
Language and Perception in the Coupling Between Human and Nonhuman Actors

Ivan Tchalakov

{...} When I entered holography, I filled in the 'white spots' in my knowledge about basic physical principles. There are always some fields in physics which graduate students usually pass by and do not understand well enough—simply because they are not interested in these fields. But my professor at St. Petersburg once said that the physical nature of the things is primary, while mathematics is just like language—if you don't have an idea, having excellent language skills is worthless. But if you have an idea (i.e. you understand the physical nature of what you are studying), then you still can express it even by stammering.

(B.S., physicist at CLOSPI)

Abstract

The paper presents some new results in studying the phenomenon of *heterogeneous coupling*, i.e. the establishment of lasting intimate relationships between human and nonhuman actors at the micro-level. These are very small communities (sometimes consisting of only one person with his object of study or work), which emerge and stabilize during the process of research in scientific laboratories, engineering design offices, or in the complex environment of contemporary large technical systems. In a recently published article (Tchalakov 2004) we pointed to a certain insufficiency of contemporary STS approaches (actor-network theory in particular) when considering this intimate (micro-) level of interactions between human and nonhuman agents, and especially the problem of what cements concomitance in the heterogeneous couple, what supports and stabilizes it. However, unlike the previous publications, which sought such a supportive and stabilizing ground in the sensory, bodily aspect of interactions between humans and nonhumans in couple ('savage layer of intercorporeality'), the author here offers a more cautious approach, attempting to (partly) restore the role of language in these interactions. In doing so a reference is made to the findings of the well-known American phenomenologists Don Ihde and especially his interpretation of ideas by the late Merleau-Ponty.

The paper presents some new results of the author in studying the phenomenon of *heterogeneous coupling*, i.e. the establishment of lasting intimate relationships between human and nonhuman actors at the micro-level. The text that follows consists of three parts plus a conclusion. The three parts possess a common narrative structure, composed of specially selected pieces from an interview of the author with a Bulgarian physicist¹ and pieces of theoretical analysis, which provide the framework of the problem and develop the arguments. To some extent the interview fragments and the theoretical analysis provide two parallel narrative lines of the story, mirroring each other and (the author hopes) facilitating the understanding of both.

Laboratories and the phenomenon of 'coupling'

In this section, I briefly outline three complementary theoretical visions of the laboratory as a locus for scientific activity. It points to the insufficiency of traditional notions of *laboratory* and *experiment* to grasp the intimate (micro-) level of interactions between human and nonhuman agents and suggests a new notion of *heterogeneous coupling* (see also Tchalakov 1996, 2004).

Let me start by introducing the story of one such community, established between a (then) young woman—an optical physicist, and the special type of (photo-refractive) crystal she was studying. This community lasted for almost twenty years:

I am working in the field of the physical description of materials for optical recording and processing of information. I mean the elaboration of methods for studying these materials, to obtain basic data about their parameters. [In the beginning] I studied silver-halide materials (chemical compounds of silver with halogen elements—chrome, bromine, iodine, etc.) and bi-chromate gelatin [...]. It was difficult work—our chemists² were producing large amounts of samples and they required each sample to be measured. However, this was hardly possible on such a large scale, simply because the equipment was still not automated. To be honest, the work gradually became tedious and routine, I was not satisfied and tried to find more independent work.

I prepared a review of the literature on the possibilities for reinforcing, i.e. for introducing additional energy into the materials during the process of recording.

It is necessary to find out some way of reinforcing the photo processes emerging inside the material, because very often they are rather weak. For example, I seriously analyzed the possibilities for improving the quality of recording using electromagnetic fields [...] This coincided with a visit of our director Methodius to the former USSR, the 'Ioffe' Optical Institute in Saint Petersburg (then Leningrad). This was about 1977 or 1978. The Russian colleagues were ahead of us, possibly by a few years [...] only a little earlier a French group led by Prof. Micheron had suggested the use of photo-refractive crystals (such as $\text{Bi}_{12}\text{SiO}_{20}$) for the holographic recording of information.

Methodius brought back a piece of one such crystal from this visit and I started working with it. This crystal was really very suitable for my initial intentions—it could be reinforced to control and, in a sense, manage its parameters. At the beginning there were lots of problems—I needed knowledge of solid-state physics, which was not exactly my specialty. The fact that we had good relationships with colleagues from the 'Ioffe' institute presented an opportunity for progress. They came here for three months and we worked together. Then in 1982 I went to Saint Petersburg for three months [...].

A few years ago a colleague from the Solid State Physics Institute here in Sofia gave me some similar crystals for analysis. He had been working on these crystals since the mid-1980s, but initially he was unable to provide good optical treatment of their surfaces [...] We discovered something interesting in these crystals. We recently sent an article to JOSAB (Journal of the Optical Society of America B). But I worked with the Russian crystals in the entire period prior to that.

I began by searching for methods to use in the controlling of their parameters. I was looking for such conditions that would allow a stronger and more stable recording in the crystal. I applied only external influences—additional light (before the cycle of recording, during the cycle, after it) and magnetic fields. We never applied temperature influences, only magnetic field and light. Following these studies I am now able to control all basic parameters of the crystal—maximum diffraction efficiency, time of recording, time of deleting. In some limits, of course. We obtained a stable (optical) storage and found a way to fix it—now the storage lasts for hours, even days, and this at room temperature (Archive of the author, interview held in 1994).

What are the existing notions to account for these findings? The pragmatic and 'constructivist' trends in contemporary STS consider the laboratory itself as being something distinct from the experiment or the organization, as a *form of life* wherein specific activities are underway and specific relations originate. As Karin Knorr-Cetina summed it up, the concept of a laboratory enables us 'to consider the technical activities

of science within the wider context of equipment and symbolic practices within which they are embedded' and to give due consideration to the content of the research work. The laboratory is a form of life in which the scientific objects are not simply 'technically created' but are also symbolically and politically constructed in a most inextricable way (Knorr Cetina 1994, 143; see also Knorr Cetina in Schatzki, Knorr Cetina & Savigny 2001). The Actor-Network Theory as another key approach in STS typically considers the laboratory as a *local reconfiguration of the experience*, where new 'embodied skills', new or modified artifacts (devices, instruments), and new codified texts come into being (Callon 1996). Referring to the well-known study of H. Collins of the construction of the accelerator in Berkeley, Michel Callon (1996) wrote that 'the results are neither applied, nor transferred—they are reproduced'. From this point of view the laboratories mirror the 'future' of an actor network, when through a series of more or less successful translations and displacements the human and the nonhuman actors evolve in common to new forms of an (a)social order.

The new understanding of the old notion of *experiment*, developed by ANT, adds some important feature to this process. In his article 'A 'Matter' of Life or Death—or Should We Avoid Hylozoism' (see also Latour 1992), still unpublished but well-known in STS circles, Bruno Latour examines the experiment as a specific 'literary' work and simultaneously, as a 'transfer of skills and qualities' between the human and the nonhuman agents. In Pasteur's texts the 'anthropomorphization' of lactic acid yeast corresponds to the 'microbiomorphization' of the scientists examining them: 'If I am right, and if Pasteur is a good guide, a laboratory experiment is precisely the place where the distance between objects and subjects of study are minimal. Scientists must assimilate, absorb, play, represent, translate, digest the properties of the nonhumans in the name of which they speak, but those nonhumans are in turn defined by clothing some of the properties of the humans that speak in their names' (Latour 1993, 16).

Yet, my own ethnographic studies in the field of opto-electronic research³ convinced me that the 'laboratory' is too broad and 'socialized' a concept, in which humans, nonetheless, dominate. When observing

life in the holographic laboratory in Sofia, I was surprised that almost every researcher had a nickname that inevitably contained, as an essential element, the name of the objects he was studying (as semiotic characters). It would appear that for purposes of communication, the colleague's most relevant characteristic is the name of his or her specific nonhuman partner. I also often noticed people in twos and threes seeking privacy to have an argument. Then they would be absent for hours and days in work around the optical tables and lasers, sometimes calling in a colleague of theirs to come to their aid. Observing all this, one is left with the impression that at least several sequences of events, at least several experiments of the type Latour speaks about, may occur simultaneously in laboratory life.

However, by employing the term *experiment*, Latour translates from an older and, as he himself named it, 'detrimental' tradition. It is scarcely accidental that only a year after his text had been written Knorr-Cetina concluded that the traditional epistemological concept of 'experiment' obstructs the study of 'real time processes through which scientists, one of the most powerful and esoteric tribes in the modern world, arrive at the goods that continuously change and enhance our society' (Knorr-Cetina 1994, 141). The concept of experiment is unavoidably burdened with the epistemological dogmas of the 'subject' and 'object', of the 'method' and the 'testing of hypotheses', and so on. The experiment is too much of an activist concept; it is overloaded with rationalist metaphysics.

Consequently, I suggested introducing the concept of 'coupling' to describe the 'melting pot' processes occurring in laboratory life and considering emerging relations between researchers and the nonhuman agents they are studying as 'heterogeneous couples' (Tchalakov 1996, 2004). The laboratory is a large community, in which the processes revealed by Bruno Latour represent only one, though fundamental, aspect or layer. The classic analyses of laboratory life of the 1980s reveal the wide variety of its subdivisions and zones—experimental halls and studying rooms, text processing rooms, offices and attendant services, and so on (Knorr-Cetina 1981; Latour & Woolgar 1979; Traweek 1988). In the context of ANT, coupling can be defined as a process by which—during the process of research—scientists gradually emerge as 'spokesmen'

for the nonhuman agents they are studying, their messengers in the 'society at large'. In essence, heterogeneous couples are the 'constituent elements' of the laboratory. They are elementary 'micro-communities', which sometimes may be larger than the simple relationship between the scientist and the specific nonhuman agent he or she is examining (crystal, piece of DNA, etc.).⁴

This definition, however, describes the coupling from the outside. Although it reveals one key aspect of what is going on inside between the humans and the nonhumans—the mechanisms of 'reciprocal taming' and the exchange of 'features and properties' (Latour 1993)—it leaves untouched the problem of what cements concomitance in the couple, what supports and what stabilizes it. It seems to me that at this point, the semiotic analysis of the intimate relationship between humans and nonhumans with its 'minimum ontology' (simple and plain assumptions about the world, which let actors speak for themselves) lands in a situation where the actors do not speak and start concealing very essential layers of what is happening in life 'inside'. We come up against a boundary, against non-transparency, and against 'silence'.

The idea of a coupling between humans and nonhumans could hardly have meaning if we stick to the activist schemes or if we stay with the actors, with their goals, plans, interests, translations, and so on. This process has already been sufficiently explored. The heterogeneous couple concept only has meaning if it indicates a *new type of relation*, a new layer in the interaction between humans and nonhumans, which oversteps the activist ontology and, in a sense, provides the foundation for it. Karin Knorr-Cetina hints at this type of relation, citing the analyses of Fox-Keller and talking about the relations of solidarity and mutuality between people and what she calls 'knowledge objects'. She is talking about 'unity' and 'sharing' as well as about the 'disappearance of self-consciousness' and about the 'subjective fusion' of the researcher with his knowledge objects; about turning the object into a subject. It is worth stressing Knorr-Cetina's reminder that according to E. Durkheim, unity and sharing can be both *ethical* and *semiotic* (Knorr-Cetina 1996, 16).

The foundations of heterogeneous couples as elementary forms of life in contemporary societies

In a longer text written some years ago I described the case of one heterogeneous couple in holographic research, which has prevailed over the numerous difficulties and obstacles to bring forth the stake that has united it and finally win the recognition of the research community (Tchalakov 1998; see also Tchalakov 2004). I pointed out there that the heterogeneous couple is constituted along two lines: *first*, it is based on the *belief* that the nonhuman exists and that one is facing a partner and not an illusion, and *second*, it is constituted through the distinction from the other people (colleagues), based on a different understanding of the hypothetical non-human agent's nature, up to whether it exists or not. Getting deep into the 'ecstasy' of the heterogeneous couple often means breaking standing relations with other humans and a disintegration of previously established 'social' communities! At the same time this often means entering into new forms of association—with those who are ready to accept your arguments and proofs. Depending on the events inside the heterogeneous couple, the human could 're-socialize', could return to the previous social world, however, as a 'speaker' or 'representative' of the tamed nonhuman. He or she will be constituted again for the colleagues as an 'other', yet as a 'displaced' and different other.

Working on the case I struck on the interesting phenomenon where *two types of responsibilities clashed*—the responsibility to your human fellows in the couple (and those outside it) and the responsibility to the nonhuman agent, whose existence is not certain at all (often questioned by the colleagues). I asked what it is that gives strength and support to those involved in the couple to meet the hardship, resist the pressure and continue to get to know the nonhuman?

Seeking to answer this question I was helped by the studies of the late Merleau-Ponty on what he calls 'wild being' or the 'wild layer of intercorporeality'—i.e. the role of the sensorial, the bodily relationships of the human towards the things in the world.⁵ Merleau-Ponty has pointed out that '[...] Husserl rediscovers the sensory as the universal form of crude reality. The sensory is not only the things themselves but also

what comes up in it even as emptiness, it is everything that leaves a trace, everything *that features in it even as being ousted and as some kind of absence*' (Merleau-Ponty 1960, 217). He speaks about the primordial relations of intercorporeality, which 'culminate and transform themselves into the appearance of ordinary things (bloße Sachen)' (Merleau-Ponty 1960, 218). In these 'relationships of founding' (Fundierung) we cannot say which is the primary order—the *pre-objective order* or the *logical objectivity* (ibid.).

It appeared to me that the world of 'taming nonhumans' has a lot in common with this 'pre-theoretical, pre-ethical and pre-objective' order of the human world. When coupling with natural and technical objects, which appear as a kind of 'other', the human can really find himself 'outside' the other humans. According to Merleau-Ponty, however, this loneliness remains above the primary intercorporeality with the things in the world. The human in a heterogeneous couple is alone, but in intercorporeality with the fellow nonhuman, with the obscure, enigmatic, and evasive 'object of knowledge'. Plus, those timid laboratory artifacts, remnants from the ordered world left outside, some of which have lost their inherent meaning, their completeness, and their functionality—for example, pointless mathematical formulae, inappropriate computer programs, lab facilities that 'do not come in handy'. The world of coupling is not simply a monad and is not isolated from the external worlds—on the contrary, it is essentially the everyday life of the laboratory. However, the entities residing within its micro-range—that is, nature's entities, the others (fellow scientists), technical artifacts (apparatus, equipment, materials, etc.)—have suddenly acquired a 'coefficient of insufficiency' of absence. The new object of knowledge is present in the primordial intercorporeal relation based on the conviction that it is here, evolving from the 'physical nature of things'. It is this primary conviction, which displaces the ordinary everyday world in science so that the inherited objectivities and intentions prove insufficient, inadequate. They are transformed with the same move, however, into *landmarks* and *borders* for (further) directions of research.

I would like to introduce at this point the second piece from the interview with Margarita, the physicist whose story with the photo-refractive crystals we began above:

[...] When a few years ago I took the new materials from my colleague at the Solid State Physics Institute in Sofia, I decided first to look at their holographic parameters, although at the time these parameters were not so interesting for us. I thus checked whether a hologram could be recorded and measured their diffraction efficiency, spatial frequencies, etc. These were standard, tiresome procedures, which we had made thousands of times. Nevertheless we made the measurements because we had to and because we considered it necessary to know these parameters. Then I noticed that alloying the crystal with certain micro-elements (especially manganese) allowed the phase grating [simplest possible hologram—I.Tch.] to be recorded with very high diffraction efficiency. It results from the interference between two laser beams—those we apply to the crystal and its reflection from the back surface of the crystal. This phase grating causes heavy losses in the light passing through the crystal [...] Later we found out that this grating also shifted the vector of polarization of the light, which caused quite interesting effects (because of the properties of the laser beams).

It was a most peculiar case—we had expected one thing, while we arrived at something quite different. Initially we were inclined to look for an entirely different range of photo-induced phenomena rather than for holograms, I had completely forgotten about holograms. That is why when this grating suddenly appeared I never assumed that it would cause such troubles. I was simply unable to relate all these things [the observed phenomena—I.Tch.] to each other [...] I had no any intention of recording a hologram—recording holograms always presupposes very special conditions! I would need two equalized beams, corresponding modulation, etc. So when this hologram appeared in the worst possible conditions at first it made fun of us [...] We were seriously disappointed when it appeared in such a strange manner, and we were dismayed about what was happening there [...].

A colleague of mine made a similar experiment and he was also unable to understand what was going on. He studied photo-chromatic effects measuring the ability of the crystal to propagate polarized light beams. However, when he illuminated the crystals with these beams, which normally should not pass through them, he registered light behind the crystal! He believed the cause was the photo-chromatic effects in the crystal. But this was not the case, because it was this [hidden] hologram, which changes the vector of polarization and made it possible for the beams to pass through! [...] Eventually we modeled all this on the computer and solved the problem mathematically with a special matrix describing the case.

So this represented a kind of by-pass until we arrived at a final conclusion. One must know the material very well. One should measure almost everything possible, in order to be able to determine the relationships. Otherwise no conclusion

can be reached as to whether there is an effect or a defect—whether what one is looking at is caused by vibrations or by other well-known things [...] or if there is something really new [...] In our field a newcomer [young scientist] needs an introductory period before he enters the real research work. [He needs] *to touch* the crystals, *to see* what will happen under various conditions, *to record*, *to delete*, *to illuminate*, *to apply a magnetic field*, *to read* what has been recorded—*to analyze* the crystallographic orientations, *to calculate*⁶ a little and hence to try seeing the vectors. Because all these effects are tensor in their nature, they depend on the vector of the light wave. So he/she needs to know all these things in advance, in order to interpret the phenomena correctly. Otherwise we publish something about which the international community would say: ‘Good, these people relate the phenomenon with this, but they are wrong!’ And we would need to stand up for what we held to be true (Archive of the author, interview made in 1994).

The reader can readily detect Margarita’s devotion and strong ties with the nonhuman agent she was studying behind the specific technical terms she used in the interview. In her story the crystal emerges as a fully valued character—with its peculiarities and ‘hidden facets’, with its willfulness and resistance. The extreme importance of the practical forms of relationships between human and nonhuman partners that turned into an obligatory and almost ‘sacred’ ritual is also evident: ‘the most standard, tiresome procedures were made thousands of times, and which we continued to measure because *we had to* and because *we considered them to be necessary*’. It is through these procedures that the familiarity, the intimacy of the relationships inside the heterogeneous couple gradually emerges. At the same time these routines establish the conditions, the background against which the ‘unexpected’, ‘unknown’ features of the nonhuman agent become ‘visible’.

It is not difficult to imagine the researcher ‘dancing’ around optical tables, her careful gestures when putting together the experimental setup, then focusing the laser beams, her eager gaze at the screens and displays of the devices; then the careful checking of the data ‘upstairs’—at her office, on the desk and on the computer, the numerous calculations and the endless comparisons between various samples; followed by coming back ‘downstairs’⁷ to the laser and experimental setup, the modification of the setup, then new experiments [...] This is a living body, which vibrates

and pulsates, which at some points extends like an octopus; covering with its breathless 'kinesthesia' the nearby objects and then suddenly bending still in the perimeter of its skin, remaining thoughtful and silent. I am tempted to compare what I saw in CLOSPI with the text written by my colleague Kolyo Koev on the 'living body':

[...] There are different fields of kinesthetic possibilities, which pulsate around the living body as organ of movement, and it is in these fields the different aspects of the appearance of the thing are drawn in. The Self functions as specific combination of subjective spontaneity and reciprocity, which actualizes itself in the corresponding kinesthetic situation, 'reviving' various appearances of the thing (Körperdarstellungen) [...] The living body, the zero-point of the idea, is beyond this zero, it is already in the world it constitutes, as Levinas says' (Koev 1996, 46; Levinas 1983, 180).

In dialogue with Husserl and Sartre, Merleau-Ponty and Levinas, Kolyo Koev has analyzed the problem of visibility and the key role of perception in social life. He traces the way the phenomenology overcame the Cartesian division between body (extended, material substance) and soul (consciousness, subjective-mental substance), which still plagues most of the social sciences, and then continues further. Citing Levinas, he stresses that in the situations like those presented in the interview with Margarita, we actually deal with '*transitive intentionality*', which is somewhat different from the well-known 'objectifying intentionality' of Edmund Husserl. It is because of this *transitive intentionality*, we should say, that the 'unknown' and 'unexpected' aspects of the nonhumans become visible for the researcher. At the point of its birth, however, this is a visibility only for the human partner in the heterogeneous couple and *not* for the 'Others'—for the colleagues, other humans, which are outside the 'intercorporeal' relationships constituting the couple.

How is this transition from the intercorporeality that reigns in the heterogeneous couple to the 'sociality', to the communion with other humans possible? How is it possible to communicate the newly visible [in the coupling] to the other humans? It seems to me that phenomenology still remains within the frameworks of a 'social' situation, where the 'Other' is a human 'Other' and hence the possibility for verbalization, for designation by language of what is given in perception is possible and

solvable in principle (to mention only the principles of ‘reciprocity of perspectives’ and ‘I-can-do-it-again’). But how is the expression, the explication of the unique experience in a heterogeneous couple possible for the human Others?

The language and ‘wild layer’ of intercorporeality in the heterogeneous couple

In this section we advance the idea about the importance of language in the interaction between human and nonhuman actors in heterogeneous coupling as complimentary to the ‘intercorporeality’ between them.

During my research stay in Graz in the spring of 2003 I had the opportunity to pursue an analysis, which adds and significantly modifies the original ideas of Merleau-Ponty about the fundamental role of sensuality and about the primordial relation of intercorporeality, which I believed provides a foundation for the stability and sustainability of the heterogeneous couple.⁸ I am referring to the paper of the well-known American phenomenologist Don Ihde, ‘Signing the World: Language and Perception’, published as a chapter in his book on visualism in science (Ihde 1998). Don Ihde carefully analyzes the texts of late Merleau-Ponty, the problems of ‘wild being’ as central in these writings, and shows how the author has become increasingly hesitant about the existence of a sensuality and ‘intercorporeality’, which precede and are primary in relation to the language. By reconstructing the internal logic of these texts, Ihde has revealed how Merleau-Ponty stuck to the *primary interpenetration of language and perception* and has raised the problem of building a pragmatic anthropology able to go beyond the modern division between nature and culture. Don Ihde’s analysis is especially important, because unlike the pan-semiotic approach of the actor-network theory, he preserves the fundamental role of perception in the process.

The main thesis of Don Ihde is that:

[...] Phenomenology in its anti-Cartesianism claims to have rediscovered the living subject in the life world. This rediscovery claims the power to overthrow the Cartesian notions of psychophysical dualism; mind and matter are transcended.

However, a similar and no less tenacious distinction haunts our intellectual world as well, the distinction between *nature* and *culture*. Broader in its way, and thus perhaps more difficult to dispel, this dichotomy must fall, too, if phenomenology is to work out its program. Given this distinction, perception in its way belongs roughly to nature, while language belongs more clearly to culture. This language is 'added' to nature (Ihde 1998, 75).

Don Ihde claims that in Merleau-Ponty there are evidences of 'an ambivalence' with respect to the opposition of nature versus culture:

[...] In his essay 'The Primacy of Perception' he appears to appeal overtly to the distinction; in *Phenomenology of Perception* he speaks of speech as 'the surplus of our existence over natural being' and links language to 'a linguistic world and a cultural world' but increasingly implication is one which must eventually call the nature-culture dualism into question. But in *The Visible and the Invisible* perception becomes enigmatic precisely in relation to 'cultural' factors (ibid.).

Although the late Merleau-Ponty, according to Ihde, nowhere directly attacks the nature-culture dualism, the ambiguity of perception in these latter writings 'calls for an attack to be made'. A piece from the last chapters of *The Visible and the Invisible* remarkably illustrates this point:

The distinction of two layers (natural and cultural) is an abstract distinction: everything within us is cultural (our *Lebenswelt* is 'subjective', our perception is cultural and historical) and everything within us is natural (even the cultural is grounded on the polymorphism of the wild Being). This refers not only to the perception, but also to the Universe of predicative truths and meanings (Merleau-Ponty 1964, 259).

How is it possible to go beyond the nature-culture dualism and especially beyond the dualism between language and perception? According to Don Ihde the answer could be found in the necessity of radicalization of language. Although his note refers to phenomenology, it is clear enough: 'If we are to 'see' in a new way, we must be able to 'say' in a new way. A language needs to be born' (Ihde 1998, 76). His claim is that one possible direction in the quest for a new understanding of language in social sciences, which does not reproduce the nature-culture dualism, could be found in Merleau-Ponty's studies on what he called the 'theory of embodied meaning'.

Before presenting this theory, let us return to the story of Margarita and the experience of the optical physicists—in the situations where the language rushes into the process of observation and in a way ‘dictates’ it. The piece that follows actually preceded the second piece we already presented above. As the reader will see, however, from the point of view of the ‘logic’ of our analysis, it should follow on from it. At the end of the citation I left the last sentence, the one the previous piece of Margarita’s story begins with:

[...] The crystal is a complex system—when it stays in darkness without external influences, it remains in one state. But if I took it right now and it is already in the laboratory room—then it changes its color. *This means* [!] that there are ‘captures’ in the crystal, which absorb the light and become ‘inhabited’. So when we illuminate the crystal, when we begin to tune it in and reach a state in which we say: ‘Now at this point we should measure!’, in the very same moment it passes into another state. Nobody knows how much time it needs to ‘release’ itself. Yet the crystal needs to return to the initial conditions, to the state of ‘non-inverted inhabiting’. Otherwise these captures are moving, they are ‘inhabited’, ‘released’ etc., because of light, temperature, etc. This greatly influences the process of recording. That is why I need so much to establish the initial conditions [...] and then to formulate the conditions, in which this state reappears. This is the major difficulty—we may not be able to produce the conditions, in which [...] or even not know what kind of conditions they are. We may have obtained some results at random and not be able to reproduce them—we often arrived at such difficulties, especially during the process of fixation—sometimes fixation was very good, but we did not know why and hence we were unable to repeat it. We realized eventually what was going on [...] and now [are able] effectively to control the crystal.

Interviewer—This is very interesting, because you are using here a very figurative, ‘spatial’ language [...] How do you dare to speak about all these things inside the crystal?

Margarita—What do you mean, ‘how do you dare’?

Interviewer—You see or touch nothing of what is going on inside the crystal [...].

Margarita—Well, I am relying on the experience of my colleagues [...] I did not start from ‘terra incognita’, something that nobody knows. *There are models* [!], which deal with similar materials or similar phenomena. Such models can be used as a starting point and then modified in regards to our case. Yes, there are models for other recording materials, which can be applied partially or developed [...].

Interviewer—And how do you relate these stories and models with your concrete crystal? [...] How did you see this phase grating inside the crystal? Where does it come from?

Margarita—Look, I [...] We made this link. When I took these new materials from my colleague at the Solid State Physics Institute, I decided to look first at their holographic parameters, although these parameters are not so interesting for us at present. So I checked whether a hologram could be recorded, what its diffraction efficiency, spatial frequencies, etc were. These were standard, tiresome procedures, which we made thousands of times. Nevertheless we were measuring because we had to and because we considered it necessary to know these parameters. Then I noticed [...] (Archive of the author, interview made in 1994).

According to Merleau-Ponty language (expression) is given ontologically always as *embodied*, as specific language practice. The meanings in this practice break their way through the same way the living bodies make their way through in the world: ‘there is thus, either in the man who listens or reads, or in the one who speaks or writes, a *thought in speech* (*une pensée dans la parole*) the existence of which is unsuspected by intellectualism’ (Merleau-Ponty 1945, 209). For Don Ihde the ‘thought in speech’ is the language version of ‘being-in-the-world’, it is the ‘expressive dimension of human existence.’⁹ He points out that ‘[...] the expressive activity of the subject in speech is intentional, directed, and focused activity. And as with all phenomenological intentionality, such an action is both internal and external, or better, already outside the enclosed self and directed towards the world’ (Ihde 1998, 70).

This ‘thought in speech’, the ‘embodied expression’ are specific, concrete, and positional, they are places from which the world is perceived. Ihde cites Merleau-Ponty’s inference that ‘we may speak several languages, but one of them always remains the one in which we live. In order completely to assimilate a language, it would be necessary to make the world it expresses one’s own’ (Merleau-Ponty 1945, 218). Following Merleau-Ponty’s rejection of linguistic dualism, i.e. the existence of ‘pre-significant sound’ and ‘post-linguistic thought’, Ihde draws a parallel between embodied, expressive meaning and the embodied, perceived subject: ‘[...] signification revives the words the same way the world revives my body: with its deaf presence, which evokes my intentions without displaying itself’ (Merleau-Ponty 1960, 112).¹⁰ There are symptomatic

examples illustrative for the phenomenon of *expressive embodiment*: the child learning speech, the first understanding of others, learning a new language, learning a new philosophy, the lover revealing his feelings (see Ihde 1998, 69–70).

That is why, concludes Ihde, according to Merleau-Ponty there is strictly speaking no ‘state of meaning’ prior to existential language. There is, however, a movement *from silence to speech*, which is *not* movement from *non-meaning to meaning*. Rather this is a movement from *implicit to explicit*, from ‘the ambiguity already *pregnant* with significance [the intercorporeality with nonhumans in the heterogeneous couple, I.Tch.] to the expressed significance of speech’ (Ihde 1998, 72).

We arrived at the basic claim that if it is possible at all for a meaning to be ‘born’, this is because ‘*the world is already pregnant with this possibility*’ (ibid.). This statement stems from the enigmatic texts of the late Merleau-Ponty, where ‘[...] to my mind the most radical and interesting use of language comes into great prominence [...] *The Visible and the Invisible*, itself an evocative and suggestive title, bring us *flesh, chasm, intertwining, perceptual faith, and wild Being*. This is ‘wild language’ more akin to a literary genre than to much philosophy. Merleau-Ponty’s struggle with language leads him beyond the strategy of transforming terms to the initiation of a radical discourse’ (Ihde 1998, 67). These are the last ‘working notes’ of Merleau-Ponty—sketched out, away from the systematization and critical elaboration of their author. One might possibly hesitate to use these unfinished and incomplete notes as an argument if they have not carried the specific energy of the author’s ‘seeing and speaking in a new way’, they raise the problems the previous texts only touched.

The notions of *invisible* (as basis of perception)¹¹ and *silence* (as basis of language) help to grasp the idea of a *world already pregnant with the possibility of meaning*:

We need to introduce the distinction between empirical utilization of ready-made language from its creative utilization, the former being only a result of the latter. Speech as an empirical language—as skilful activation of a sign already given—is not an authentic language. It is, as Mallarmé has said, like a shabby coin put silently in our hand. Contrary to this the true speech signifies and

eventually represents 'what is missing in all bouquets', it liberates the meaning enclosed within the thing. This speech, however, is considered by the empirical use of language only as silence, because it does not reach the common name (Merleau-Ponty 1960, 56).¹²

According to Don Ihde there are a number of intermediary states illustrating the embodiment of meaning—gesture, gestural meaning, indirect voices of silence in painting, concrete meanings of music, these all lie 'between silence and speech; they are meaning activities of the subject, but short of explicitness of speech' (Ihde 1998, 72). He points out that the reverse side of this movement from implicit to explicit, from silence to speech 'remains implied in every speech-act'. The existentiality of language is such that implicit silence is always larger than the focus of explicit speech. This larger field forms the background of the actual expression. Hence every speech, every explicit language is *indirect*. Silence, in the sense of Merleau-Ponty is the 'the field of pregnant, latent expressiveness already present to the living subject [...] we must consider speech before it is spoken, the background of silence which does not cease to surround it and without which it would say nothing' (ibid., 73). The embodied meaning, the *thought-in-speech*, the *speech-in-silence* are actually testing in the language what the bodily subject is testing in the world. Speech, says Don Ihde, is 'the focal center, the explicit foreground of meaning which floats, varies, is directed but which always stands out against the background of silence [...] [the] speech is the taking of a position' (ibid.).¹³

If we were to push the intuitions of Merleau-Ponty to a logical conclusion we could say that it is into the pre-given silence when the sensory being 'pregnant with meaning' appears for the first time: 'Speech should come to the child as silence—to break through him by silence and as silence (as something simply perceived [...]) This fruitful negation is constituted through the medium of flesh, the flesh that is burst open [...]' (Merleau-Ponty 1964, 268). He writes shortly afterwards in one of his last notes: '[...] what is left is the problem of transition from the perceptual meaning to the meaning of the language, from behavior to thematization. The thematization itself should be considered as a higher-level behavior—as dialectic relationship: language, the breaking of silence, realizes what silence wanted but has not achieved [...] the silence embraces the language' (ibid.).

The silence of intercorporeality in the heterogeneous couple, the communion with the nonhuman 'Other' where—as in communion with other people—there is always more than what is said. It is time, following Don Ihde, to stop searching in the texts of Merleau-Ponty for more than what was said there. And to remain in his silence [...].

Instead of a conclusion

To come back to the story of Margarita and her experiences with photo-refractive crystals, if there is some truth in the analyses of Merleau-Ponty and Don Ihde, then we cannot say—as I did a few years ago—that the sensory is primary, while the language meanings are secondary; that the sensory predominantly belongs to nature, while language meanings belong to culture. They are on an equal footing and what makes it possible to go beyond their division and their opposition is their primordial *embodiment*. This is always given in the *invisible* (as the primary basis of perception) and in the *silence* (that makes articulation of any kind possible) of the world. Because of its presence in the world the living body reveals the *meaning*, understood as 'explication of a pre-given possibility'. When I say 'living body' I mean not only our situation among material things, but also among the 'materiality' of the language we live. Both of them—the material bodies and 'materiality' of the language envelop and transcend us, resist us. Coping with their resistance, we 'explicate' and make our behavior (corporeal *and* linguistic) meaningful.¹⁴

If we accept this, then the life in heterogeneous micro-communities, illustrated by the story of Margarita, reveals yet another aspect I miss in my previous analyses: Margarita is 'dancing' not only among the crystals (non-human agents) and devices (hybrids) in her laboratory, but also amidst the language of her scientific tradition, amidst '[...] the models, which deal with similar materials or similar phenomena [...] [The models that] can be used as a starting point and then modified'. It is not only the crystal that resists her 'living body' and it is not only the clash between the two bodies, their intercorporeality that lets the 'sensory (pre-given) meaning' emerge. Another equally important process is taking place in parallel—the clash of

Margarita with the 'body' of scientific language she has learned to speak as a scientist. It is only by changing this inherited language, by accommodating and filling out the models inherited with this language that she became capable to 'see' in a new way, to arrive at thoughts that 'surprise herself'.

So if the meaningful behavior towards the nonhuman partner in a heterogeneous couple resembles a 'dance' whose steps you learn with pain and difficulties, then the attempt to spell out the experience you gain in the couple is the 'melody of the dance', which comes as if from nowhere and which you timidly begin to hum, and then to sing louder and without stammering to the other people.

Notes

- ¹ The case is taken from my ethnographic study conducted at the Central Laboratory for Optical Storage and Processing of Information (CLOSPI), Bulgarian Academy of Sciences, between 1993 and 1998 in Sofia, Bulgaria.
- ² The lab I was studying comprised three groups (clans) of researchers—*solid state physicists* (defining the direction and scope of research), *photo-chemists* producing various holographic media, and *electronic engineers* on input and output devices.
- ³ In addition to CLOSPI, I have also studied the Laboratory of Applied Optics (Optische Nachrichtentechnik) at Open University Hagen, Germany, and the Institute of Autometry and Electrometry, Siberian Branch of the Russian Academy of Sciences, Novosibirsk, Russia.
- ⁴ In my study of CLOSPI, the largest group of this kind consisted of two or three researchers with (sometimes) a Ph.D. student and a few laboratory assistants. In 2000, during the summer practice with my Plovdiv University students at the Kurdjali Dam, Rhodope mountain, we discovered yet another heterogeneous micro-community, which consisted of sixteen people plus a hybrid (the huge 104 meter high ferro-concrete dam packed with sensors) and the 'tamed' water collected in the dam lake (see Mitev 2001).
- ⁵ The initial idea came from my colleague Kolyo Koev, who has recently published his book on 'Visibility: Phenomenological Contexts', Critique and Humanism Publishers, 1996, Sofia (in Bulgarian), where he explicitly placed Merleau-Ponty's ideas in a sociological context and revealed the interesting and, from the sociological point of view fruitful relationships of these ideas with those of Michel Foucault, Emanuel Levinas and others.

- ⁶ Please pay attention to the abundance of infinitive verbal forms, which I consider to be an indicator of the genuinely sensory, bodily character of the relationships with the nonhuman agent she was studying/coupling with.
- ⁷ CLOSPI provides a peculiar spatial division of labor—the optical laboratories with lasers and vibration-insulated optical tables are in the basement, while the physicists' rooms packed with books, desks and computers are on the ground floor. Above these are the rooms and laboratories of the photo-chemists and electronic engineers with their input and output devices.
- ⁸ I am indebted to my colleague Ulrich Glotzbach, at that time also fellow at IAS-STG in Graz, who drew my attention to this specific text of Don Ihde.
- ⁹ '[...] There are only differences of signification in the language. If the language finally says something, this is not because every sign possesses its own meaning, but because all signs, taken separately, hint at signification which is always postponed/missing and where I, aiming at that signification, bypass the signs because they never possessed it. Every sign expresses itself only by referring to certain mental tools, to a certain ordering of our cultural appliances, and taken together the signs are like a blank sheet that has not yet been filled, like the gesture of a friend pointing out an object in the world which I do not see [...] There is a kind of 'language-like' signification in the language, which mediates between my yet silent intentions and the words, so that I am surprised by my words and they inform me about my own thoughts' (Merleau-Ponty 1960, 110–111) (Translation I.Tch. The French text: '[...] il n'y a dans la langue que des différences de signification. Si finalement elle veut dire et dit quelque chose, ce n'est pas que chaque signe véhicule une signification qui lui appartiendrait, c'est qu'ils font tous ensemble allusion à une signification toujours en sursis, quand on les considère un à un, et vers laquelle je les dépasse sans qu'ils la contiennent jamais. Chacun d'eux n'exprime que par référence à un certain outillage mental, à un certain aménagement de nos ustensiles culturels, et ils sont tous ensemble comme un formulaire en blanc que l'on n'a pas encore rempli, comme les gestes d'autrui qui visent et circonscrivent un objet du monde que je ne vois pas [...] Il y a une signification «langagière» du langage qui accomplit la médiation entre mon intention encore muette et les mots, de telle sorte que mes paroles me surprennent moi-même et m'enseignent ma pensée').
- ¹⁰ 'La signification anime la parole comme le monde anime mon corps: par une sourde présence qui éveille mes intentions sans se déployer devant elles'.
- ¹¹ The metaphor of the 'blind spot' of consciousness illustrates the notion of *invisible*: '[...] It is the visibility itself, which contains the invisible—The perceived world (like painting) is the totality of the roads of my body, and not simply a sum of spatial-temporal individuals [...] It should be clear that the perceptual world [...]

is not a product of our psycho-physical constitution, neither a product of our set of categories. It is a test for a world, to which our categories, our constitution, our subjectivity, explicate the fixture. What the consciousness does not see is this part in it, which makes possible the seeing of the rest (similarly to the blind spot of the eyes, the place where the nerves enter it) [...] this is its adherence to the Being, its corporeality; these are the existentialities that make the world visible; this is the flesh where the object is born' (Merleau-Ponty 1964, 253–254).

¹² Translation I.Tch. The French text: 'Distinguons l'usage empirique du langage déjà fait, et l'usage créateur, dont le premier, d'ailleurs, ne peut être qu'un résultat. Ce qui e parole au sens du langage empirique,—c'est-à-dire le rappel opportun d'un signe préétabli,—ne l'est pas au regard du langage authentique. C'est, comme Mallarmé l'a dit, la pièce usée que l'on met en silence dans la main. Au contraire la parole vraie, celle qui signifie, qui rend enfin présente l' 'absente de tous bouquets' et délivre le sens captif dans la chose, elle n'est, au regard de l'usage empirique, que silence, puisqu'elle ne va pas au nom commun'.

¹³ Compare this to the idea of '*blue-collar realism*' of Arie Rip: '[...] A more productive way, epistemologically as well as ontologically, is to think of 'reality' as 'mounted reality'—a phrase from the studies of photography and film. One can capture reality 'out there' but only by framing it in a particular way [...] Is this relativism? Reality becomes relative to the particular 'mounting' that is chosen? Yes. But the much more interesting aspect is that there is always a reality, the reality of the particular mounting and its effects. It is the mounting that is observable, tangible, material. The content of what is mounted, the message, is much less tangible. It has its effects, through human interpretation and through semiotic network linkages. But without the materiality (even if often not recognized) of the 'mounting', the discourse of 'reality' would not be very persuasive [...] If reality is mounted, this suggests that what is mounted is constructed and in that sense less real than the 'non-constructed', the out-there, which resists us. But as soon as the non-constructed is foregrounded, thematized, it becomes itself a mounted reality. In that sense there is no unmounted reality' (Rip 1997, 7).

Taking the photograph's metaphor, Arie Rip arrives at almost the same conclusions as late phenomenologists, however, he misses the 'embodiment' and 'materiality' of language, separating the 'mounted' from the 'content of what is mounted'.

¹⁴ Stressing the necessity of interplay between language and perception in the process of coupling, it is important to note, however, that it is possible for language (rather 'speech as an empirical language') to take over perception, preventing scientists from understanding the nonhuman partners they are studying. Evelyn Fox-Keller provides ample evidence for this in her excellent book on Barbara

McClintock. Describing the approaches of different biological sciences towards the problems of heredity, she writes: ‘anatomists, chemists, experimental breeders, mathematical geneticists, and naturalists [...] all are different cognitive groups according to the ways they perceive chromosomes’. There are ‘perceptions’ already taken over by the [empirical language] traditions of corresponding sciences, all differing from McClintock’s specific position as a cytologist: ‘[...] Thus all our colleagues, who are busy either with the structure of molecules or with the appearance of organisms, regard the chromosome as doing what various theories, such as the chemical theory of chromosomes and the chromosome theory of heredity, require to do. They find that it is doing its job, or seems to be doing its job, smoothly and well—so smoothly and so well that they can take it for granted; they can deduce its properties; they do not need to observe them. We must applaud the success achieved by our colleagues on the basis of these assumptions. *But they see chromosomes through the mind’s eye. We, who believe we see actual chromosomes through the microscope, must explain what we have seen*, and point out that it is not always what our friends expect (Italics, I.Tch.). For us neither the chemical code, nor the linkage map of the chromosome, nor the gene embodied in it, are enough’ (Fox Keller 1983, 90).

References

- Callon, M. (1996), Les statuts économiques des activités de recherche et développement [Eléments pour une analyse dynamique des réseaux techniques et économiques], *Représenter, Hybrider, Coordonner*, CSI, Paris.
- Fox Keller, E. (1983), *A Feeling for The Organism. The Life and Work of Barbara McClintock*, New York: Freeman.
- Ihde, D. (1998), ‘Singing the World’, in *Expanding Hermeneutics*, Evanston, Ill.: Northwestern University Press: 63–76.
- Knorr-Cetina, K. (1994), ‘Laboratory Studies’, in S. Jasanoff et al. (Eds.), *Handbook of Science and Technology Studies*, Thousand Oaks, CA: Sage.
- Knorr-Cetina, K., T. Schatzki and Eike v. Savigny (Eds.) (2001), *The Practice Turn in Contemporary Theory*, London: Routledge.
- Koev, K. (1996), *The Visibility: Phenomenological Contexts*, Sofia: Critique and Humanism Publishers [in Bulgarian].
- Latour, B. (1992), ‘Pasteur on Lactic Acid Yeast: A Partial Semiotic Analysis’, *Configurations*: 129–145.

- Latour, B. (1993), 'A 'Matter' of Life Death—Or Should We Avoid Hylozoism' (mimeo).
- Latour, B. (1994), *Nous n'avons jamais été modernes*, Paris: Le Découvertes.
- Latour, B. (2001), 'Regeln für die neuen wissenschaftlichen und sozialen Experimente', Darmstadt: Colloquium Plenary Lecture, 30 March 2001.
- Levinas, E. (1987), *Collected Philosophical Papers*, Dordrecht: Martinus Nijhoff.
- Levinas, E. (1983), 'Intentionalität und Empfindung', in *Die Spur des Anderen*, Freiburg/München: Alber.
- Levinas, E. (1982), *Ethique et Infini*, Paris: Fayard.
- Merleau-Ponty, M. (1945), *Phénoménologie de la Perception*, Paris: Gaulimard.
- Merleau-Ponty, M. (1960), *Signes*, Paris: Gaulimard, (Le philosophe et son ombre).
- Merleau-Ponty, M. (1964), *Visible et Nonvisible*, Paris: Gaulimard.
- Mitev, T. (2001), 'The Elements and The Man... and Their Mutual Modification. The Heterogeneous Community 'Kardjali Dam'', *Sociological Problems* 1–2: 139–157 (in Bulgarian).
- Rip, A. (1997), 'From Blue-Collar Realism to 'Mounted Reality'', paper presented at 'Actor-Network Theory and After', Conference, Keele, U.K.
- Tchalakov, I. (1996), 'Building Human/Non-human Communities: From Random Couples of Lonely Researchers to a Laboratory as Stabilized Heterogeneous Group', paper presented at Joint EASTT/4S Conference, Bielefeld, Germany.
- Tchalakov, I. (1998), 'Making a Hologram: A Book about the Light, about the Scientists and Their World', (Development of Opto-Electronics in Bulgaria, 1969–998), Sofia: 'Marin Drinov' Academic Publishing House.
- Tchalakov, I. (2004), 'The Object and the Other in Holographic Research—Approaching Passivity and Responsibility of Human Actors', *Science, Technology & Human Values* 29 (1).