# TOWARDS MORE NATURAL DIALOGUE LOGICS IN A MORE NATURAL DIALOGUE SYSTEM

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## 1. *Introduction*

In this paper we intend to comment shortly the nowadays crisis in logics and its developments, and the ways to escape this crisis. In this perspective we will approach dialogue logic, and try to prepare the grounds for the construction of a frame for more natural dialogue logics.

## 2. *Is logic today in a crisis?*

E. Barth, in her contribution to Walton's issue on the logic of dialogue (Walton, 1985), criticizes very strongly modern logic in general and modern philosophical logics in particular.

But in order to understand her remarks and criticism, it is necessary to be aware that she differentiates two types of rationalism. Rationalism 1 assumes the sufficiency of cognitive methods. But such rationalism is in her view compatible with empiristic and pragmatic thought. Rationalism 2 on the other hand takes the assumption that pure use of reason is at the extreme positive end of the spectrum of functions of a human organism (Barth 1985, p. 375); This rationalism Barth rejects. In this perspective she states:

"Logic and epistemology as academic disciplines are still determined rationalistically 2 with almost no exception. Neither Wittgenstein's philosophy of Logical Truth as tautologous nor his later teachings have changed that; for the value criterion of rationalism 2 is not basically that of Importance of Content, but that of Distance from the Familiar, from the trivial, the commonplace, from that which is accessible to the vulgus.

In wide circles logic is identified with mathematical proof theory - basically. At the rise of a new, more comprehensive "philosophical logic" (an expression first used in a modern sense, I believe, by Professor Rescher)], hopes were raised that this might develop into a field of

knowledge and insight of real cultural and social importance. I think it is fair to say that these hopes have been frustrated. In contemporary "philosophical" logic a rationalistically 2 determined mathematical proof theory is still taken, tacitly and sometimes openly, as the (only) nucleus, in the sense that all other logical research is conceived and classified either as extensions of mathematical proof theory (modal logics are usually looked at this way) or as mathematical alternatives (intuitionistic logic); or else as "applications" of some system that is itself classified in one of these ways.

Real systematic connections between the pursuits of logicians and empirical research are uncommon. They are tacitly supposed to be impossible by the prevailing definition of the discipline" (Barth 1985, p. 375-76).

In this spirit Barth sees a rather dark future also for contemporary dialogue logic: so she argues "pragmatical semantics and dialogue logic may, if nothing is done, lose their impetus as alternative ways of looking at things; namely if we allow them to be dominated rather than served by people in search of new academic playgrounds, whose main cultural objective is association with high-status fields; or by metaphysical mathematicians in search of a home in the maximally distant. [Some persons are quite explicit concerning this question of the relative status of academic pursuits. Thus ten years ago a cultural magazine quoted one of L.E.J. Brouwer's direct students as saying([1]):

To do mathematics, particularly in its most abstract form viz., the foundations of mathematics, is the most essential (task for a thinker), to which even every human contact must be subordinated, and which leads to absolute truth, the pure idea.]

The situation is not likely to change for the better unless we become quite conscious about the existence of such attitudes and beliefs and unless we recognize and are quite open about the fact that dialogue logic and further theory of argumentation cannot flourish under such philosophical circumstances, nor is it to be expected that the new and subtle methods of data collecting and information processing (computerization) will abolish the need for an improvement of human logic(s)" (Barth 1985 p. 376-77).

In what way, is there a solution for this problem? A new type of logic

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([1]) The citation may serve us as an illustration of the cultural danger signalized here.

is needed – Barth says. A theoretical logic which is systematically related, in a scientific appropriate manner to the results of an empirical logic.

This is in opposition she remarks very critical with the main trends in logic: "As a matter of crude fact neither mathematical logic in the narrower sense nor the new "philosophical logic" has ever led to nontrivial systematic contributions to the understanding and subsequent improvement of the models of thought and of argument that are found in the polis. It is not only that one has not yet reached the stage at which such clinical assistance would be within reach. It is that nothing points in the direction of possible future successes of this kind. The field of research in question is not yet organized in such a way that this will ever be possible. It is strange that people are aware of this fact and yet they do not seem to mind that this is the case" (Barth 1985, p. 377).

Therefore she concludes:

"An empiricist cultural reorientation is needed in logic. This reorientation is not likely to come from those who are trained only in mathematics nor from those who are trained only in philosophy.

We like to add that we agree that taking into account the requisites of AI, and the urge from industries for "realistic logics", that is logic with more empirical adequacy, there is a strong need for new aproaches to logic for theoretical logics based on empirical logic. This is again a nice illustration of the strong influence of application, of applied science and here in particular of applied epistemology, on the development of theoretical sciences. ($^2$)

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($^2$) In the Netherlands, and in some other areas, the obstinacy of this rather old-fashioned rationalism2 can be understood in the light of the philosophy both of mathematics and of life in general of L.E.J. Brouwer: to which Barth's philosophy stands in glaring opposition. Brouwer was a rationalist2 in the extreme. He took his philosophy from German idealism, which he adopted lock, stock and barrel with the exception of its logic in the narrower sense. He did adopt its hatred towards "formal" logic and its general semiotic outlook. People who do not recognize the enormous difference between what I call rationalism1 and rationalism2 sometimes construe Brouwer's rejection of mathematical realism as a kind of pragmatism. This requires that "pragmatism" be defined as the airy and arrogant doctrine that anything (that pays, or glorifies the Thinker), goes. That has nothing to do with seriously paying attention to practical needs and possibilities; for instance, in the way of the mathematician Gerrit Mannoury, leading analyst in the Dutch Significs group, who to some extent tempered Brouwer's earlier extreme expressions of sympathy for human and cultural callousness and even for extreme cruelty.

### 3. *Is the current logic the core of dialogue logics or rather an obstacle for their development?*

In the frame of this discussion about the crisis of modern logic, the issue is important for anybody who is dealing with dialogue logics, if he has to use the classical logic methods and its results as a starting point. By way of extension of and by the use of special interpretation rules of this core, does he have to construct his dialogue logics? Or is this approach just a chimera? Are the classical logical methods too poor, too one-sided or even just irrelevant for the task set?

As a mere introduction in this issue let us confront one aspect of the nowadays dialogue logics built on classical logic and confront them with one of the recognized targets of dialogues.

Krabbe (1985) in his overview of the nowadays formal system of dialogue rules says that all these systems have terminal rules in terms of winning or losing the dialogue. Some of them permit under certain conditions the proponent to win and correspondingly the opponent to lose but they do not always include possibilities for the opponent to win a dialogue. Sometimes infinite dialogues are admitted by a system and said to be won by the opponent. But anyway, he says, in finitary dialectic systems each dialogue ends either with the Proposant as the winner and the Opponent as the loser, or the other way arround. He adds "I do not know of any such system that admits draws".

Truly all natural dialogues are finite, but it is certainly inacceptable to argue that all dialogues are intended towards winning or losing, in other words competition is not the standard function of dialogue. For this sake let us look at Platonian dialogues e.g. It is evident that Platonian dialogues are an important inspiration for the study of thought in general and of dialogues in particular.

Prof. R. Thibau, my friend and specialist on Platonian thought, inspiring him on Plato's "symposium" and the Phaidreos, made the following statements about the function of the dialogue:
"Dialoog betekent niet over alles en nog wat discussieren, in volle tolerantie, wat uiterst pretentieus is, ook niet het uitwisselen van nuttige politieke of wetenschappelijke informatie, maar dia-logos: doorheen het gesproken woord, doorheen het woord van de anderen, in volle vrijheid tot grotere geestelijke rijpheid of wijsheid komen".
Dialogue does not mean discuss about anything, it does not mean to

change useful scientific or political information, it just means dia-logos via the spoken word, via the words of the other, arrive at higher spiritual maturity, at more wisdom.

In this spirit we can understand Horatius (de arte poetica) that for constructing dialogues, one must be a good observer of differences which results from age, education, passions, usages, times and climate...

These points of view strongly suggest that to consider dialogue logics only in the perspective of winning or losing, of opponents and proponents, is much to narrow. To construct dialogue logics which have some relevance outside the circles of some pervert scientology, a plurifunctionality and therefore a pluridimensionality of the dialogue and its logic has to be considered. It is true, if we adventure to do that, we are obliged to venture us outside the safe but perhaps sterile harbour of classical logic games.

## 4. *A frame for a more natural dialogue logic*

From already a superficial empirical research, we dare to argue that a dialogue logic system with some pretention of adequacy has to be based on at least 5 basic sets.

They are the sets {S}, {M}, {D}, {P} and {C}. {S} is the set of situations or discourses. {M}, the set of means the actors have. {D} the set of purpose. {P} the pay-off and {L} the set of actors. We have also to introduce a set of functions {ki} which correlate an element of each set which each other. This correlation can be normative, descriptive, evaluative or even predictive.

In what follows, we intend to comment somewhat the hypothetical features and characteristics of the above mentioned components of the dialogue system. However we don't intend to introduce set theoretical characterisations of them. We have made an attempt to do that to a certain degree in another paper (Vandamme 1985). But I do not believe that these technicalities are that relevant for the point I want to make today, that is to outline the type of observational data and research that is badly needed for the construction of more realistic dialogue systems.

### 4.1 *The situations or the discourses*

The kind of arguments one can introduce, the examples to choose that is the means at one's disposal, the purposes one pursuits, the kind of pay

off, and the features of the actors will depend up to an important degree
on the situation or discourse one is in.

For this reason we believe that the set {S} is very important and perhaps
dominant on the other sets. Nevertheless we are aware that the actors,
the participants in the dialogue are able also to manipulate the discourses.
They can switch or at least try to switch from one discourse to another.
So e.g. a scientific discussion on biology, can be transferred to a religious
one, consciously or unconsciously by one of the participants. But such
a transfer will cause important changes also in the other levels of the
dialogue.

Perhaps some wille ask why we use here the term "situation" and
"discourse" as synonyms. We believe that in fact both characterisations
are equivalent. It refers just to another style of approach. The term "situa-
tion" refers to an ontologic – realistic perspective. The term – "discourse"
rather refers to a symbolic strict nominalistic approach. In this last point
of view, a situation is differentiated from another one in terms of the sym-
bols (verbal or non-verbal ones) used by the participating actors. In our
view it is very crucial to gather observational data as much as possible
on the several relevant discourses for a certain group in relation to the
other values for the other sets.

Following Nowakowska we can specify a discourse $S_i$ in more detail
as follows: Each $S_i$ is formed by a set of symbols, which can belong to
several media $m_1, m_2 \ldots m_k$. Let us represent the relevant vocabularium
of the medium A, by $V_1$, of medium 2 by $V_2$ and medium k by $V_k$. In
each medium we wish to introduce a zero element. So f.i. in the verbal
medium, the zero element is silence.

The most important media are:

     $V_1$: the verbal medium: that is the peculiar natural language used
     $V_2$: the body movement (the movements of arms and face)
     $V_3$: the actions
     $V_4$: the musical aspects of vocal or non-vocal origin
     $V_5$: the pictural elements
     $V_6$: the sculptural or architectural elements

We must also be aware that it is useful and necessary to introduce a
coordination and dominance relation between the several media. Again
as much empirical data are necessary here as well about the peculiar rele-
vant media for a specific discours as well as about the peculiar features
of the coordination and the dominance relation.

## 4.2 *The purposes*

The purpose of a dialogue can be to trigger a certain action or behaviour of certain actors, listeners. The targt can also be to change or stabilize a certain cognitive model. Cognitive however we like to use here in a broad sense, containing all kind of symbolic constructions of conceptual, emotive, volutive or/and evaluative value (for a more formal representation see Vandamme '85).

For sure cognitive change and action as a target are difficult to differentiate from one another. For a change on the one level, triggers a change on the other and vice versa. Nevertheless it is practically useful to differentiate both for the reason that if one puts priority on the actional effect or on the symbolic dimension, at least in the short run, important difference in strategy and tactics may be detected, about the efficient use of means. What complicate things even more is that we can even consider to trigger an action as a special case of to trigger an cognitive model.

It is also useful to keep in mind that the purposes, can in certain cases be clearly and distinctly specified at the start of a dialogue. In other cases however it may be very poorly defined at the start. Along the dialogue process a more distinct picture may be built by the participants, in harmony or in disharmony with each other. The inverse may also be true. One can start with a clear picture of the purpose, the ideas one intends to convey to the partners and end up with much confusion on the own target (cfr. certain Platonic dialogues).

This becomes the more clear when we stress the point that one has to differentiate between dialogues with a heuristical purpose, and the ones with a justificative or applicative purpose. In the case of the heuristical purpose of the dialogue, the problem is to construct a cognitive representation given eventual certain adequacy requirements (mutually satisfying or failing the consistency requirement). In the case of the justification or application target, a given cognitive model is given, the task of the dialogue is to justify it or to apply it in a certain field. In the case of justification one can differentiate, between others, between making the construction plausible or acceptable. In the former case it means to make the interlocutors accept that it is justified that one is busy with elaborating and using the specific representation. In the latter case it means that one tries to convince the interlocutors that they themselve have to work with

and inside the peculiar representation approach proposed. Another style of justification is justification by explanation.

Finally we must also be well aware that the cognitive purposes can be built out of symbols belonging to several different media. Not only verbal symbols are relevant here.

### 4.3 *The means*

It is rather evident that for a specific medium, specific means are at hand of the actors in the dialogue. Today most attention has been paid in the scientific studies for the verbal medium. Although we argue that without doubt, in our modern society, in general the verbal medium is dominant on the other media, it is necessary to pay much attention towards the other media and their specific means: technics and tools. For the strong rise of the importance and success of the mass media, in the first place the T.V., has to an important degree weakened the dominance of the verbal media [(cfr. in the United States the negligence by Reagan of the press and Radio in favour of T.V. with its much more predominance of body language and other forms of non-verbal communication)].

The means at one's disposal will also be strongly dependent on the purposes of the interlocutors in the dialogue. So it seems to us that it is very important to keep in mind the heuristical versus the justification or application targets of the dialogue.

In the case of justification we are convinced that Fregean logics are most convenient. At least this is certainly true for justification by explanation. Although we believe that even in science non-Fregean logics are of complementary use and necessity for the persuasion of other people of the plausability or the acceptability of the models proposed. But certainly in the phase of discovery and application the non-Fregean logics are a must.

This is a crucial reason why we dare to argue that dialogue systems which incorporate only Fregean logics, or non-classical extension thereof as there are existing modal logics, time logics, non-monotonic logics, actions logics or many valued logic are by necessity, inadequate or even irrelevant. Here we agree entirely with Barth. The job of logicians requires therefore, we believe, very crucially the development of formal non-Fregean logics, based on empirical data gained by careful observations.

It is not our intention to develop here the topic of non-Fregean logics. Nevertheless we want to say some words about it.

The Fregean logics can be characterized in terms of its representational or perhaps rather its non-representational features, in terms of its meaning theory, and in terms of its derivational power. On each of these level the Fregean logic can and has been attacked and what is more, alternatives have been introduced which transform logic much more in a vivid intelligent power. It is true that a price has to be paid for this transformation. The benefits of the open character, of the analogy of the non-Fregean logics go at the expense of losing the benefits of the more closed character of the Fregean worlds. But this is another story (for a annotated bibliography on non-Fregean logic see Van Dormael, 1985).

### 4.4 *The actors*

The active participants in a dialogue we call genuine actors. These genuine actors can be further differentiated dependent on the quality of the interaction: cooperation, competition, antagonism etc. We also have to take into account the more passive actors. Here too several differentiations are necessary and possible. So we have the casual or accidental passive interactors: listeners which happen to be present, but nevertheless by their presence or even by their non-verbal behavior they can influence the dialogue. We have also the target listeners for whom the whole dialogue is organized (cfr. the public in politic discussion etc.).

In many dialogue systems, we see that one of the active actors is privileged. He is sometimes called the playmaker. It is he who decides if the actors follow the rules, the conventions, and even decides who has won or lost in case we have a competitive dialogue.

In many institutional dialogues we see that the playmaker is crucial. The judge in a court is an example by excellence of a playmaker, and perhaps also a priest in a ritual or the moderator in a debate can be considered that way.

It is also very crucial to pay much attention towards the media which are at hand for a particular participant. We know that not all the participants are authorized the same use of media. The struggle for power is up to an important degree a struggle for access to the media.

### 4.5 *The pay-off*

The pay-off for sure can be very disparate too. The most straightforward pay-off, is a cognitive one: the construction by the target listeners of a model with its conceptual, volutive and emotional aspects. The closer

this model is near the target model, the more positive the pay-off. The bigger the difference, the lower the pay-off.

In special cases their exists an explicit social or even institutional sanctioning of the pay-off. In competitive dialogue, it can happen by the recognition by one of the actors of his defeat or by the acceptance of losing by paying or giving something, ...

But it is evident that such a social sanctioning of paying does not at all exhaust the pay-off. The pay-off is a pluridimentional process, relative to the several types of targets that can coexist with the execution of a particular dialogue. The social institutional pay-off is in this only one of the many.

To illustrate this, take a play between a child and a therapist. The child may play to win, that is to get the institutional pay-off. The therapist may play to get the child busy and socially involved. He also gets a positive pay-off, even if he loses the game, or perhaps just because he looses the game. For in case the therapist gains, the child may get demotivated and so the purpose of the game is not achieved. Therefore the therapist gains in this case by losing.

## 5. Conclusion

Taking the comments above into account we suggest that a dialogue system has to be characterized by a pentagonal structure: five sets of sets, interrelated and coordinated by a set of relations. Relations internally between elements of each specific main set (internal relations), and relations externally between elements of different main sets.

On the basis of observational and even experimental data about the content and structures of these several components, the central task is to construct a dialogue system as much formalized as possible, and to integrate in them Fregean and non-Fregean logics. My paper is intended in this undertaking as not much more then a starter, but starters are sometimes also important at least when one does search.

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