

# Pure Data as a feminist tool for meaningful learning

Alejandra Maria Perez Nunez  
pueblo@mail.ljudmila.org

## ABSTRACT

I would like to reflect upon the ways Pure Data software can improve and create contexts for meaningful learning. Following the work of Paulo Freire, latin american educator from the sixties, I will highlight the relevance of creating educative environments that become embedded with the practices that people develop and refuse official *one cognitive style* instructional models. Paulo Freire (1974) indicates how Latin America has a history of colonization and a history of applying foreign models to its own reality and indicates the conditions that make knowledge an instance for domination. In order to describe and understand the processes behind I will propose to consider a cybernetic view on computer technology and software. The nature of patching together with the need to understand the processes that are involved in sound processing that is offered by Pure Data is an example of a method where learning develops as a network of relations. It triggers dynamic systems of understanding instead of static contents that you have to learn through official instructional models like learning to use the interface of a software tool. These can be said of other programming environments as well but I understand Pure Data as a software and as a community of people sharing roles in learning and educating. I would like to propose that Pure Data is a tool for feminist education since it propagates a receptive model, one that is different from a paranoid model that relates to controlling a piece of given software. I see appropriation, networks of relations, the power of integration as a feminine way -not meaning a woman way- but a receptive, symbiotic action that may empower learning environments for the oppressed.

## Keywords

Pure Data, networked cognition, references, syntax, control, relations, paradigm of collaboration, feminism, hacking, education for the oppressed

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, to republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

*Pd Convention 2007*. Montréal, Québec, Canada.  
Copyright 2007. Copyright remains with the author(s).

Why to speak about a *feminist* tool for learning? educational models enforce the rules of each society. There is a need to liberate some forces that historically have been denied. I envision this capacity as an arrangement that propagates very effectively through different sectors. In a similar way a school influences a social area, the new instances for self learning now pulse and spread out fast vectors on the internet.

A kind of learning that would be participatory is understood as *feminist* in this article and the use of the feminist word is charged of its political role of representing the underrepresented. To speak about a feminist tool means a tool for the immigrants, the poor, illiterate, minorities of all kind that need to find spaces where to grow in participation.

For this reason I find relevant to bring into this description the work of Paulo Freire, for his tremendous influence in the education of people in Latin America before U.S. take over through series of military dictatorships in the 70's. I try to bring into our discussion his ideas because he worked so largely in Brazil, Chile and as an advisor for the educational reforms in Guinea Bissau and Mozambique <sup>1</sup>. Another reason is that he worked with adults. In this article I will not be speaking of children education but more observing and making a reflection on the experiences of self empowered adult learners. Learners that take turns in facilitating the experience of learning. Many communities around free software show this in the exchanges followed in mailing lists, development groups, workshops, user groups.

I feel I should say this paper comes from a reflection upon my own learning that I can see distributed and multiplied in learning threads in a community i.e. in mailing lists. I think academy brings some validation to this but is not enough compared to what can be achieved by practice. It is my desire to develop more instances where the principles that here I outline may be recreated.

## *a comunism of ideas.*

The closed circulation paths of science, art, knowledge and all agencies related to the production and distribution of information, symbols and cultural goods follow the same rules that dominate world's economy and concentrate power in the hands of the elite.

Michel Foucault (1969)[3] describes how knowledge is modulated by agencies that execute control, like the hospital, the school, but ultimately through the units that constitute language, like conceptual formations and units of history for

---

<sup>1</sup>source wikipedia

example <sup>2</sup>.

There is a relevant amount of control that multinationals execute on the cultural shaping of countries, the amount of money microsoft invests in education in Latin America for instance. Do people think this is a bad thing?. The kind of domination that can be executed by instructional models of teaching and learning how to use windows has already shaped a few minds and Microsoft actions are looked as benevolent by Latin American governments.

One reason to bring Paulo Freire to this description is that he lived and developed his work in a period where Latin-American culture was extremely rich and creative. We haven't lived anything compared to that cultural flourishing period as that lived in the 60-s 70-s until now, where small self produced, autonomous groups in countries as Bolivia, Mexico, Argentina, Chile, Venezuela are bringing back the motivations and long time desired reparations. It is the time to use the tools we have to empower the weak.

I would like to focus more on the following proposals

\* that Pure Data is a programming environment that encourages to create relations. To take part in the technology you use, to make music for example. There is a constant positioning of yourself with respect to the process you may be doing. This may be a property of patching. It is a representation of networked cognition, you need to re-map an example patch in order to use it.

\* that Pure Data is not only a programming environment but a community and this combination enforces learning within a mesh. Mesh and participation are perhaps the keywords for understanding how such a learning is accelerated. My own learning has been through revising mailing list archives and receiving the Pd list. I am a passive user of the list and without necessarily arguing about the social maturity of the Pure Data community or mailing list participation there are in fact numerous cases where people exchange roles in learning and teaching or just passing on information.

## 1.

It is true that this paper, so much interested in searching for a proper voice, one that is coming from my cultural background, should focus on authors coming from the south. I admit my fascination by authors like Foucault and Guattari. I feel is valid to bring them to my discussion as a *cannibalistic* manoeuvre, I regurgitate what they draw upon european societies, the western world is explained by them. Perhaps is not creative enough to speak of binary orders like dominators and dominated, but I owe to do it in order to address the current situation of countries of the south or underdeveloped. We urgently need to find the agencies that will reinforce the local abilities or potentials in order to define our invigoration through our own symbolic assets.

I find necessary to mention Foucault[4] to define some concepts such as a view of control acting as a syntax, as particles

---

<sup>2</sup>"Hence the major effect of the Panopticon: to induce in the inmate a state of conscious and permanent visibility that assures the automatic functioning of power. So to arrange things that the surveillance is permanent in its effects, even if it is discontinuous in its action; that the perfection of power should tend to render its actual exercise unnecessary; that this architectural apparatus should be a machine for creating and sustaining power relation independent of the person who exercises it (...)" Foucault, 1975 p.34

of meaning. Foucault speaks of utterances (*enonces*)[1] as the most active units of language, they are unique he says. Is the utterance a network of relations? Does it contain a mesh of references? As if having a laminar <sup>3</sup>constitution words and objects traverse each other. In my Pd patch I go linking, adding a node, making a connection I define the space of references. I determine what's the direction of the processing flow. Note that for an experienced user of Pure Data this action might be rudimentary, - 'reverse engineering' a patch by means of re mapping it. It is nevertheless a well known learning tactic more frequently described as *hacking*.

In the diagrammatic dimension of a graph I punctuate and trace directions. This tracing or mapping, the construction and de- construction of a diagram is by itself invigorating. It's a pedagogical practice that contains many kinds of rewards. There is surprise, enthusiasm and success brings attached autonomy and confidence.

Foucault helps to start from a basic beginning point, which is the syntax of control acting as circuits at minuscule levels, recreating formations, conceptual strategies of power that in the realm of software and education are prominent. They become more and more prominent since the massive use of digital goods, the strict policies in terms of software licensing, since the problem of piracy and since the exploitation of genomic patents. These are real problems in Latin America, Africa and countries like India.

Paulo Freire (1974) [5] indicated how Latin America has a history of colonization and a history of applying foreign models to its own reality. If we consider how western knowledge is organized we have everything to loose. We will perpetually be in a condition of inferiority just because we have to import all foreign systems of understanding as the main *factories* of knowledge come from Northern areas. <sup>4</sup>

A new colonization through technology is being enacted in developing countries such as those of Latin America. This is perhaps due to the lack of tradition or historical precedents that could sustain appropriation of technology <sup>5</sup>. Such an appropriation should be mediated by an elaboration of systems of understanding about machines that would permit cognitive integration (and not adjustment and adaptation).

---

<sup>3</sup>Laminar flow, sometimes known as streamline flow, occurs when a fluid flows in parallel layers, with no disruption between the layers. In fluid dynamics, laminar flow is a flow regime characterized by high momentum diffusion, low momentum convection, pressure and velocity independent from time. It is the opposite of turbulent flow. In nonscientific terms laminar flow is smooth, while turbulent flow is rough. source wikipedia

<sup>4</sup>"The excess of power which has characterized our culture from the start created on the one hand an almost masochistic desire to submit to that power and on the other a desire to be all powerful. This habit of submission led men to adapt and adjust to their circumstances, instead of seeking to integrate themselves with reality. Integration, the behavior characteristic of flexibly democratic regimes, requires a maximum capacity for critical thought. In contrast, the adapted man, neither dialoguing nor participating, accommodates to conditions imposed upon him and thereby acquires an authoritarian and a critical frame of mind" (p.21) [5]

<sup>5</sup>Latin America contributes only with 2.1 percent of the world's academic scientific research, this contribution goes down to 1.2 percent if considering only IT research.(Rajani, 2002-2003) [12]

Something that gives a context to technology so it fits with local environments? a narrative perhaps, a symbolic construction that links the local ecology to the acquired technological artifact as a way to prevent it from becoming a tool for domination. Technological objects trigger processes of consumption and creation of new needs, unplanned by the user and planned by the designer<sup>6</sup>. The chains of consumption, such as computer, external harddrive, USB stick, recording media, proprietary software, denotes an administration of consumer needs that multinationals perform and spread out through the use of computer technology. In developing countries such as those of Latin America the series of obstacles to reach for instance the networked infrastructure of the internet are not only determined by the lack of material resources, but also by conditions that constitute inexistent symbolic assets.

The lack of codes of appropriation constitute in general the potential for domination that computer technology may execute, making a reference to the codifications formulated by Freire,<sup>7</sup>.

When technological objects penetrate different ecologies than those programmed by their designers, a process of appropriation begins, triggering effects that can even evolve into counter-appropriation. Many times technological objects die quickly by misuse and lack of care, triggering a second round of consumption that might evolve into directly affecting local economies. What should this user do in order to revert accelerated processes of decay? *Hack 1*: Users should understand technology, and not have a disengaged view of it.

Never has it been more easy to become educated by powerful knowledge and never has the domination executed by economic structures been more powerful. By powerful knowledge I mean the possibilities for self education on computer programming languages for instance or the existence of collaborative educational initiatives such as mailing lists or wikipedia or of open universities to name a few. Ignorance is followed by alienation, hence to uncover processes behind technology become imperative. These processes are not only technological but political, symbolic and narrative, *Hack 2*: a way to appropriate technology is to unravel the systems that lie behind technological processes in order to bend or tweak them.

### *a cybernetic view of learning.*

I would like to find a path to understand what is the kind of learning that I propose to call meaningful. In the tradition of cybernetics of second order there is the question of "how we come to know", and explores theories of self-reference to understand such phenomena as identity, autonomy, and purpose Cognition occurs as a coordination of coordinations between the body and the environment and one of the characteristics of a coupled and emergent mind is its mobility. The mind occurs in the encounter between body and envi-

ronment. There is a nervous system that sustains perception and that has become as it is through series of coordinations and successful interactions through generations

Self organization and self production by means of closure are keywords, disturbances are mediated by a separation, the mediation of a membrane that deals with exchange between an exterior and interior medium. Autopoiesis, a term developed by the biologists Humberto Maturana and Francisco Varela to denote a form of system organization where the system as a whole produces and replaces its own components, and differentiates itself from its surrounding environment on a continual basis through operational closure [10]<sup>8</sup>.

Processes of distinction are main operators of the cognitive acts and the fact of having a mind that is embodied, a mind that is a body implies a few things like, the body/mind unfolds from within an environment and develops through a series of interfaces that she creates. These interfaces (*puntos de contacto*) bring the ground for more interfaces to be produced, that's how a network of contact points or nodes is growing everytime you have a group talking or discussing or when you are exploring a city or an archive.

The body/mind which is mobile is essentially referential, constantly is comparing, scaling, combining, the body as a separate entity implies a recognition of rhythms (difference and repetition i.e.). There are distinctions, punctuations and dynamics of referencing.

The graphic representation of sound synthesis is in my view an example of this referencing system, where I have to take positions in relation to each programming block. This positions are simply cognitive acts like here, this, that, now, when, then, etcetera. I don't mean to deny that this is happening in all sorts of coding examples and I am also referring to an inductive technique for learning (hacking). In a way PureData is a diagrammatic adventure, is an active diagram and explorations may find a fertile playground in it.

From another point of view the subject of cybernetics reappears, third order cybernetics dealing with transient dynamics<sup>9</sup> [11], and with systems with no membrane and with a temporary organization. Like networks of synchronization in the brain<sup>10</sup>, they assemble temporarily while a cognitive act is being performed and disassemble again later. No path is repeated although is widely accepted that some regions of the brain perform differentiated actions, there is no fixated structure that repeats a sequence and different regions of the brain oscillate at unison. There is a notion of distribution in this order of cybernetics, there is no fixated structure, there is no location specific for each act, there are networks of coordinations that spread over vast regions, illuminating and pulsating at unison displaying a map over the brain. The chaotic organization of a mesh described as an illuminated coordination is the beginning for the second argument

## 2.

<sup>8</sup>Maturana and Varela, 1980

<sup>9</sup>Parisi and Terranova, 2000

<sup>10</sup>In 2004 I conducted an interview to Eugenio Rodriguez at Max Planck Institute in Frankfurt. Eugenio is researching on synchronization of large scale neural networks in the brain. He begun this research with Dr. Francisco Varela in Paris. Amongst some publications on the subject,[7] .[13] and[14]

<sup>6</sup>Henri Lefebvre proposed a demography of objects to observe and record the periodic decay of different objects until its obsolescence.[8]

<sup>7</sup>"Phase three: The creation of the codifications: the representation of typical existential situations of the group with which one is working. These representations function as challenges, as coded situation-problems containing elements to be decoded by the groups with the collaboration of the coordinator"(op.cit p.45) [5]

A third type of cybernetics is embodied by FOSS development as the paradigm of collaboration. The motto of development of FOSS software is the openness of its code, "information wants to be free"<sup>11</sup> and whose openness allows loops of cooperation, uncontrolled cycles of production and leaps of development. Sharing immaterial assets in such non-hierarchical ways improves the quality of the software because it allows the massive participation of large cooperation networks that work in a distributed way on software development.<sup>12</sup> Proprietary software acts via ways of domination through information, their models are not open to appropriation. Pure Data may be an example of a turbulent third order cybernetic where transient arrangements lead to people into a experience of community learning.

### open patching.

I wanted to build something that will resist against centralization, something that will improve its performance by the use of interference and disturbance<sup>13</sup> and that will develop connections that were not originally planned. Flores and Winograd (1986)[15] talk about the design of computers as something different from the categories of conscious design, addressing the broader question of "how a society engenders inventions where existence in turn alters that society"<sup>14</sup> Computers are designed under a powerful tradition "that emphasizes 'information', 'representation' and 'decision making'". They label this tradition as the rationalistic tradition because of its emphasis on particular styles of "consciously rationalized thought and action (...)" "the rationalistic tradition is distinguished by its narrow focus on certain aspects of rationality (op.cit)". Through Pure Data I have come to see machines and software surpassing rationalistic tradition. The machine that I build is not only to perform a synthesis or control different sources. I can also learn through this open environment and I can think of it without having a purpose more than that of making diagrams simply as non-purpose machines or potlatch<sup>15</sup> machines (a truly joyous machines<sup>16</sup>)

Pd patches are active diagrams locating and allocating blocks of processes. It gives a result that is both sided: you may perform some sound synthesis and you may be educated by the building of your machine. The pedagogy of

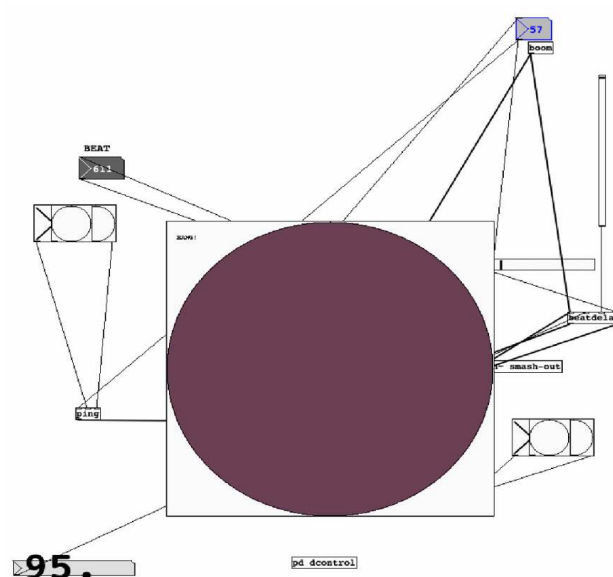


Figure 1: pure.pd a patch by Gerard Van Dongen Gilcher

the oppressed<sup>17</sup> it is based on a method that facilitates appropriation of knowledge as a key step to learn. Freire's method for the education of critical consciousness was based upon the experience of the illiterate, no instruction would be given until an advent of consciousness about the situation displayed. To Freire education should be based on discovery and consciousness. Instruction is just another way of domination as knowledge coming from outside the reality of people. Freire's method is nomadic in the sense that although having a structure, the content through which reading and writing is transmitted is through dialogue, and through a set of conditions that are set during mutual exploration, where the predominant relation is between I and thou. The "it" is a kind of relation that does not allow dialogue to appear. What is attained is a kind of nomadic learning strategy, dependent on the environmental conditions and the experience of all adults attending the learning situation. The presence of the mediator is there to facilitate this process.

The fact that the "it" relation is recognized as a blockage for learning is important since it is the type of relation that is common between people and computers. This is the kind of relation that is promoted by windows, macromedia, adobe and all transnationals of shrank wrapped software applications that don't invite to see their guts.

-What about engineering something so open that every time it connects to different bodies or entities of different natures it reshapes its form, its program, its potential of play and finally its potential of affection, to affect and be affected by its surroundings. What would be the means of creating such systems of understanding that would be independent from validation paths and that would infinitely couple to subjectivities?

In the quest of breaking down systems of elitism and obsolete professionalization I came across other sorts of learning environments. I started to know about Pure Data by attending to workshops and following the different threads in

<sup>11</sup> Brand, quoted in John Perry Barlow, 1994

<sup>12</sup> "As with material property, intellectual property relies on the goodwill of non-proprietary social functions and arrangements(...) The application of strict proprietary rules leads to a increasing fragmentation and unbalanced division of wealth in the world against the interests of other worlds, protecting the "firstness" of the "first world" against the interests of the other worlds (Rajani, 2002-2003 p.11)

<sup>13</sup> CAE, 1994 [2]

<sup>14</sup> p.8

<sup>15</sup> S'opposant a la notion artificielle de troc, la forme archaïque de l'échange a été identifiée par Mauss sous le nom de potlatch ( Marcel Mauss, Essai sur le don, forme archaïque de l'échange dans Année sociologique, 1925) (...) Les moins avancées de ces peuplades américaines pratiquent le potlatch a l'occasion des changements dans la situation des personnes -initiations, mariages, funérailles - et, même sous une forme plus évoluée, il ne peut jamais être disjoint d'une fête(...) (Bataille, 1967 p.33)

<sup>16</sup> What Tinguely says of one of his own works applies to desiring-machines: a truly joyous machine, by joyous I mean free (Guattari, 1995 p.141)

<sup>17</sup> Freire, 1973 [5]

the mailing list. Here I point out two systems of knowledge that are nomadic and to some extent independent from institutional forms of control, the model of the workshop and the amateur. Both approaches could be understood as opening forms (opening in the sense of providing a different way from the vertical, hierarchical and academy regulated way of dealing with knowledge). Zooming into these practices to discover their particularities, what is it that I find? Digging into my own amateur practice and the processes of self learning I've triggered in order to assemble my patches I discover that my approach is through practice, to the actual learning through practice, because it is through exploration that my mind couples with phenomena<sup>18</sup>. I am directly referring to those definitions of a performing mind, as the coordinations of body and environment that constitute a continuity such as a conscious being (this would be coordinations of coordinations or relations of a second order of recursion that sustain self production<sup>19</sup>. Mind conceived as a phenomena of interface emerging out of the interplay of relations body environment. Mind embedded in an web with what it 'minds'. Mind as knowledge about a certain reality is mediated by this embeddedness between perceiver and phenomena, thus a mind embedded in perception.

This coupled mind recreates itself in exploration of for instance the patch and the computer. You generate a narrative with which relate to it, the narrative of the video-game or the narrative of the office or the narrative of the hacker, or the narrative of the consumer. If the accent is then in the narrative or other accommodations even of the body, the ergonomics of the learning of technology for example. If the emphasis is in the appropriation and cognitive coupling then thinking about education of technology specially for countries of the south, shouldn't only aim towards technological infrastructure (of hardware or software) but more on the ways to appropriate it. Amongst such ways of appropriation I would list, ergonomical ways, like studying with your body ways to perform with a piece of technology like sensors and patches ; syntactical ways in which you generate code and sets of recursions, iterations and loops that let you perform something you want or only enjoy the aesthetics of programming; social ways, in which you converse with others, exchange information (like in mailing lists), create spaces to meet, alienate, love or dominate others, etc.

An experimental design is realized by moving, changing, making connections, disconnecting, trying a different combination, trying over and over one setting. In the bending of material it is possible to discover the process of coupling between different structures. I propose to think of patching as a motor strategy, you actually connect objects and messages and not just write code to perform a synthesis. This combination of systems is led by the creation of a body that performs different sorts of mapping. I interpret these mapping operations as series of subjective positionings (Foucault, 1969), series of locations, here, there, that, when, with, then; locations that are not only refer-

ences to physical locations of objects, messages and numbers but are also contained in the syntax of situations, in the directions and sense of the body and the proprioceptive sense and in the directions of an evolving discourse. The method could be called a motor approach to cognition, following traditions such as phenomenology (Merleau Ponty) and neurophenomenology (Varela).

### 3.

#### *learning through a mesh a.k.a. learning as transduction.*

As Gilbert Simondon argues (1992), "transduction denotes an activity of individuation of a physical, biological, mental or social process emerging from the metastable relations between two disparate realities (...).Transduction explains the nonlinear dynamics of connection between strata defined by their potential capacity to affect and being affected (to impact and being impacted) by singular levels of actualization of a body-sex"<sup>20</sup>. The genesis of a stable entity is implicitly a transductive process. Simondon describes technicity as a "unity of becoming" and as a "network of relations". The term transduction denotes "a process- be it physical, biological, mental or social -in which an activity gradually sets itself in motion, propagating within a giving domain, by basing this propagation on a structuration carried out in different zones of the domain: each region of the constituted structure serves as a constituting principle for the following one , so much so that a modification progressively extends itself as that same time as this structuring operation...The transductive operations is an individuation in progress it can physically occur most simply in the form of progressive iteration"<sup>21</sup>

Does a smooth medium help us to be focused in the content of the exchange or deviates us from communication? For instance sloppy internet connections reveal the medium, packets, bits, buffers. Can these brakes in any way improve our engagement with communication? If we think of frustration as an emotional response, a quick abandonment that will show a lack of interest or a different set of current priorities. Or if we engage on solving a problem triggering all effervescence in our cognition -learning is an affective condition, a social coordination that modifies our organization, we learn out of engagement, play, integration, you learn about the machine by creating interfaces and all sorts of extensions, you 'machine' or you 'compute' when performing actions in the computer and cycles of recursion are generated making your body-mind fuse in the action of computing.

Here I would like to point out the charm of complex meshes or patches that make the infrastructure visible creating a break that perhaps wakes us up to perception/learning.

In my view one of the counter effects of interfacing Pd with clean and nice displays is losing its entangledness. This turgid mesh, a disastrous mind and impossible mesh sometimes is the green box (boite verte) for learning, for making relations, for putting things together in order to promote latent relations, future punctuations. Note that efficiency is not a keyword here, neither is cleanness, neatness. Neither is black box, I wouldn't like to be interpreted as if through this ideas I mean to say that our mind works as a machine.

<sup>18</sup> "a coupling term which refers to the necessary and permanent embeddedness and dependency of the self on its environment, since only through such coupling can its world be brought forth: physico-chemical laws for the cellular world, macroscopic physical properties for cognitive behavior, molecular interaction for immune self, socio-linguistic exchanges for our subjective selves" (Varela, 1991)

<sup>19</sup> Maturana, 2002 [9]

<sup>20</sup> in Parisi, 2004 p.21

<sup>21</sup> Simondon, 1995, 30-1 in MacKenzie, 2002

Can we design machines as systems of understanding that are independent from control mechanisms? Independent from hierarchy, independent of circuits of validation. Everything could be interpreted in terms of control but actually this concept is relatively new and machines are prior to this word. Here I am calling attention over the historicity of a concept such as control, a claim that Foucault (1969) formulates in the need to put into question conceptual formations that pervade our culture. If control is brought into question, how can a system of knowledge provide with a program that is nomadic as a kind of design that escapes the panopticon? Control is a paradigm and information is affected by it, the paths of circulation are limited and somehow monitored, knowledge is not distributed equally. Knowledge about technology and science is not accessible to all.

An alternative to design technology to the paradigm of control is a model of cooperation -A friend computer, an open source metamachine that is assembled by knowledge from people, and in this way distributing the sources and the design. What we see in the Pure Data mailing list are the unconnected parts of a metamachine whose presence reveals the transparent connections acting behind technology, connections that are at the same time, human, historic, technical, poetic and why not, political.

The challenge is then to show the invisible constituents that extend and unite these parts. These visions of the interior are a kind of metavision of the historicity of the bodies that bind to such structure and the aim is to attain an openness of knowledge about processes attached to the production of the machine itself. Its an environment where appropriation is a key concept consisting of a mixture of tactics, to name some, plagiarism, interpretation, and a methodic use of everydayness. Pure Data is an example of recombinations of knowledge that could lead to situations of nomadic learning, emergent knowledge (*connaissance* via the synchronization of different cognitive patterns, mine and other people's patterns, ours and electronic patterns, informational and technological. Structural coupling refers to these bindings of body-language, chords and objects, patching of languages and code and to the different materialities being embedded in a situation. In this investigation, exploration becomes a source of combinations of embodied actions, the situation evolves into a machine, a machine of various bodies, interconnecting with one another creating passages and distribution of energies, creating paths that are absorbed by new organizations.

A Pd patch is a design that is open to include new structures and that benefits from its bastard nature. Patches are made of instances of structural couplings, in those instances interaction of components take place, interactions at a molecular level, transductions. I have brought into place the different dimensions that in my view compose situations of networked learning. Although I'm not claiming the network as the new champion model. In fact the network is the trap, the trap for communication and for learning. It takes a lot of engagement and critical consciousness to use the trap to make it leak for us some samples of meaning.

The system of understanding that I propose to build around and on top of Pure Data is an impossible machine in the sense that components of different nature are brought to-

gether into one body and represents a situation where disparate natures are together. This machine is an assembled situation and from this assemblage which performs a series of routines, is possible to observe from within the actual situation. Within this qualitative model we will be able to hold study situations of multidimensional nature. What I am also saying here is that Pure Data could be used for other things than media. Considering how media of all kinds is so close to be coopted by spectacle perhaps is not a bad idea to recreate some other practices like education. To name a few examples literature exercises, creative composition adventures with the participation of machinic recombinations (Pd cut- ups), Pd for understanding electronic gates and circuit simulation, Pd for learning of spectral music.

It is worth to mention that I am arranging together a couple of elements in a chain: Pure Data software+Pure Data archives+Pd community+Pure Data learning situation. They conform what I imagine as the learning mesh (a special kind of metamachine).

The break in perception<sup>22</sup> is the moment when we become aware of our body and all networks of cognitive and emotional coordinations. These breaks that constitute the uneasiness of a patch lead to a sort of learning through the appearance of transitory interfaces - we can expect transduction of attributes between disparate realities, it is an active map also in the sense that it embodies an environment created from different techniques of appropriation, self learning, plagiarism, DIY practice. Finally it is a feminist tactic or feminine in the guattarian sense [6], a receptive way that couples together different styles and contexts. What I propose it is an understanding of Pure Data software through a feminine model or a paradigm of cooperation. A paradigm of relation as in erotic experience, the constant transduction of attributes between parts become coupled according to changes of intensity. It could also be integrated in a vision of excess where the components of the machine constantly change by means of these moving couplings<sup>23</sup>, like in the mailing list meta machine i.e. These moving assemblages of interfaces escape definitions and transduce energy that will surpass the grids of control.

## 4. ACKNOWLEDGMENTS

Thanks to paper chair and reviewers for excellent comments and questions and to Yves Degoyon, Reni Hofmuller and Martijn Sinke for reading and assistance.

## 5. REFERENCES

- [1] G. Deleuze. *Foucault*. Les editions de minuit, 1986.
- [2] C. A. Ensemble. *The electronic Disturbance*. 1994.
- [3] M. Foucault. *The archeology of knowledge*. Routledge, London and New York, 1969.

<sup>22</sup>Varela, 1999

<sup>23</sup>The object is no longer to compare humans and the machine in order to evaluate the correspondances, the extensions, the possible or impossible substitutions of the ones for the other, but to bring them into communication in order to show how humans are a component part of the machine, or combines with something else to constitute a machine as soon as this nature is communicated by recurrence to the ensemble of which they form a part under specific conditions. The human-horse-bow ensemble forms a nomadic war machine under the conditions of the steppe. (Guattari 1995.p121) [6]

- [4] M. Foucault. *Discipline and punish. panopticism.* 1975.
- [5] P. Freire. *Education for Critical Consciousness.* Continuum, London, U.K., 1974.
- [6] F. Guattari. *Chaosophy. Semiotext(e) foreign agent series. distributed by The MIT press U.S.A.* John Wiley and Sons, New York, 1995.
- [7] J. Lachaux, E. Rodriguez, J. Martinerie, and F. Varela. The brainweb: phase synchronization and large-scale integration. *Nature Reviews Neuroscience* 2(4), pages 229–39, 1999.
- [8] H. Lefebvre. *La vida cotidiana en el mundo moderno.* Alianza Editorial, Madrid, Spain, 1968.
- [9] H. Maturana. Autopoiesis, structural coupling and cognition. 2002.
- [10] H. Maturana and F. J. Varela. *Autopoiesis and Cognition: The Realization of the Living.* D. Reidel, Dordrecht, The Netherlands., 1980.
- [11] L. Parisi and T. Terranova. *Heat-Death, Emergence And Control In Genetic Engineering And Artificial Life.* 2000.
- [12] N. Rajani. *Free as in education. Significance of the Free/Libre and Open Source Software for Developing Countries.* Oneworld Finland and Kepa, Helsinki, Finland, 2002-2003.
- [13] E. Rodriguez, N. George, J. Lachaux, J. Martinerie, B. Renault, and F. Varela. Measuring phase synchrony in brain signals. *Human Brain Mapping* 8(4), pages 194–208., 1999.
- [14] E. Rodriguez, N. George, J. Lachaux, J. Martinerie, B. Renault, and F. Varela. Perception's shadow: long-distance synchronization of human brain activity. *Nature* 397(6718), pages 430–3, 1999.
- [15] T. Winograd and F. Flores. *Understanding Computers and cognition, A new foundation for Design.* Addison-Wesley, Indianapolis, U.S.A., 1986.