines of Chomky's nativist claim about the language faculty need to be summarized.

Chomsky claims that the language faculty is innate. To interpret and understand this claim, the very general ideas underlying Chomsky's research program in linguistics should be borne in mind.

Chomsky's theory has changed quite substantially over the last sixty years. But the general framework has remained the same. Chomsky's nativist claim relies on a crucial distinction Chomsky introduces to characterize the language faculty. He distinguishes between two layers in the architecture of the human language faculty: first, the faculty to learn any language, and second, the linguistic competence of individual speakers in their own language. The faculty to learn a language is what Chomsky calls Universal Grammar. So, Chomsky makes a distinction between the initial state of the language faculty, the so-called Universal Grammar, and its final state of this faculty, that is, the competence of the speaker.

The purpose of the Universal Grammar hypothesis is to provide an explanation of the acquisition of language. Chomsky postulates that this acquisition would not be possible at all if it were not guided by innate linguistic principles, namely the Universal Grammar. Such is the claim in which linguistic nativism consists. Universal Grammar is a set of universal, innate principles, which constrain the form of all possible human languages.

In Chomsky's work, the claim that Universal Grammar is innate involves two main ideas.

Chomsky embraces a naturalistic approach of the mind. However, it's not enough to say that language has biological foundations to claim that the language faculty is innate. This foundation must also be specific to language. What Chomsky calls a module, which differs from what Fodor means by this concept [Fodor 1983], refers precisely to the domain-specificity inherent to the principles of the language faculty, that is, the fact that they are specific to language. Talking about an innate language faculty implies considering that there exists a specifically linguistic module in the human mind.

The notions of modularity and domain-specificity capture one part of the notion of innateness as Chomsky uses it. The other part consists in the idea that a child does not construct Universal Grammar on the basis of its own experience: Universal Grammar is not acquired in this sense.

To sum up, to assume the innateness of Universal Grammar is to assume the computational specificity of the language learning mechanisms and their independence from the ontogenetic experience of individuals. In other words, it is to assume the modularity of the language faculty on the one hand, and on the other hand to admit that the child does not construct the universal grammar on the basis of its own experience. From a biological point of view, Universal Grammar is supposed to be a component of the human cognitive architecture.

According to this interpretation—that is shared by a certain number of authors, but whose non-genetic nature should be underlined in my view—,

the debate about linguistic nativism can be stated as follows: are the mechanisms underlying language acquisition domain-general (i.e., also underlying the acquisition of other cognitive capacities) or domain-specific (i.e., specific to language acquisition)? And are these mechanisms acquired?

My point is that the stakes in the debate about the existence of an innate language faculty differ from those in other debates, which also revolve around the innate and the acquired. It appears that the issues raised in each case are not the same.

In the case of language, as we have seen, what is central concerning the innate/acquired debate is that Universal Grammar is not learned and that its underlying mechanism are of specific nature. The question is an architectural one, which engages the modularity of the human mind/brain.

But take the case of diseases. There are debates aiming at determining the more or less important role of genes in some diseases. For example, the disease called sickle cell anemia is a disorder with a known genetic cause: abnormal hemoglobin, due to the mutation of a gene. It causes a tendency in red blood cells to aggregate and block the arteries. The abnormal cells are destroyed, and this causes anemia. In this example, the genetic cause is a necessary and sufficient condition to develop the disease. But take the case of hemochromatosis: a genetic cause, namely a genetic iron overload, coming from a homozygote mutation in a gene, which can provoke cirrhosis or a liver cancer. The mutation is a necessary but not sufficient condition to develop the most common type of hemochromatosis. Non-genetic factors such as drinking alcohol can also play a role. So, diseases for which a direct genetic causality can be established may be called innate and opposed to more complicated cases, in which the role of the environment is more crucial. In these two cases, scientists could talk about acquired diseases. Here, the interaction of genes and environment is the relevant element to qualify a trait as innate or as acquired.

Let us now take a behavior like birdsong, as described in the review made by Ariew in his 1999 paper concerning the notion of innateness [Ariew 1999]. In some species, the young bird needs to hear a congener singing to develop the “normal” song of its species. In other species, this is not necessary. That is the feature, namely the presence of learning or not, researchers use to describe birdsongs as innate or as learned.

I thus maintain that in these three examples, language, diseases, and birdsong, the innate/acquired opposition refers to something different and has not the same meaning. But in each of these three cases there is a genuine scientific debate. That is why I propose to use, instead of a general notion of innateness, a series of particular definitions, specific to the different debates. According to the previous examples, there are apparently at least three levels at which the innate and the acquired distinction can be formulated in specific terms. A first particular definition of innateness will refer to the implication of genes in the development of a phenotypic trait, compared to the role of the environment. A second particular definition is to be found at the behavioral

level and refers to the learned or unlearned dimension of a trait. A third particular definition at the neuronal-cognitive level links innateness to the notion of domain-specificity.

4 Implications for the understanding of both Chomsky's nativist claim and the notion of innateness

In this last section, I will examine the implications of the way in which I propose to define and to use the notion of innateness.

First, my proposition to replace a general definition of innateness by a series of particular ones raises some difficulties with regard to the unity of the notion and its range, whether ontological or only epistemological. We face the following dilemma. Either there are only particular definitions in which the notion of innateness takes a different meaning. In this case, there does not seem to be any justification to continue using a single general notion of innateness, and the notion should be abandoned. Otherwise, the innate is always considered referring to the genes, as in the different debates mentioned above, but that the general definition of innateness in terms of genetics is impossible to formulate in the current state of scientific knowledge. The particular definitions are useful because scientists are not able to link together all the different levels which are involved in the previous debates. But these particular definitions are of temporary use, until science is able to show the connections they all have in genetic terms.

It is possible to defend a slightly different version of the second branch of the alternative, where both the unity of the notion of innateness and the necessary use of particular definitions can be maintained.

Particular definitions of innateness are necessary not only to clarify the stakes of a debate in order not to mix up all of them and to misunderstand the problems being discussed. They are also necessary because they refer to different ontological levels in the organism. But the unity of the notion is warranted by the fact that, in a naturalist perspective, we can admit the unity of all the levels, the genetic, the neuronal, the cognitive, and the behavioral. These different levels refer to the same biological foundation. Even if the description of those causal relations is out of the range of current scientific knowledge, we can assume that there are some causal relations between them, which are complex, and neither linear nor isomorphic. From this point of view, it is inevitable to have particular definitions of innateness. It is not only an epistemological convenience, but also an ontological necessity.

Then, to adopt such an account of the notion of innateness also has some implications on the way we interpret the linguistic nativism debate.

The analysis of the linguistic nativism debate, in which innateness plays a role, has to be defined differently from the similar as it is used in debates involving other levels of the organism. In the argumentation above, this calls for abandoning a general notion of innateness and to adopt a series of particular definitions. But this will bear other consequences in turn on the way Chomsky's linguistic nativist claim is to be understood.

If innateness has not one single general definition but has to be defined in particular ways, the main lesson we can draw concerning linguistic nativism is that Universal Grammar is not the description of a brain module.

Chomsky proposes a linguistic characterization of the initial state of the language faculty, which is Universal Grammar. His arguments are linguistic arguments. How should we interpret this linguistic characterization at the biological level? In a naturalist perspective, the linguistic, psychological and neurobiological levels can be taken as different levels of description of the same reality, namely the language faculty in the speaker's brain/mind. But there is no strict correspondence between these levels. Even linking the merest behavior to the underlying neuronal organization is highly complicated. Thus, Universal Grammar is not the description of the *neurobiological* initial state of the language faculty.

Chomsky's linguistic arguments, insofar as they are well-founded and empirically robust, provide some proofs of the existence of a modular universal grammar being independent from the ontogenetic experience of the child, and innate in this sense. But they do not allow deducing the innateness of the language faculty as being directly influenced by the genes, nor does Chomsky's Universal Grammar describe a neuronal network.

The biological entrenchment of the Universal Grammar does not rely on an identification of the linguistic principles and their neurobiological basis in the brain. Neither at the genetic level nor at the neuronal level does Universal Grammar identify with the structures or the mechanisms which underlie it. It only means that, if the nativist arguments are well-founded and empirically robust, they indicate that the biological existence of a language faculty is plausible.

5 Conclusion

In this paper, Chomsky's linguistic nativism has been used as a case study to analyze innateness, from which an argument has been drawn to defend the necessity to use particular definitions of this notion, instead of a general, impossible definition. According to me, this specific use of innateness enables us to overcome the difficulties attached to this notion.

Then, it has been proposed that such an account of innateness also helps us to better understand the range of Chomsky's nativist claim. Ultimately, it should be underlined that restricting the use of the notion of innateness

to particular definitions has important consequences on the interpretation of the nativist hypotheses which are proposed in cognitive science. Actually, it prevents a genetic or neuronal interpretation of a hypothesis formulated in cognitive terms, which is an important lesson to keep in mind when considering all the debates in cognitive science involving nativist hypotheses.

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