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NOTICE ABOUT THE DISTINCTION MADE BETWEEN “*CONNAISSANCE*” AND “*SAVOIR*”

François Conne, August 1998

Message to the co-editors of the CERME1 proceedings¹.

Preliminaries

The first point to be taken into account is that what I shall here present is not a discussion of language, neither a philosophical problem. The fact is that this distinction [between knowing and knowledge] is made in some theorisation of the didactics of mathematics, specially the *theory of situations* (Brousseau, 1998) and my approach in the study of the *transposition-of-knowledge* phenomena (Conne, 1992), and that is useful to present it here.

As we have seen, there is a problem with the translation of these theoretical terms into English. As a first approximation, I use to translate the French word “*connaissance*” by the English “*knowing*” and the French word “*savoir*” by the English “*knowledge*”. You have to take these terms as theoretical terms, so it is not very important to spend a lot of time discussing word choice. The fact that *knowledge* is a noun will indicate that it is something identified and that it takes its place among other types of knowledge. In the other hand, *knowing* suggests two things: a subject who is actually in certain process, just knowing something.

In his book: Objective Knowledge (1972), K. Popper distinguishes three worlds: "We can call the physical world “world 1”, the world of our conscious experiences “world 2”, and the world of the logical *contents* of books, libraries, computer memories and such like “world 3”." (Popper, 1972, in the chapter entitled: “*Two faces of Common Sense*”). In the following chapters and especially in the one entitled: “*Epistemology Without a Knowing Subject*”, Popper describes the “world 3” which is objective but a “man-made product”. We can see, then, that the distinction we want to introduce in our theory encounters more or less Popper's thesis.

Knowledge has a social and instituted character insofar as "to know" provides to the knowing subject a social distinction toward some institution where that knowledge has some importance. It is clear that an individual's knowing activity is engaged in some social situation, so one can say that knowledge will provide references and distinctions for this activity.

In some didactical theorisations, the distinction has been introduced for several reasons. I would insist that for these theories the question is not an ontological one (such questions can be left to philosophy). Sometimes these theories stress on this point and prefer to talk in terms of relations, of relations to knowledge.

Summary of the article “Savoir et connaissance dans la perspective de la transposition didactique » (Conne, 1992)

“In my thesis, I had shown that pupils could be agent in the didactical transposition (throw regulations in classroom), then it was important to better understand the relations between didactical and cognitive facts. I think that the joint point lies in the concept of situation, and just at this level. In 1942, H. Wallon wrote: « The object of psychology can be, instead of individual, a situation. » But if we decide to take in account not only the subject but also the situation, we are obliged to

¹ The exchange between the co-editors of CERME1 and François Conne is mentioned in volume 3 of the proceedings (p.105): Schwank I. (éd.) *Proceedings of the First Conference of the European Society for Research in Mathematics Education* (CERME 1, August 1998). Osnabrück, Germany: Forschungsinstitut für Mathematikdidaktik and ERME.

define relations between both. It is a truism to say that this particular object, which is knowledge, is a matter of interaction between a subject and a situation. Following J. Piaget, we can consider that the activity of the subject is central. While he is the agent structuring the situation. Nevertheless, we know that a situation can induct and channel the knowledge of a subject, and that this property just permits the teaching process. So the psychological perspective does not give a sufficient answer for who is interested by didactic. For this reason, I propose that one should distinguish between two cases. First one, the case in which the control of the relation between subject and situation lies in side of situation, it will be the order of knowing ("connaissance" in French). Second case, in which this control lies in side of the subject (and the representation), it will be the order of knowledge ("savoir" in French). If the cognitive processes are relevant of the adaptation, and the equilibration of cognitive structures, *the knowledge ("savoir") is ordered by usefulness in transforming situations*. I shall say, for example, that the purpose of didactical devolution is to put the control of subject/situation interaction in the side of pupil.

So the thesis of this essay is that the order of cognition ("connaissance") is not identical of the order of knowledge ("savoir"). Then I show how this distinction leads us to the concept of transposition of knowledge (savoir), and also how every investigation about cognition starts from a transposition of knowledge. I describe the relations between knowing ("connaissance") and knowledge ("savoir"), then the transposition of knowledge, and finally, the didactical transposition. I stop my text just before a new distinction. Some didactician, seeing the institutions beyond the situations, make difference between knowledge ("savoir") and instituted knowledge ("savoirs institués"). But, it was already much question of that sort of knowledge in the last issue of RDM (n° 12/1)." (Conne, 1992, p.221)

Introduction to the necessity of the distinction between *knowing* and *knowledge*.

I shall explain here for which reasons I needed to make such a distinction in my work. My first motivation was to clarify the relations between cognitive psychology and the study of teaching mathematics. Both Piagetian psychology and cognitive psychology were placing more and more emphasis on the processual aspects of cognition and were increasingly abstracting from content. While, on the one hand I can understand that psychologists, who are interested in general psychological phenomena, make such an abstraction of content, on the other hand, I can only notice that it is a source of problems for those who tries to study the teaching and learning of such specific matter as mathematics. For this reason, I thought it would be useful to make clear the differences between the objects of the psychology and the objects of mathematics didactics. It seemed to me that this could be based on the distinction between *knowing* and *knowledge*.

Like for Popper, it seems to me evident that if *knowledge* is an objective and quite autonomous thing, it is nevertheless a man-product (there is a strong link between the three worlds). *Knowledge* would not exist outside of societies of *knowing* people. This necessary link will be stressed by the following affirmation: *knowledge* is *knowing*, but with something else more. This means also that *knowing* is not necessarily *knowledge*, it is a plenty of *knowing* which is not (and fore some not yet) identified in a *knowledge* frame.

But on the other hand, one cannot get an access to *knowing*, even to *knowing* process, without referring it, in some or in other way, to *knowledge*. Anyone who wants to investigate the *knowing* process, has to start from *knowledge* just in order to recognize it. It is very easy to analyse all of Piaget's experiments (and even all of Freudenthal's criticisms of Piaget) with this in mind. This is what Piaget did, for example, with his famous experiment on the conservation of numbers. The reference to mathematical *knowledge* is not only evident in the fact that *bijection* was taken as a criterial (term-to-term correspondence), but in the whole design of the experiment where the reference to *transformations* is essential. For Piaget, *transformations* are linked to *conservation* just as for mathematicians they are linked to *invariants*. Piaget took mathematical knowledge as a way of specifying epistemological questions in order to submit them to an experimental study of psychology.

I must now add something else which makes clear the link between this and the general process of *transposition of knowledge* (the didactical transposition of knowledge is a case in point). To study the cognitive process, psychologists (and philosophers too) very often draw an analogy with the biological process of adaptation. It could even be suggested that such an

analogy provides a definition of intelligence. That's what Piaget did. You can see that mathematics is not the only field of knowledge which were considered in the design of his psychological experiments. I consider that Piaget made transposition of non-psychological knowledge to psychological ones affecting the meaning of the transposed knowledge, once from biology: *cognitive adaptation* is not exactly the *species adaptation*, and once from mathematics: *term-to-term correspondence* is not exactly *bijection*.

For me, adaptation to environments (or even situations) is not enough to produce or communicate mathematical contents, and to consider this in terms of *situated cognition*, or with *problem solving* models changes nothing at this. Of course, Certainly, *knowledge* is linked to situations; more than one specific piece of knowledge is involved in a situation. And situations change (evolve). This is why knowledge should not be considered as static. Systems of *knowing* are not static, and can be considered as being subject to adaptation processes. I said it was necessary to add something when one study *knowledge* systems. About ten years ago, I proposed defining *knowledge* as *useful knowing*. One must accept *useful* in a very extensive meaning. *Usefulness* is related to situations and social institutions. More precisely, it is related to environments (physical, human and social environments - which in our theories we call in French "*le milieu*"). For the subject, it includes the feedback effects of *le milieu*. Therefore *useful knowing* can be identified, and it is than possible that it will be marked by institutions (which structure and distinguish things from *le milieu*), for example by naming or by whatever else way of evocation. In my theorisation, there are three levels: *knowing*; *useful knowing*, which in a reverse way can be considered as a *recognized knowledge*; and *instituted knowledge*. This is an original proposition that still stay in discussion among didactician.

Some issues of these considerations

As you have seen, this distinction is related to the concept of *transposition-of-knowledge*. One can define this in the terms of *usefulness*. A *knowledge* of some field (i.e. some *useful knowing*, relatively to some *situation* in some *institution*) is *transposed* when it becomes *useful* in another field (relatively to other *situations* in other *institution*). Because *knowledge* is also *knowing*, transfer is made by humans. It is not sure that when it is transferred, it will automatically be *useful* for its new purposes. To achieve the *transposition* process it is necessary that the *knowing* becomes *useful* in the new field to which it been was transferred. The transposition of a knowledge always affects its meaning. One have not to attribute any value to this changing, *transposition* is not a question of value. For example, Piaget transposed the mathematical *knowledge* "bijection", or *transformation and invariants* to the design of many of his experiments (and *invariants* were called *conservation*). But he also transposed biological *knowledge*, such as *adaptation*, to psychology. He is not the only scientist to have done so. Now to take an example of a *didactical transposition*, it was attempted to teach elementary mathematics by the way of transposing the mathematical *knowledge* about *sets*. The idea was that we could recognize in pupils *knowing* some aspects which where formalized by *sets*. But at school, *sets* acquired a very different meaning from their mathematical one. Nevertheless, *sets* where *useful* to approach numbers and numeration at primary school levels. Experience showed that this *usefulness* was not very efficient, and *sets* where abandoned almost everywhere.

This distinction is also related to the teaching process, in particular to the dual mechanism of *devolution and institutionalisation*. And this is also convenient to everybody who wants to trace similarities and differences between psychologists and teachers when working with pupils. Both take their starting point with *knowledge*, and both try to induce by pupils some *knowing* process in situations that are closely linked to that *knowledge*. Only by this way can the experiments get precise information about *knowing* (by the mean of making in some more or less limited way abstraction of the situational context). Only by this way can teachers make some *knowledge* be learned by their pupils. In other words, the teacher and the psychologist must act in a way that

makes the transfer of the control of the situation from him to the pupil. This is called the *devolution* process of teaching. In teaching, for example, teacher must act in a way that the pupils deal with a reality as much as possible disconnected from didactical conditions. Effectively pupils are supposed to do maths. The *theory of situations* models this by saying that a *teaching situation* has two embodied dimensions: a *didactic* dimension and a *adidactic* dimension. Teachers are perhaps a little less free than psychologists, because they have to provide some predefined *knowledge*, which means that they have to assume that the *knowing* induced by the situation will not evolve too far from the goals of their teaching. The teacher must also ensure that an explicit link is established between the *knowing* products and the *knowledge* he/she has to teach. It is this specific aspect of the teaching process that is called: *institutionalisation*, it links *the knowing* of the pupil to a predefined *instituted knowledge*.

To sum up, two types of movement are produced in the teaching process. The *devolution* mechanism makes the process move from *knowledge* to *knowing* (by the mediation of the *adidactic* dimension of the situation), while the *institutionalisation* mechanism makes the reverse way from *knowing* to *knowledge*. A very important point is that pupils are actors (acting) in these processes. That is the reason why we should not call *institutionalisation* the teacher's or the psychologist's interpretation of knowing, because to interpret the observation of pupils does not necessary require the activity of pupils.

One can very easily figure *knowing/knowledge* like an iceberg, *knowledge* being the emerging part of it, and *knowing*, the main part if the iceberg being immersed. It is clear that only a very few part of *knowing* is identified, and more less part is *instituted*. The *devolution* mechanism will always induce much *knowing* and much more than what will be *institutionalised*. All this *knowing* is necessary to the learning process, and consequently to the teaching process, but most of it cannot be called or even identified (nor has it to be) by the teacher. It follows that this *knowing* is not taught. For example, *natural logic* is necessary for the learning of *formal logic*, the teachers cannot avoid it appearing in his lessons. But how to talk about *natural logic* without the background of *formal logic*? So the teachers must put *natural logic* at distance from the exchanges and limit them to *formal logic*. In other words, that is an amount of things that teachers need to achieve the teaching process, but which they cannot exchange with their pupils. This is what G. Brousseau's *theory of situations* calls "*connaissances*" (I won't take the liberty of translating this term). I mention this because the point of view of this theory is, on this point, more limited than the one exposed here. But on this point there is no a contradiction between the two theories.

Références

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