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STRUGGLING FOR SURVIVAL: THE PRODUCTION OF MEANING

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Abstract

In this paper I present a view on meaning production which departs both from the usual notion of "communication" and from realist and objectivist approaches to it. To make such a view operational, an account is given of why meaning production does not "go wild"—something any relativist approach should provide—showing the notion of interlocutor to be central in that process, indeed a constitutive part of cognition.

IN

There are many ways to imagine the processes which happen within Mathematical Education. Beyond right and wrong, those differences signal particular ways of conceptualising not only human cognitive activity, but also what is seen to be "reality."

With respect to teaching, however, no matter which approach we consider, it always relies on the notion of *communication* in the sense that meaning can be conveyed from one person to another, through the use of some intermediate element—languages, drawings, gestures, arrangements of things, etc.. One way of analysing that situation is to say that teaching is so organised *because* people believe in communication. Another, is to say that people participate in a practice which *constitutes* communication as existing, and that only through such a constitution it becomes an underlying assumption. In both cases *meaning* seems to be a key word, something which should not come as a surprise, given the fact that we, mathematical educators, try to make *meaningful* something they, working mathematicians, say is *meaningless*. Something must be wrong, and it seems it has to do with the way we have been dealing with the notion of meaning. There are additional difficulties. For instance, we say that something is meaningless *for* someone, but the criteria is often an objective one, such as "it does not belong to the subject's culture." Meaninglessness is also frequently taken as "why should I be doing this?" (solving equations, for instance).

INTO MEANING

What is it that we produce meaning for?

Let's call that thing a *text*. Limiting ourselves to consider only written text is not adequate nor necessary.¹ We do produce meaning for written text, but also for diagrams, sounds,

¹Ros Sutherland has convinced me it was not adequate, and the changes in my thinking which followed, that it is not necessary.

arrangements of "concrete objects," paintings, stars in the sky and for many other things. Nevertheless, we should be able to agree that whenever we produce meaning for a *text*, we believe that *text* is meaningful, ie, that someone has set it that way with a purpose—which can be "read" from it. With that in mind, I say that a *text is the residue of an enunciation*, which is present for one as part of a demand for one to produce meaning for it. One believes that someone said it, but one also believes one should produce meaning for it.

Meaning production, then, always involves at least three elements: *author*, *text*, and *reader*, and those three elements are widely perceived as functioning together to produce communication, in the sense of meaning being conveyed from author to reader via text. Were we to assume that view, however, it would not be possible to account for the fact that people produce meaning for things which were not produced by anyone.

An alternative view is to say that that an *author* is constituted by the *reader* precisely as a *text* is constituted, as much as an *author* makes the *reader* a reader—he is reading (fig. 1). Acknowledging that meaning is produced as to correspond to what an *author* meant, does not necessarily imply that it corresponds to what "the author" meant, not even that there is "the author."²

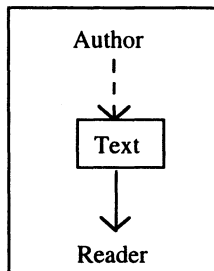


fig. 1

From that perspective, and in that situation, an *author* does not produce *meaning*, but *legitimacy*, ie, a demarcation of meaning production. Jacques Derrida correctly points out that meaning cannot be conveyed, but it is also necessary to account for the fact that *readers* will not simply produce whatever meaning. When someone looks at a diagram and says, for instance, that "current will flow in that direction", meaning is produced, not by truly corresponding to what "the author" said, but by that very enunciation. The *reader* says it because s/he believes an *author* would have also said so, that is, the *reader* has a justification for that statement which s/he believes would be acceptable to an *author*. Somewhere else I have shown how that process

²Once I was talking with a highly respected catholic theologian, when he said that he did not know whether there is a God. To me that was, of course, disturbing. It took me many months to understand that, as a non-native English speaker, I had missed a very fine statement.

links meaning and knowledge production (see, for instance, my paper on the Proceedings of PME XVIII).

Let's examine some examples:

- (i) the teacher writes on the blackboard, " $3x+10=100$ ". That *text* is presented with the demand—almost always implicit—that pupils produce meaning for it, ie, that they *say something about it*. One pupil, who has learned to produce meaning for equations as balanced scales, says, "it's three equal stones and ten kilograms, balancing one hundred kilograms." But that has nothing to do with "the author" (the teacher), who meant it as a numerical equality (a "true" equation).
- (ii) for centuries people living around some caves had used it for shelter, never seeing in it anything but a hole in the rock; one day a visitor—incidentally, a professor of archaeology—goes into the caves (looking for shelter), and makes one of those big-time findings: delicately carved on the walls there are *texts* produced by some very ancient people.
- (iii) look at the walls surrounding you (if there are any): are you sure no brick-layer left there the formula of a powerful anti-cancer drug (delicately carved, of course)?.

We could certainly add situations in which an *author* has arranged stars in ways to tell us something about our destiny, but that might not sound right, for taking us too close to asserting that producing the laws of physics involves some kind of faith.

WHO'S READING ME?

Considering the popular notion of "author communicates to reader," we are still left to examine the other half: *author* first. By that we mean enunciation.

As much as the *reader* has to constitute an *author* to be so, the *author* has to constitute a *reader* to be so (fig. 2); and as much as the *reader* does not produce whatever meaning—because the constituted *author* demarcates meaning production—, the *author* does not say whatever statements, because a *reader* demarcates enunciation. The process is very much the same as before: whatever the *author* will say, s/he will do so believing that s/he has a justification for saying it which is acceptable to a *reader*.

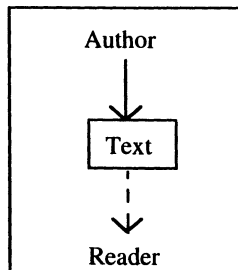


fig. 2

We might well try to re-examine the situations presented in the previous examples:

(i') when the pupil says "it's three equal stones and ten kilograms, balancing one hundred kilograms," s/he must believe there is a *reader* who (which?) will accept that equations are like balanced scales, otherwise s/he would not say it.³

(ii') the people who made the carving did it for someone, divine or terrestrial (or both—perhaps existing in one single entity); maybe it is the most amazing coincidence that erosion produced something which so strongly resembles writing or hieroglyphs.

(iii') There was someone in my secondary school, who—legend told at the time—had once been a brilliant physicist and became mad. He used to repeat to us, while sweeping the dust: "seven negative 'H' over a pointy edge: that's universal solvent." One day, while studying chemistry, it came to my attention that the following transformation could correspond to that man's words (fig. 3), which in chemical terms would relate to a reaction in which anti-protons and heat are added; heat potentialises chemical reactions, while anti-protons annihilates protons; the only meaning I could ever produce for "7" was of a mystical nature.

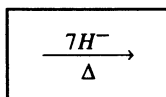


fig. 3

The man in (iii') was the *author* to a *reader* who was nowhere my friends and I knew. He was taken to be mad. As to the *author* on the additional example, well, I do find it difficult to think of such an *author*, although not for the possibility of s/he not being there.

BLIND FAITH SHARP BLADE

Every *author* needs a *reader*, every *reader* needs an *author*. Anyone of us is the *author* at times, the *reader* at other times. Diagrams in figures 1 and 2 fuse to produce the illusion of communication. Failure in communication becomes an accident. "Knowledge" becomes a commodity, which can be stored and passed over to someone else. Institutionalised teaching becomes part of productive systems. Whenever reproduction is required, faithful communication is a good thing. Such teaching *constitutes* communication.

STRUGGLING

Soon it becomes clear that the two processes—meaning production and enunciation—are very close, in both cases demarcated by *interlocutors*: an *author* or a *reader*. But why should it

³There are, in fact, documented situations in which what was at some point seen as acceptable to a *reader* becomes, through a denial of legitimacy not acceptable as a justification—ie, that cannot be stated any longer. See, for instance, my short oral presentation in the Proceedings of PME XIX; full version of the paper available from the author.

happen that way? The explanation may be that such a strategy increases our chances of belonging somewhere, something which may make us feel safer—maybe truly safer. For instance, people adopt religions in order to belong to a community which seems adequate, as much as children grow up to believe that “civilised” behaviour is good—unless, of course, s/he lives in a shanty-town or in ex-occupied Palestine.

I mentioned in example (iii') above, that the worker in my school was taken to be mad just for believing in that potentially revolutionary statement, and everything else he said was seen from that point of view. But madness is, to a great extent, a matter of interlocutors; in some circles, to say that you listen to voices is schizophrenia, while in others it is a mediunic gift. But let's not go any further into that. The key point is that we produce meaning in order to belong to a social practice, or, in a wider scale, to a culture, as much as we produce enunciations for the same reason.

While meaning is produced from a *text*, enunciation “generates” a *text*, and that could set the two processes apart. Also, there would remain the question of why an enunciation happens, after all. From the perspective I propose, an enunciation is produced precisely in response to a demand to produce meaning for a text, as part of belonging, and that seems to solve both questions at once: every *author* is a *reader*. As to the question of where it all begins, we only have to consider that human beings are born into worlds which already exist, into languages which already exist; people are born into meanings and cultures.⁴

SURVIVAL

Humans beings survive by learning to belong and belonging, and what is peculiar to us is that belonging has to do with meaning, not just with smell and behaviour patterns. In that process, we learn that we should produce meanings which are acceptable to an interlocutor. At first, acceptability is getting what we want, but gradually we become able to pretend we can anticipate acceptability; in Vgotsky's terms, we might say that gradually thinking dislocates action, preceding it.

I think Vygotsky was right in saying that this change has to do with internalisation, but where he would speak of internalising socially produced forms, I would rather speak of internalising socially produced and socially acceptable ways of producing meaning. Intellectual development, still according to Vygotsky, is coming to be able to do by oneself something which previously could only be done with the help of someone more able, and the powerful insight contained in the ZPD process, as postulated by Vygotsky, together with the ideas brought forward so far in this paper, allow me to say that intellectual development is coming to be able to produce meanings which previously could only be produced with reference to someone else's authority: intellectual development is autonomy in the sense of an ability to anticipate acceptability, and that is achieved through the internalisation of interlocutors.

⁴Following Nelson Godman's notion of *worlds*. See, for instance, his *On mind and other matters*.

OUT

We started by considering that teaching relies on the notion of communication. We did not say then, but it is true that such a view has for quite a while gone hand in hand with teaching as transmission of “knowledge.” Communication, however, is not a possible condition—let alone a necessary one—for there being a convergence of meanings, whereas the notion of interlocutors I propose might offer a sufficient mechanism for it to happen, a situation which suggests that we re-think teaching, and that we take it to be a process through which interlocutors are eventually internalised. That not only points out to the important role and responsibility of teachers, but also to the fact that interlocutors internalised within other activities—involving family and friends, for instance—might take a bigger role in meaning production processes than we would initially think, as Valerie Walkerdine has already pointed out.

Finally, it becomes clear that justifications should become a central part of teaching, not only as in proofs, but as part of the possibility of eliciting meanings being produced. If pupils are to internalise interlocutors, and if teachers want to become interlocutors to pupils, teachers should at least try to know *why* pupils are saying what they are.

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LANGUAGE AND STRATEGIES IN CHILDREN'S SOLUTION OF DIVISION PROBLEMS

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Year 5 and 6 children have been videotaped while solving a variety of written division problems. We have examined their strategies and found that children with more flexible strategies are often more successful at solving these division problems than children who use only one or two strategies to solve them.

Using examples on video, we shared some findings of this ongoing research aimed at examining the development of these strategies and the use of language over a period during which children meet division formally in school.

Introduction

There are many ways which pupils might describe, interpret and solve a division problem in written, symbolic form, like $96 \div 4$. They might, for example, describe it using the words 'shared by' or the word 'divided by'. Indeed different *words* might indicate different *meanings* or *interpretations* assigned to the problem. 'How many fours in 96' or '96 shared into fours' indicates that the pupil is interpreting the question as 'how many groups or lots of 4 are there in 96?' (measurement model). On the other hand, '96 shared by 4' or '96 shared between 4' indicates that the pupil is solving the problem 'if 96 are shared among 4, how many items would be in each group?' (sharing or partitive model). The 'sharing' interpretation of division, although only one possible interpretation, often persists after division has been formalised at school, possible because experience of both the language and the concepts of division is often grounded in sharing experiences even before formal schooling.

However, there are a variety of visual images, interpretations and outcomes that might be associated with division problems, and it is even possible that pupils will negotiate meaning amongst themselves. In the case where pupils are not given a context in which to interpret written, symbolic problems, there are also many different ways in which they could approach *solving* these problems. In dealing with the numbers pupils could, for example, begin with the divisor and count up to the dividend, or they could begin with the dividend and somehow work their way down to the divisor. They could also approach or represent the problem using other, broader strategies like drawing a picture, making tallies, or creating a story.

Aims and Expectations

One of the aims of our research project is to classify such strategies that pupils use when solving six particular problems, presented below in Table 1. No context was provided for these problems. We would expect that the pupils with greater flexibility and therefore a greater range of interpretations and strategies to choose from, would achieve greater success in these problems. This is because the problems have been designed to require different strategies, and also to

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