Cybernetica vs. Descartes

december 2017

De geest van het non-cartesiaanse theater volgens Orion Maxted

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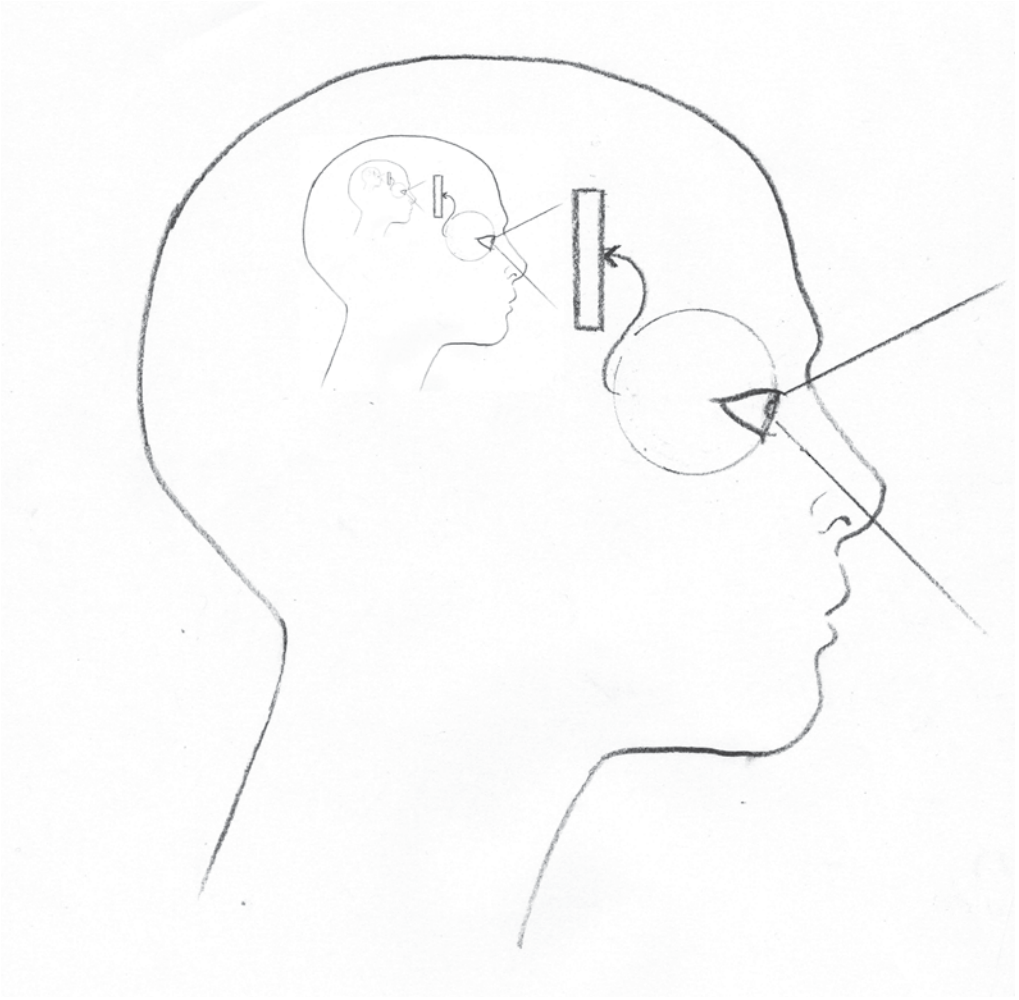

Het theater als complex systeem waarin spontaan een globale, zelfregulerende orde ontstaat? Het theater als schaalmodel van de menselijke geest, van de hele wereld, van mierenkolonies tot Wikipedia? Volgens informaticus en performancekunstenaar Orion Maxted is het theater de plek par excellence waar de aloude cartesiaanse scheiding tussen geest en lichaam – én tussen 'ik' en 'jij' – opgeheven kan worden.

Door Orion Maxted

"Contemporary science sees societies, organisms and brains as complex adaptive systems. This means that they consist of a vast number of relatively autonomous agents (such as cells, neurons or individuals) that interact locally via a variety of channels. Out of these non-linear interactions, some form of coherent, coordinated activity emerges – a phenomenon known as self-organization. The resulting organization is truly distributed over the components of the system: it is not localized, centralized or directed by one or a few agents, but arises out of the interconnections between all the agents."

Francis Heylighen, Challenge Propagation: Towards a theory of distributed intelligence and the Global Brain, (2014).

Complex adaptive systems theory and the related fields of cybernetics and systems theory appear to underpin the transformative technologies of our time: biotechnology, artificial intelligence, the internet, ecology, cognitive science, sociology, geopolitics and economics, to name but a few. Moreover, these theories provide a common systemic basis of understanding connecting all these fields, whilst, some would argue, connecting back to many of the non-dualistic ideas from Eastern thinking tradition. This suggests we may in fact be living through a revolution, or second enlightenment, of complex systems.

So how can contemporary theater and performance relate to these developments? My interests is to align art-thinking with science-thinking, not by killing art, theatre or poetry, but by finding what they have in common. And in so doing, to make the systemic worldview available to theatre audiences. After all, art, theatre, poetry, are specific constructions to help us to perceive and experience the world around us.

In my recent performances: [THE MACHINE], HUMAN SIMULATION and now THE WISDOM OF CROWDS (working title) – I have been researching the possible ways to make theatre and performance along systemic principals. In particular by creating complex adaptive systems where the 'relativly autonomous', interacting agents are actors or audience members who are connected together in a system principally made of language - communiaction. The systemic principals are informed by the rules of cybernetics, systems biology, memetics and computer algorithms.

In my work, I prefer to work from concrete principals, such as processes, feedback loops and transformations that can be applied that can be applied to language, movement, objects, presence, position, colour, volume, etc. However because of emmergence, the interaction of these concrete principals with the world always generates theory – like a spider spinning a web. To a degree this text is one such web, I hope an interesting one, that brings some insight to what I'm thinking about and why complex adaptive systems are interesting and relevant to theatre and our understanding of the world.

> " Als de verklaring voor hoe we denken simpelweg bij een andere denkende entiteit wordt gelegd, verklaart ze helemaal niets. "

The origins of this text was a conversation between myself and Professor Francis Heyligen, who invited me to be a member the Evolution, Cogniton and Complexity research group (ECCO) at VUB. That conversation became a 'cybernetic aftertalk' at the Beurseschouburg which was picked up by Etcetera magazine - so here we are.

During the conversation in question we came across the idea of The Cartesian Theatre.

Cartesian theater and its little spectator

The Cartesian Theater is a metaphor from cognitive science about the mind-body problem. The invocation of theater in this context is obviously intriguing to me as a theatre maker. In this text, I will attempt to use The Cartesian Theater to examine the relationship between theater, the mind and the world through complex systems.

The metaphor of The Cartesian Theater makes explicit the image many of us have when we stop to think about consciousness. It is the innocent seeming perception that the input signals, which come from the outside – via our eyes, ears, nose, our sense of touch, and so on – come into the brain, passing through all the nerves and neurons, until they finally end up at a specific place – a boundary or finishing line – where all the input signals come together on a screen or, miniature theater at the 'center' of the brain (which most people locate a few centimeters behind the forehead) where 'we', or rather a little version of ourselves, sits observing all the images, sounds and other sensory data that flash by, while we think, make decisions, and send out commands.

That idea is wrong, says Daniel Dennett, the American philosopher who first coined the term Cartesian Theater in his book Consciousness Explained precisely to warn us against this way of thinking about consciousness. The problem is that this Cartesian theater requires a spectator – a Homunculus (literally: little man). And that raises more problems. Because how does the spectator manage to see? Following the same logic, then surely he also needs a little theater inside his head? And that theater, in turn, would require an even smaller spectator, with an even smaller theater... And so on, and so on, reducto ad absurdum: an infinite regress. The explanation of the way we think has been replaced by another thinking entity – thereby explaining nothing. As Francis

Heylighen puts it: "It's as if a recipe for cake contains the ingredient 'cake'." Dennett's point is that, clearly, this way of thinking about the mind is a mistake. Yet it's hard for us to imagine consciousness otherwise – because the idea of our brain as a 'privileged center' is so sticky, seductive and appealing. Just like cake.

A very brief history of worldviews

The point Dennett wants to make is that we contemporary western folk still hold on to remnants of Cartesian dualism, albeit in a materialist form. This actually affects how we see and act upon the world. To understand this, we need to trace a brief history of worldviews following in the footsteps of Gregory Bateson, the British cybernetician and anthropologist who goes back in time in 'Pathologies of Epistemology', an essay from Steps to an Ecology of Mind.

Early anthropological records suggest that the pagan religions regarded humankind as being one with its environment. At first we took clues from our natural surroundings – patterns, animals, stories – and used those as metaphors to understand ourselves: the totemic worldview. Then the relationship seemingly reversed: We started from those stories about our lives and ourselves, and we used them to give meaning to the world. The stars, the rivers, and so on: the animist worldview. What happened next, though, was fatal. First, we separated the idea of the mind from the natural world, thereby arriving at the idea of the gods. Second, philosophers from Greece and India introduced a conception of the world fundamentally composed of separate parts: the atomist worldview.

Cut to 17th century, post-renaissance Europe, where these two worldviews collide: the gods (which by then have come to represent the Christian worldview) versus the atomists (by then synonymous with the reductionist mechanistic worldview). In the middle sits the doubting homunculus himself, René Descartes. Descartes is trying to synthesize these two worldviews. He wants to reclaim epistemological authority from God, yet he worries that the mechanical worldview, which explains animals as automata, leaves no room for a human mind, soul, or free will. So, to cut a long story short, he proposes two separate kinds of substance: mind and matter, which interact at the pineal gland – bringing us to the Cartesian dualist worldview.

From I think, therefore I am, Descartes places mind above matter. He gave us the idea that the brain simply represents reality to the mind, with the brain acting as a kind of theatre of reality 'out there'. This is known as the Naive Reflection-Correspondence theory of mind. (Whereas we now know our brains are active in co-creating reality). Even though science has stopped believing in dualism - because how can the separate mind-stuff and matter-stuff interact if they are really different stuff? - the separation, and hierarchy, between mind and brain lives on in a secular materialist way, namely in the separation Dennett describes through The Cartesian Theater as Cartesian Dualism.

> " Van een afzonderlijke 'ik' die het lichaam eenzijdig domineert, is het een kleine stap naar machtsgebruik en intimidatie van anderen. "

Underlying it all is the tendency to see the mind, brain, world in terms of separation rather than connection. In the case of Cartesian Theatre, this separation is the idea that the mind is located in a specific place distinct from the rest of the brain, this is a partly a remnant of reductionism – the attempt to explain the universe by dividing it into separate parts and then determining the properties of each part. What is at stake is that this gives us a faulty understanding how our minds function, and by extension how the world functions. But more than that, this fault in our thinking system might be at the core of many of our modern global crises.

As Bateson puts it: "When you separate mind from the structure in which it is immanent [...] you thereby embark, I believe, on a fundamental error, which in the end will surely hurt you." The idea of a separate 'I' able to unilaterally exert control over the body leads quickly to the use of power and coercion over others. It becomes 'Me' versus 'You'; humankind versus environment. "The organism that destroys its environment destroys itself", to quote Bateson again. When we see ourselves as separate from the world, as if observing the world from a distance. We, as human beings separated our environment, don't really see how world events are connected. So crises just seem to appear from nowhere. And the last thing we're able to see is that these problems have their origin in our thoughts tendency to separate things, On the contrary we thought that kind of analytical thought as being the very thing we had to solve our problems. But, as Bateson says, when we change the unit from 'I' to 'I together with environment', i.e. when we see our minds, ourselves, our societies, our environment, as cooperation becomes the obvious strategy.

TOWARDS A NON-CARTESIAN THEATER?

Perhaps you're wondering what this has to do with actual theater? After all, The Cartesian Theater is a metaphor about the brain-mind problem, not about theater itself. Nonetheless, theater has been invoked in this story of consciousness, worldviews and complex systems, and perhaps that's not a coincidence.

Dennett is saying that we ordinarily think about the mind as a theater, and that therefore we don't understand the mind. Does this also work the other way around? In

other words: is there an extent to which we actually think about theater as a Cartesian mind? And if so, is this way of understanding theater be out of tune with our times as we enter an age of complex adaptive systems?

Rather than being a complex adaptive system, doesn't it contain the remnants of the kind of Cartesian hierarchy, that particular notion of power and coercion, of mind over brain, described by Bateson? Doesn't it tacitly hold on to the idea of the 'script' of 'commands' passed from the mind of the writer via the passive conduit of theater, actors, stage, etc, directly to the brain of the audience? Doesn't it still tacitly hold on to the image of itself as a 'mirror', exemplifying the Naive Reflection-Correspondence theory of knowledge? Isn't theater in effect, often staging the contents of audiences mind - staging perceptions for a homunculus? In a sense the construction of theatre still implies the old world view that the world is composed of privileged centres where 'ideas' come from and go to, rather than being the result of the whole system.
It reinforces the image of the separated spectator - and all the problems that stem from that separation.

Of course some of these arguments are at least as applicable to other art-forms such as cinema or television. Perhaps Daniel Dennet just doesn't understand contemporary theatre, or he picks on theatre because he think of it as anachronistic. But that's not the point.

I happen think that theatre has unique qualities that also make it non-Cartesian. And, I'd like to imagine a new kind of non-Cartesian theatre with you – a theatre where power and authority are constantly delegated and redistributed through the whole system. A Theatre based non-complex adaptive systems.

Language and action distributed through a network of human actors

Dualism or reductionism get us nowhere; we need to understand a system not as located, nor as beginning or ending in any one part, but rather as a whole distributed across many components and their relationships. These relationships mean that the whole has properties that its components lack.

The relationships between the components are more important than the components themselves. That's because, in systems theory, every component is itself a smaller system, composed of parts and relationships – with each of its parts in turn being a smaller system, composed of parts and relationships – and so on. In the end, everything boils down to relationships (of relationships of relationships). The material basis is therefore an abstraction in systems theory – it doesn't matter if something is mind or matter; what counts is the way the relationships are organized. This transcends the mind-brain dichotomy arising from Cartesian dualism. Examples of components in such a complex adaptive system range from proteins, neurons, cells, computers or companies to people. This last 'category' shows that

> " Kunnen we ons een netwerk inbeelden, zoals de natuur, waarin macht en autoriteit voortdurend gedelegeerd en herverdeeld worden? "

we really can use theater as a substrate for implementing actual complex systems.

The most basic distinction in systems theory is the boundary between a system and its environment.

The environment consists of everything that is not part of the system, but that interacts directly or indirectly with it. The system boundary is always subjective, porous, shifting or shiftable. The relationship between system and environment is conceptualized as input and output. The system responds to input – i.e., a change in its relationship to the environment – as soon as the system detects it. This causes the system to act upon the environment in some way, creating output. The flow from input to output is a process, a transformation.

In the kind of theater that I am proposing, the performance represents the workings of a system, while the typically human actors are its components. (They can also be called 'agents', or 'nodes'.) Different systems or actors can be joined together when the output of one becomes the input of another.

There are three basic ways of coupling systems: sequential, parallel, or circular. When two or more systems are joined, they become a single system. So what we end up with is the image of a network of people, in which language and action are distributed and thus collectively transformed. In short: the equivalent of thought in the brain.

There are many ways of organizing the structure of the network and many different rules, conditions, actions, etc., with which to form the relationships. Some of the most important structures are circular. Simple feedback loops – where more of 'this' causes more of 'this' – can be explosive, causing the system to become nonlinear and to run away. Feedforward loops on the other hand – where more of 'this' causes less of 'this' – allow a system to make predictions and to become self-corrective.

The Wisdom of Crowds

I'm going to describe some of the inner processes of The Wisdom of Crowds (working title) – an experimental performance that brings together many ideas from cybernetics, algorithms and complex adaptive systems,

which we presented at the Cybernetic, Algorithmic, Systemic Theater Symposium at Frascati, Amsterdam in June 2017, and that which we are currently developing into a full-length piece to premiere at Something Raw Festival in Amsterdam, March 2018.

In the piece, the audience are transformed into a giant brain that is capable to thinking, solving problems and making a performance. A brain is a type of complex adaptive system. So following Heylighen's, definition, we are trying to create the conditions for "the spontaneous appearance of global order from local interactions, distributed across all components". The components of this mind are the audience members, interacting through what they write on their mobile phones.

A text projected onto a screen instructs the audience to take out their mobile devices and to login to a network. The audience discovers that they can write – whatever they want - and that their writing is projected on the stage; and that they can upvote and downvote each other's writing. The individual audience members are in fact connected through an algorithm, forming a network.

The phone-audience interface is kept simple and straightforward so that the focus is on patterns of emerging out of those local transformations and interactions, leading to a kind of 'global order' – so that the audience connect and become a single thinking entity.

With an audience of 200 people we have a network with 200 x 199 connections. The system monitors them all. Every time somebody edits or up-votes somebody else, the relationship between them is strengthened. Every time somebody is down-voted, the relationship is weakened. If a thought ends up winning the competition to get onto the stage projection than that connection between the audience members who collaborated to write and vote that 'thought' is doubly strengthened. This means that, over time, the brain learns which are its best connections, its best collaborations. We are in effect building a small neural net made of people. An artificial neural net is an algorithm that mimics the connections of neurons found in nature, i.e. in our brains. These types of algorithms are currently having great success in the areas of artificial intelligence, facial recognition and deep learning. Computer-based neural nets have been trained to recognize images of cats, for example. Interestingly, programmers discovered they could reverse engineer the neural nets: by asking them to recursively look for cats in images that don't contain cats, and by slightly enhancing the region that stimulated something in their cat-recognition networks, pictures of strange cats' faces do in fact appear in the image. In The Wisdom of Crowds, the proposition is similar: if a theater audience can recognize performance, then if we can connect them as a neural net, and then 'reverse engineer' that neural net, so that a 'performance' appears?

Three further cybernetic concepts are also appear: competition, stigmergy and feedback.

Through the voting we see competition. That the whole

> " In het theater dat ik voorstel, staat de performance voor de werking van een systeem, terwijl de menselijke actoren de onderdelen uitmaken. "

'brain' is producing 'subconscious' ideas which compete for dominance, in order to appear in the shared working space of 'consciousness' i.e. in the Wisdom of Crowds – the stage projection – where after a brief moment, each idea will likely be replaced by content, or another 'subconscious idea' from another audience member. What passes as 'consciousness' is simply the module that the whole network picks as the winner at any given time.

At a certain point, the audience will discover that they can not just up-vote and down-vote each others writing, but also edit each other's writing. This brings us to the cybernetic concept of 'stigmergy'. Stigmergy is the process that communal insects, Wikipedia, protein transcription networks and consciousness have in common whereby agent (e.g. an ant, individual, cell, neuron) leaves a trace in the environment (a pheromone trail, a sentence or a protein), which later stimulates another agent to continue that task or to perform a subsequent action. Language in the brain, i.e. 'talking to oneself', together with memory, functions as interiorized 'stigmergy'.

We can also divide, the audience, i.e. the network, into two sub-networks effectively producing two sub-brains. These two brain systems write to each other – they are linked by the desire for collaboration or competition. At the same time, two (actual human) actors appear in the space. Soon the audience brains learn that they can control the actor, like an avatar or puppet, to affect the other

actor and its environment. The actors will say or do whatever the audience brains think and write. Each brain module Multiple feedback loops thereby appear: between the actors, the two audience-brains, and the text. Feedback loops mean that every action triggers a subsequent action - one of the conditions for complexity and adaptation to emerge.

Now the problem for the brain, i.e. the audience, (and for me the maker), is how to coordinate the audience brain so that they can they think together and create a performance, or solve a problem, where the sum is greater than what the individual parts could do on their own. Something that lives up to the idea of 'The Wisdom (or the Madness) of crowds.

An extended mind

Out of the whole mind, a performance emerges. What we notice as we build a complex adaptive system theater mind - is that this mind closely resembles society.

Coming back to Bateson:

Let me list what seem to me to be those essential minimal characteristics of a system, which I will accept as characteristics of mind:
-The system shall operate with and upon differences.
-The system shall consist of closed loops or networks of pathways along which differences and transforms of differences shall be transmitted. (What is transmitted on a neuron is not an impulse, it is news of a difference.)
- Many events within the system shall be energized by the respondent part rather than by impact from the triggering part.
-The system shall show self-correctiveness in the direction of homeostasis and/or in the direction of runaway. Self-correctiveness implies trial and error. Now, these minimal characteristics of mind are generated whenever and wherever the appropriate circuit structure of causal loops exists. Mind is a necessary, an inevitable function of the appropriate complexity, wherever that complexity occurs. But that complexity occurs in a great many other places besides the inside of my head and yours. […] let me say that a redwood forest or a coral reef with its aggregate of organisms interlocking in their relationships has the necessary general structure. […] A human society is like this with closed loops of causation. Every human organization shows both the self-corrective characteristic and has the potentiality for runaway.
Bateson 1978, p.488

It turns out that 'mind' and 'complex adaptive system' are synonyms. Theater as a complex adaptive system, is a mind. The units of evolution and mind are the same – they both turn out, in the broadest sense, to be responsible for preserving and developing differences and complexes of differences in networks.

theater = complex system = mind = evolution

Our mind is a model, a small-scale piece of the same pattern that is pervasive in the whole world – not a mirror of that world. And the same can be said about theater.

As a complex system, as a mind, as evolution, theater becomes a looking glass with which to observe, shape and reflect upon this brave new systemic world – for theater audiences and scientists alike. As a systems biologist, Professor of Synthetic Systems Biology Hans Westerhoff (University of Amsterdam) has said, real complex systems are incomprehensible to the individual human mind. But if we join many minds together as an extended mind, then perhaps it becomes possible think such systems from the inside.

The mystery of consciousness diminishes when we see

> " De geest en complexe adaptieve systemen zijn gelijk aan elkaar. Het theater als een complex adaptief systeem, is dus een geest. "

that it belongs to a network and that, as in theater, the network extends beyond the individual actor or audience member into the whole system. Consciousness is a property of the whole then, collectively created and distributed, transferred onto each part, each individual, who in turn expresses the whole, using the same terms – I, you, we, it.

"Nobody is really in control, so we give up control, then it turns out that what I really want is what you want. And I don't know what you want.
Surprise me." (Alan Watts)

Special thanks to

Francis Heylighen, whose conversations and lecture series Cognitive Systems: a cybernetic perspective on the new science of the mind at the Free University of Brussels has been invaluable in the formulation of this essay.

Works cited

Francis Heylighen, Cognitive Systems: a cybernetic perspective on the new science of the mind (notes 2014-2015, ECCO: Evolution, Complexity and Cognition, Free University of Brussels).

Daniel Dennett, Consciousness Explained, Little, Brown and Co., 1991.

David Bohm, Wholeness and the Implicate Order, Routledge, 1980.

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