

What is it to be Human? A theatre neuroscience perspective

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Abstract

What is it that Neuroscience and Theatre-making have in common, what could it be that each can learn from the other, and what could a reflection on this tell us with regard to what it means to be human? It appears that the human being comes into being equipped with a grammar of action which cannot be acquired otherwise. Theatre making requires that same grammar of action to be reorganised and codified in a manner in which it can be knowingly refined – a manner which then seems to allow it to be used creatively and with an ever increasing dynamism. The cognitive sciences are providing new insights into the mechanisms that substantiate that grammar, allowing it to achieve new syntactic heights that make the word “imitation” unsuitable as a description of human action.

Keywords: Human, Neuroscience, Theatre, Grammar

This paper is a transcript of the presentation the Authors made on the 20th April 2007 in the opening session of the seminar series “*Teatro e neuroscienze*” at the *Scuola Superiore di Studi Umanistici, Università degli Studi di Bologna*; as such it retains the dialogical and colloquial format of the presentation, albeit with some slight modifications here and there, mainly of a linguistic nature.

JJS The fact that this three-month long series of seminars is entitled *Teatro e Neuroscienze*, and the reference its brochure made to the 14-year long collaboration between Professor Muscat and I, resulted in our opting to make our contribution in the form of a joint presentation, as you know. We have therefore chosen to speak in a sort of dialogue around a number of slides we will be showing. We decided to do it this way because of the complexity that twinning our two disciplines necessarily entails. We shall therefore be taking a line that will take what is known of the work of the performer as a model to inquire into what we still do not know about the human being. Though this may not seem strictly in line with these seminars' quest for a new theatrology, we hope to shed interesting light on that inquiry.

In good part, our choice to proceed in this way is grounded in our belief that there is one thing that theatre-making can never stop doing – and that is carrying out experiments. That is Fabrizio Cruciani's superb intuition – all theatres are laboratories where experiments are carried out; in some laboratories exciting experiments are the norm, necessarily resulting in crucial insights, whilst in others, time-tried and tested, proven experiments whose outcomes have long been known are churned out again and again, not only uselessly but, worse still, ineptly. In view of this, in view also of another superb intuition, Meyerhold's this time, when he says that "Theatre is the art of Man", our presentation will be taking a course which we hope will underline this dual, exciting reality of performance being constantly a research into what it means to be a performer, which is concomitantly a research into what it means to be human.

RM What has probably enabled us two to collaborate as we have been doing over the last 14 years is the fact that neither of us has presumed to be able to really understand what the other is doing. I am not a theatre person but, as a neuroscientist, I like to look in and see what the performer and the performance may be able to do. I do not pretend to be able to understand what the theatre-makers are doing and I do not expect my collaborator for 14 years to appreciate totally what it is to do science. What we wish to do – and I believe that is very important – is to have a discourse between the two, a discourse which would then allow me to see particular things which I don't see when I do my work with rats.

JJS Neither does he presume to be able to really understand what I do in my research processes in my Studio and in my theoretical writings, in my handling of my terminology, where I seek to analyse what it is that I am trying to do, nor do I presume to understand what it could be that he is trying to do in his laboratory on his rats. The thing is, however, that we are both dissecting and analysing, in the same way as the performer is dissecting and analysing, in the same way as the scientist is dissecting and analysing on his rats... but we shall come to that later on.

We met late in 1993, when I was working on my thesis and I needed to sound a neuroscientist on some ideas which had suddenly come to me. Immediately, we saw wonderful prospects ahead if we could bring our two disciplines to bear on our shared interests, so we entered into an intense phase of meetings and sharing of writings, books and journals. In 1994 Ingemar Lindh joined our thinking process, and then Benno Plassmann. Together we managed to interest the University of Malta in what we wished to do and that opened the route to what became formally known as **xHCA**, a research collaboration based at the University of Malta. What is interesting in the scenario we are here opening out is that we agreed that the first six months of **xHCA** would be devoted to one thing only – the searching for a shared terminological corpus. The difficulty we were finding was not in some complex terms specific to one or another of our disciplines, but in seemingly simple words all of us use in our disciplines, words like "action", "do", "imitate", "repeat", "act", "move", "attention", "create", "intention", "decide", "memorise", "learn", "forget", "feel", "energy", "express", "image", "imagine", "impulse", "movement", "presence", "representation" and many others. Most of these terms had different meanings in the different disciplines; we found that we were using them in ways that created understanding problems.

We all know the importance Stanislavski attached to terminology, the many times he directly referred to it, the times he fought for his right to use his terms in the face of political pressures. We shall face this matter later on; for the moment we want to get a glimpse of its importance by referring to one fundamental phrase Stanislavski can be said to have coined. It may perhaps have been used by others before, indeed Diderot has a famous passage gyrating around the concept, but he words it differently. The importance of Stanislavski's wording of it transcends the terminological, constituting a major intuition. "I don't believe you," was the roar his actors were so afraid of hearing, "that's not how you would do it in life!" Diderot's

insight was akin to it – he pointed out how false it would sound if an actor were to use, “in the street” (Diderot’s choice of words), the same quality of shouting we would accept from him on stage.

There is much to be said on the contraposition Stanislavski’s “in theatre” and “in life” creates. For the moment we shall only point out that it would be a grave mistake to think that with this Stanislavski may have been flogging the horse of realism or naturalism. Far from it! His “that’s not how you would do it in life” has nothing to do with the mere “imitation of life”, the “slice of life” of realism. It has nothing to do with Shakespeare’s “holding a mirror up to nature”, either, nor with theatre being “a reflection of life”.

We shall come to that later however, because our structure demands that we clear other aspects surrounding it before we come to it. The reason we mention it at this point is twofold. On the one hand we feel it is one of the most potent terminological tools in the corpus Stanislavski has bequeathed us, and so we choose it to open and temporarily suspend our reflection on terminology. On the other hand, we wish to strengthen our position by referring to it to support the line we are following, because with that phrase Stanislavski sends out a very precise signal to the performer: there is some crucial, fundamental principle that the Performer needs to discover by observing how we go about our everyday actions “in life”. Without studying human actions “in life” the performer might not discover the essence of that principle, and not discovering that essence would impede him from discovering something crucial and fundamental governing his work. In that sense, in seeking to abstract, from life, that fundamental principle, the performer does need to “reflect upon life”, which does make his work “a reflection on life”. That, however, is fundamentally different to what that phrase is usually taken to mean. Stanislavski’s strategy is for the performer to do study human actions “in life”, and we are highlighting it at this point because we are taking that strategy and its objective, inverting it and then modelling our presentation on that inversion.

What we are proposing is that by studying how the post-Stanislavskian performer – the performer grounded in the revolutionary insights that came with Stanislavski’s opening the flood-gates – goes about his work creatively, one should stand a very good chance of making some crucial discoveries regarding what it is to be Human. The performer can be studied as he prepares himself, at work in his investigative laboratory situation. This situation can allow us to study the human being at work in a way in which he could never be otherwise studied. If we do that, we could gain vitally important insights into the potentialities of the Human Being. Although we shall thus seem to be skirting the discourse of a new theatology, whatever we shall be saying will, however, be supported by a veritable river of theatology. The question we are posing is “what is it to be Human?” If then Meyerhold is correct when he says that “theatre is the art of Man”, the priceless statement he repeats many times in his “Fairground Booth” essay, then in posing our question are we not also asking “what is it to be Performer?” And if we are asking that, are we not posing the most important question of all in theatology?

RM It is very important to understand what we are saying here. From my perspective, that of neuroscience, most of my work is done on either psychiatric patients – which means that I would prepare a model, for example: “What is it to be depressed?” – or else I could do cognitive type experiments, I could ask particular questions of students, for example: “is their memory working as I expect it to work? How good is their memory? How good is their reaction time?” And that would be investigating a normal individual.

It would thus either be a matter of investigating an abnormal incidence – pathology – or of investigating normal behaviour.

The advantage I find in looking at the work of the performer lies in the fact that it is – according to what John says... and I have to believe him – a reflection of life, in the sense that phrase has in our usage, as John has explained. By looking into it, therefore, I could maybe learn something else that I might otherwise not see. This means that I could then go and design a particular experiment which I could then maybe carry out on test subjects. Alternatively, I could take it one step further, where I could do an invasive kind of technique (I will discuss this further on) to carry out on my rats. And then, more importantly, if I find anything of interest, that will go back into the “world of performance”, to “inform” those working in it. The basis of our relationship lies here.

JJS Having mapped out the territory in which we intend to operate in our presentation, let us now focus on some of the most important changes the early 20th Century master pedagogues effected, thus preparing to discuss how those changes are crucial for the purposes of our research. One of the most challenging statements of the time was that of Gordon Craig, *l'enfant terrible d'Europe*, as he was referred to. Craig held that theatre cannot be an art form – because human flesh is its medium and human flesh cannot be disciplined. And yet, all that the masters did at the time Craig pronounced those words – Stanislavski, Meyerhold, Copeau, even the very thrust of Craig's own work, and that of Artaud and countless others was nothing but challenge that very statement. The entire corpus of work of the master pedagogues did little but make it evident that (1) the work of the performer is an artistic discipline and a creative act, (2) it is so precisely because it manifests a precise and real possibility for that flesh to be disciplined, (3) this can only come about by means of training, (4) training on its own does not suffice – one needs to have the ability to analyse that training, (5) for that analysis to be valid one needs to be able to construct a scientific, terminological base and (6) that scientific, terminological base needs to generate a corpus of documentation, writing and transmission – for which that scientific, terminological base is indispensable.

The vertiginous succession of events bringing all this about changed the playing-field beyond recognition. Theorising on theatre suddenly shifted dramatically away from the writing of play-texts and the writing about written play-texts to a burgeoning corpus of writing about the making of theatre – an earthquake of a change. Each master (and many a performer) started writing on his own work, analysing it, fragmenting it, breaking it down – practically a scientific analysis. Etymologically, the very word “science” is about breaking things down into ever smaller and more manageable components to enable analysis, which is precisely the very essence of the technique and the strategy the master-pedagogues devised for performers, and we will come to this later. This highly analytic writing is remarkably unlike what most other artists do – and the reason for this lies in the very nature of the art-form. In performance, there is no artistic product left in existence when the creative act is over and done with. In painting, or writing, the artist can return to his opus so as to contemplate it. To contemplate his own work – something every artist desperately needs to do – the performer can only resort to his memory. And so, early in the 20th Century, theatre-makers start writing – to retain that memory in a way that could be revisited. Memory, however, can only allow the performer to contemplate his doings, his actions, the qualities of those actions, how his muscles worked, his joints, his nervous system, his handling of energy. And so he writes – so as to be able to look back on something. Later on we shall look into this, and we shall do so with awe, seeing the performer elevate himself to become a highly refined, self-organising system, generating iterative processes the effects of which are impressive. We will also posit that this is one of Man's most amazing attributes, anyway. The performer, we shall however argue, works upon it knowingly, and that is quite something. The entire process of the performer working upon himself seems to be not only scientific but iterative, landing itself right in the very centre of the discourse of complexity.

The paths of theatre and science crossed many times, from ancient Greece, right down to della Porta, Lavater... in our times however, the encounter is of a much more fruitful nature. And that difference is due to what the early 20th Century master pedagogues brought about – the performer's work came to be seen as an art form where the practitioner is (1) artist and, at the same time, also (2) locus where the creative act occurs (it is in him that creativity is manifest), (3) creative process (it is in his temporality that creativity occurs), (4) medium – quite as the pigment in painting, through which, by which and with which the creative act is materialised, the prime matter, therefore.

I don't like using the term “prime matter”. It is often used in discussions on the performer, however, and I opt to use it so as to face the problem squarely, rather than avoid it. The reason I don't use it is simple – if we can talk of the performer as being the “medium” of the creative act, if he himself is a “medium”, a “means”, if he is the “prime matter” – then *whose* is he so? The painter is not pigment. Even though Klee did say “I am possessed by colour – I am colour”, still of course, to paint he had to take up colour with his brushes and put it onto his surfaces. In performance, however, there is this indisputable inseparability between the performer who creates and the “material” “which he uses” in creating. The phrase “which he uses”, however, is wrong – what would this “he” be, if it were the case that “flesh is the material which he uses” to create? The recognition of the inseparability of what is really one, enables us to start seeing even more important inseparabilities – that of performer and action, performer and performative act, performer and performance. It is for this reason that I say that the performer is, at the same time, *objet d'art*. He is,

himself, the artistic object. He who is the subject that takes action, he who is the agent, he also is the artistic object. The agent subject posits himself as object to be beheld, to be seen, to be observed. In theatre-making, the subject who engages in the creative act renders himself an object to be seen. The subject becomes at the same time object. The theatre-making artist seems to be saying “let’s stop this subject/object division”, and that is another major change.

This word play is of a certain import in our discourse, as we shall see later, when we come to this from an important perspective. For the moment allow me to say that I consider this to be a key of great importance. It signals the need to break with the customary way of speaking about the performer, with so many turns of phrase that in everyday life are correct, certainly – indeed, they are the only way we can speak! In discussing performance, however, many of those turns of phrase hinder us gravely when we grapple with speaking of the work of the performer, such as when we speak of what the performer does “to his body”, “with his body”, or of how “he used his hand”, or “his eyes”. We need a big change here. We need to evolve a new way of handling language in a discipline where the agent subject is also object of observation. The way we handle language in theatre discourse obscures the lucidity we can otherwise acquire, often making us think we are understanding what it is that we are trying to understand, when in reality we would only be skimming the surface, missing much of what we need to investigate, instead. We could open up on that, but we consider there are other, more important, factors we wish to examine. And one of the things we want to examine is the profound change that occurs in what the knowledgeable observer of the art of performance now chooses to observe. Observation shifts from the play-text to the very event of doing. What this means is that human action suddenly becomes recognised as potentially artistic. To make it even more surprising, what becomes recognised as potentially artistic is *the very way in which* man accomplishes action. And that, in itself, is amazing.

It is *the way in which* I move this arm that may qualify to being considered artistic. Further – it is the way in which I stand still, not moving, that may qualify to being seen artistic. All of a sudden, it becomes **the manner of doing** something that is considered worth looking at, perceived, studied – **and not the outcome**. It is as if the demand had shifted to seeing the poet writing, the composer annotating, the sculptor hammering his marble, rather than the poem, the composition, the statue. Action itself is, potentially, art.

RM This is what makes it interesting for neuroscience. Performance is the behaviour. It is all the actions. It is not the bits and pieces of actions, however. Performance is much more than that. Performance is not only the fragmentation process that goes on in the performer in the studio, not only the bits and pieces that the performer analytically and scientifically generates in certain stages of his work. Performance is all that, yes; most importantly, however, Performance also is how those analytical fragments are then re-elaborated, how what would have seemed to be bits and pieces in the earlier fragmentation phase, is then put together again. It is because of this that it provides a window of opportunity for a scientist like me to look in and to contemplate human actions and then put them into a particular model, a hypothesis. I might become reductionist then... there is that big risk. At the same time, however, by using the whole as my perfect model and then breaking the bits down into manageable portions.....

JJS And there is the scientist using his very tools and terminology but, at the same time, speaking with the terminology and the mind of the theatre-makers: “at the same time, however, by taking the whole as my model and then breaking it down into small fragments, into actions that are smaller and that are thus manageable...” That is the key analytic discourse of the master-pedagogues of the early 20th Century!

RM ...when I do that, then it is possible to carry out the types of experiments that are amenable to the type of technology I might have available – because it is always difficult to have a technology available (we shall see some slides later on, describing the types of technology one is able to use nowadays), then one could, maybe, ask particular questions, and maybe get to some form of answers. I am not saying that neuroscience is going to provide all the answers. Indeed, that is a key reason why we collaborate. It could, however provide us at least with an insight into what, maybe, we think is going on, into what, maybe, human action is all about – and then, if it could help us come closer to saying “ah, this is what human action seems to be about”, then we might come that much closer to getting to know what it means to be human.

JJS Richard has touched upon his work in his laboratory. Let me touch a bit on the work in the performance laboratory. The performer works scientifically, in the same way all artists do. If we look at what Leonardo and Michelangelo did in their *botteghe*, we will realise how scientific they were – they would not have come anywhere close to what they did had they not worked scientifically. The same goes for the musician working with his instrument, and the composer investigating the limits of all musical instruments. The performer does likewise – only he is infinitely more complex than pigments and vehicles, than any musical instrument. The performer chooses to repeat his action. Great care must be exercised here – the word “repeat” could easily trick us. And we should not allow that to happen, because one of the important changes brought about by the theatre-makers of the 20th Century is, indeed, in the understanding of the word “repeat”, a clarification of the sense of that word, of great importance for the Performer and his work. The etymology of the word differentiates it clearly from “replicate”. We can observe its root (“*petere*”, to go toward, to seek, to demand, to attack) in “*Caesar petit Roma*”. Returning home from one of his campaigns, Caesar prepares to enter Rome again for the umpteenth time, with his troops, feral prey of lions, jaguars, tigers, his royal bevy of slaves and the gold and silver spoils of war. The troops are coated in sea-spray salt, sweat and dust, their clothes show the travails of battle. His army would cut a sorry figure and Caesar knows it would be disastrous for him to enter Rome like that, where a thousand vipers may be in waiting. And so – they stop for a day outside Rome. They bathe, anoint and perfume themselves, they change their clothes and polish their armour, they wash and anoint their slaves, they arrange an impressive display of their spoils and then – *Caesar petit Roma*, he moves towards Rome again, to enter it anew, he “attacks” it anew, to establish his renewed power, he seeks to surpass the very image he had left behind him when he left with his armies to give battle – he seeks to move close to the ideal he wants to establish of himself as Emperor. It is akin to the Hindu Maya, hiding behind the veil of light, one moves closer to Maya, close enough to remove the veil; one feels one may now reach out and touch Maya, but behold, another veil... In performance, “to repeat” means to try, yet again, to move close to an ideal. It is like the Italian word for “rehearsals” – “*prove*”, “to try”. In Performance, to “repeat” has nothing to do with “to replicate”, it is not the doing of what would have already been done. The scientist would find nothing of interest there... or rather – the scientist *might* find something of interest there: because science holds, categorically, that it is impossible for one to ever manage to repeat anything!

RM Precisely. Any effort at “repetition” in the sense of trying to effect a slavish copy would never interest me. Indeed, that could only be hypothetical, because neuroscience tells us very clearly that we can never repeat anything we do. It is impossible.

JJS The Performer, therefore, time and time again, tries to move close to fulfilling the ideal he has developed in his mind. What does that mean, however? I do try, time and time again, to move close to an ideal I have in mind... and that is the work of the actor upon himself and upon his performance... but I am more than fully aware that the more I try to do that, the more that ideal grows, the more it dilates, changes, evolves – because that very moving closer to it makes me more aware that in that ideal of mine there is much more than I was seeing. What happens then is even more fundamental: the more I come to see anew into that which had been my ideal, the more I then find myself growing. And the more I grow, the more I come to “see into” that which once was my ideal, I become more “informed”, I develop a new perceptive state, affording me new readings and new visions. In the performer, it is never a replication, but a true “repeating” a true accosting, moving towards getting an understanding that is continuously being renewed, a re-writing of his ideal, of his own self – the most profound change of all.

At a deeper level of organisation, then, the performer seeks to analyse his own doings. He fragments his work in progressively smaller elements, fragments constituting what he would have done. He gives names to those fragments, so as to categorise and catalogue them, extracting them from the unidentifiable magma of the flux of being, then becoming able to organise himself and his work in clear structures – Quine and Peirce come to mind. In doing so he becomes able to reconstitute the whole, working to restore to those structures the quality that action has in life. And there we are – we have come to that key phrase of Stanislavski’s – “in life”.

In an illuminating passage in “*The work of the actor upon himself*”, Torzov/Staniavski walks into the studio one morning and tells his apprentices that “today we shall work upon our way of walking”. The apprentices protest “What do you mean? Do you mean to say that in life we walk badly?” And Stanislavski

assents. Yes, in life we walk badly. And he starts working on them. And Kostia (even Kostia is Stanislavski, of course), in a passage in his (fictitious) diary, tells us that the more he worked the less did he know what he was doing and the more confused did he get, until at last he was at sixes and sevens... and yet – the more confused he got the more did Stanislavski tell him that he could see some improvement.

What is Stanislavski trying to tell us with his “in life”? Is he trying to make us imitate life, the way we do things in life, is he after naturalism, realism? Or does he wish to correct life, seeing that he insists that the performers had to work on their walk because “yes, in life we walk badly”? He seems to be contradicting himself seriously. It is not so at all – and there lies the crucial secret of that phrase. He is only after one thing – for the performer to capture the essence of the way we **do** (things) in life, the essence of **Action**. He is far from asking the performer to “repeat” slavishly, to “replicate”, the actions we do in life, banal imitation, replication, that replication which neuroscience tells us is impossible. Stanislavski seems to know well enough that that is not possible. What he is after goes way beyond mere imitation of **single actions** or of their constituent fragments. What he is after is for the performer to refine his work to such an extent that he would be able to break his actions up, take them apart, fragment them... to then, with absolute discipline, reconstitute those elements in such a way as to bestow upon them the flux human action has in life. It is the flux of life that he is after, but – organised and controlled with the dynamics of art. And it is this that the neuroscientist finds interesting.

RM This sort of work, from the point of view of how you look at what is going on in one’s brain, is done in patients – patients who, for example, have obsessive compulsive disorder and attention hyperactive disorder.

The latter is a condition that hits young children, and there is a lot of research being carried out on it. Why is it that many young children are extremely hyperactive? From this work you begin to understand that – as John was explaining – if you are taught, or asked, to walk in training, what you are actually doing is getting less, but more. What do I mean by less? I mean that when we do walk “in life” it is quite true that we “walk badly”. When, however, you are being guided, when you are being helped to realise where the centre of gravity is, for example, you get less “movement”, less uncontrolled spatial displacement – but walking is much more **active**!

Now: in pathology, such as Attention Hyperactive Disorder, the sufferer gets “more”, but he “gets” less – he gets more movement but less of what could qualify to be called “action”. In performance you get “less”, but in actual fact you get “more”.

And this, maybe, provides some insight into the way our prefrontal cortex works. What your prefrontal cortex is doing, mainly, is that it is holding the reins of the sub-cortical areas. The analogy I could give you is that of sculpture. Sculpture starts off with a whole tree, for example. Take these beautiful beams in here. Starting with the whole tree means that you have “more”. What you end up with, however, after the sculptor gets to work on it, is much “less” than you would have started off with at the beginning. Aesthetically, however, we end up with “more”. The pre-frontal cortex is reining in, holding the reins of the sub-cortical areas that, if left to their own devices, would want to do a number of different things as a consequence of the bombardment of stimuli that keeps arriving at them.

In the laboratory I could do this in either one of two ways – behaviourally or pharmacologically. One could train rats to obtain a reward by pressing a lever every 10 seconds. This means that the rat learns that if it presses more often it will not get the reward. In effect, therefore, to get the reward the rat would produce less behavioural output: one lever press in ten seconds instead of, say, two presses in the space of five seconds. This means getting a reward, a positive outcome, for less behavioural output: they get more by doing less. Alternatively, I could insert a drug into the rat’s brain, in its pre-frontal cortex, a drug that either makes the behaviour better or worse. At the same time, this type of strategy I can now take back to the patients. In children who have attention hyperactive disorder, this may be the kind of treatment they ought to be getting and not the treatment they are getting now – a combination of training and of the different drugs they are taking now.

This business of “less” and “more” has a fundamentally neuroscientific basis. This is how cells actually work in the pre-frontal cortex to enable behaviour – and it is totally opposite to what one would think. In life, if you do something you normally would expect to get more, but your brain, more often than not, works the other way round. That is the surprising thing about it.

JJS I held back from commenting, before, to let you proceed with your exposition, but now I must comment. What you have said now – and you touched upon it a couple of minutes ago, but now you have spelt it out – is precisely how Eugenio Barba puts it. He talks of this in terms of performers working diametrically in the opposite manner to what we understand by “economy” in everyday life. In everyday life, Barba says, we put in minimum effort for maximum result. One is after the goal, and one desires to attain the goal at the least outlay of energy possible. That is the law of the market: when one does something one expects to get more than one would have put in. In performance, the energy invested in the work is enormous – which makes Barba call performance “waste”, “potlatch”. We all know of the interminable hours of work necessary for a performer to structure, compose and embody that which, in performance, would end up being a moment. There are layers upon layers of work hidden beneath that surface which is accessible to the audience’s sensibility, layers without which the work would be dead. I could go on, were it not for time strictures. But there is something else we need to consider so as to see what Richard is pointing out. The material the performer generates to bestow depth and quality upon any and every single moment of performance is extensive – of that baggage of material, he then has to make his choices, each and every second of the performance, each time opting for a particular fragment out of a vast array of fragments. Each night, at each moment, unknowingly, the performer makes his choices. He selects that single instant out of scores available to him. He could bombard his audience with broadsides of performative fragments. He does not. He chooses. His choice is technically empowered, but it is taken, every second, on the unknowing level. And in choosing, he omits. He “wastes”. He “gets less”. So as to get “more”. So as to touch his audience profoundly, by the “less” of his choosing.

RM Yes, and that is how our brain works. Another simple example I can give you is that we all see. The signal that falls on your retina, the light – you would expect that signal to activate a particular cell, send the information to the back of the brain, where the processing takes place, and it is at the back of the brain that the signal is transformed into some form of meaning. From the light actually hitting the back of the retina, however, what you get is a decrease of the activity of the cells, NOT an increase, and this is so in order to enable the signal to occur. In essence, the cells work overtime in the dark and any change in signal occurring on the retina – such as a light coming on – is registered as a decrease of cellular activity. Which of course means, again, that you get less in order to get more, and this principle is operative all over the brain. It is when John talks about training that I begin to understand a bit... that to train is, maybe, to discipline yourself “to get the less” and in performance “to get the more”. And this is exactly what the cells in the brain are doing to enable you to behave.

JJS A discourse that homes in perfectly upon what Richard is explaining is the discourse of that contraposition “in life” and “in theatre”. It heralds the profoundest level of work of Stanislavski, his work on action, the discourse on the flux of action, action in life and action in theatre. What we find is that in view of the controls, extreme rigour and search for quality Stanislavski set in motion, from his search for extreme economy in the truth of intention and of “action”, from his striving to clean theatre-making of the empty embellishments, showiness and self-indulgence for which the star-system had become notorious, Stanislavski hit upon something of great importance: flow, that quality where one can no longer sense demarcation lines between one action and another.

The discourse on flow packs as much paradox as that “getting less to get more” Richard has addressed, where the pre-frontal cortex functions contrary to the way we expect it to. In like manner, one would intuitively expect extreme analytic rigour and fragmentation to result in anything but flow. That, however, would be to misunderstand Stanislavski’s approach to analysis and fragmentation. Once again, our intuition is proved wrong. To see why Stanislavski hits upon flow from extreme analytic rigour and fragmentation it may be useful to start by first discussing something else, something that again would seem to be the opposite of what we’d expect: Why is it from flow that the unpredictable emerges?

We all recognise the dramatic nature of the unpredictable, be it in performance or in everyday life. Indeed, unpredictability lies at the very root of the dramatic and it constitutes the very essence of performance. To try to see why the unpredictable emerges from flow, however, let us start by considering the occurrence of the unpredictable in everyday life, where it may be evidenced more sharply.

In everyday life, the true flow of the actuation of eventhood is not at one with what, to an observer, appears describable as a sequence of separate and separable events. The observer is at a clear remove from the doer. The description of eventhood is at an even clearer remove from eventhood itself – the name of the rose is not the rose, nor is the name of a rose “the name of the name” of that rose, to say it with Lewis Carroll. To the observer, the flow of eventhood seems describable as a series of separate and separable actions, each seemingly describable as emerging from what would seem to have just preceded it and as bringing forth what would seem to follow it. As a result, it often is the case that an observer seems to note a lack of consequentiality, which he views as being the unpredictable: “Why did you do that if you have just...?”

The eventhood of the flow of doing, however, occurs in the bios of the doer so the observer’s separation and description of that eventhood can hardly be expected to correspond to the doer’s experience. It is often quite possible, clearly enough, for the observer to effect certain classifications of eventhood into major phases. When it comes to the doer’s experience, however, when it comes to the myriad stimuli presented to the doer by the present (and by memory), when it comes to the response those stimuli generate, that highly complex interplay of resonance and intentionality – all occurring in the doer – then it is another matter.

The thing is that an event, even while in the process of occurring, would have so evolved that, to the observer (who is always, invariably and inevitably in retrospect vis à vis the doer’s doings – and we can never afford to forget that), it would appear *as if* that event had, at some stage in its unfolding, come to some “conclusion”, thus seeming to have generated another separate and separable event, which would, to the observer, appear as following that which would have seemed to have been a preceding one.

From the doer’s perspective, however, that event would have, in the very process of its occurring, during it, evolved consequent to present and remembered stimuli arising continuously and affecting the doer, to insights occurring and impulses firing, such that possibilities of intentions would have come to the surface, exerting an increasing influence upon the doer. Those unfolding stimuli, insights, impulses, intentions would, even in the very process of occurring, have drawn that action-in-progress “with a sort of oblique action”¹, on a flowing developmental curve, evolving it in its track. It is that “oblique” evolution, occurring in that manner, that results in the observer seeing its development end up appearing other, as if the event were not one, but a series of separate, separately describable events. To the observer, then, that which to the doer would be one event in flow arrives at appearing to be a sequence of separate events, some of which would appear to come about unpredictably.

Let us now look at the phenomenon in the territory of performance – and it is important to keep our sights clear all the time, in this sense. In our presentation we are necessarily moving from discussing events in life to discussing events in performance and vice versa. There is nothing wrong in that – as long as we are aware which of the two we are focusing upon at any given moment. By considering actions in life we obtain insights into the work of the performer. By considering the work of the performer on his doings we gain insights into “What it is to be human.”

In focusing on performance, it is crucial to keep in mind that the “events” we are considering are infinitesimally small. We are addressing those events, actions, which Stanislavski discusses in his analogy of the “train journey from Moscow to St Petersburg”. Stanislavski says he has seen many an actor playing Hamlet walk in for his first scene with, written all across his face, the knowledge that in Act V he will be

¹ In his *Écriture et Différance*, Derrida quotes Merleau-Ponty from a 1951 paper. Merleau-Ponty is speaking of the author’s significations, saying that “communication arouses and provokes” those significations “with its force and with a sort of oblique action. In the writer thought does not guide language from the outside: the writer is, himself, a new idiom which constructs itself”. Merleau-Ponty, quoted by Derrida, J., in *La scrittura e la differenza*, Einaudi (Torino) 1971 p 14 (my translation from the Italian). These words go a long way towards concretising what we are pointing towards.

killed. Something more predictable than that, more undramatic, it is difficult to imagine – and yet anyone who knows anything about theatre knows it is so true. Anticipation is the malaise. Performers anticipate, skimming over much of their work and aiming for their key moments so as to please their audience. Considering anticipation to be the enemy of the dramatic in view of it being the enemy of the unpredictable, Stanislavski sets out to attack it: by focusing intensely on each action in hand, the performer will cease anticipating – he will be “present”, as the jargon goes. Stanislavski’s approach is that of breaking down each action into smaller components. The traveller has only one action in front of him: “going to St. Petersburg”. Mentally, the traveller would be in that action² when boarding the train in Moscow (indeed, even when purchasing the ticket at the station). The action in question, however, that “through-line of action”, the “going to St. Petersburg” – the journey – requires a considerable series of station stops; furthermore, the train itself can be seen as a number of wagons, each wagon a number of compartments, each compartment a number of seats. In like manner the performer breaks down his “through-line of action” into small component actions, so as to be able to organise his work well. It is the identifying of intentions, the working upon such intentions... in short, it is the entire corpus of Stanislavski’s “Work on Physical Actions”.

It is also the process Grotowski discusses in Thomas Richards’ *Working with Grotowski on Physical Actions*³. Deepening Stanislavski’s exposition, he explains that in the course of a performer’s work on a performance, even in the course of a run of performances, the moment the performer finds himself master of a particular passage, he would – in order not to let it degenerate into predictability and staleness – estrange himself from it by breaking each action in it down into smaller elements which he would then categorise and organise as separate, smaller actions, which would together constitute that which had up to then been an integral action. He would do this so as to make himself face that passage anew, breaking the familiarity that could so easily breed the deadly routine and predictability that kill the possibility of the dramatic. If he later senses that even those smaller actions would be risking degeneration, he would break them down further, and further still, into ever smaller fragments, each of which he would design and describe as an action – this being the only way to keep the life in a performance running for years.

It is interesting to note that what Stanislavski called “the line of physical actions” Grotowski labels “*partitura*”, “score”. A performer finds little or no difficulty playing each note of a score independently and with its precise dynamics. The myriad notes constituting a score’s analytic fragmentation do little else but provide a map representing the continuum that would have occurred to the composer as he composed. A score’s music lies in the relationship between those “cartographic” signals, in the way a performer will exact flow out of them. It is there that a performer’s artistry (and difficulty) lies. And the performer knows one thing very well – to achieve what he wishes to achieve, he must transcend that analytic fragmentation. And he knows something else: in order to transcend it he must (a) ultimately refrain from engaging sectors of the brain which have to do with analysis and fragmentation, the cognitive sectors, therefore, and (b) resort instead to those sectors of the brain which come into action when cognition is put on hold.

Of course, actions are not the same thing as musical notes – but the true performer works in exactly the same way. Breaking down a narratable line of, say, four actions into a myriad of infinitesimally small actions and in the intentions and decisions behind each of those, renders it impossible for the performer to proceed to execute them cognitively. The whole process works in a diametrically opposite manner to that which the actors of the notorious star-system employed – their approach was to identify the handful of key moments the text provided them, the *coups de théâtre* that would endear them to their audiences, and to devote their entire attention and energy to them, glossing over much of the rest of their performance as being of scant importance. On the contrary, the true performer elevates each moment to the status of a key moment. It is for his own sake that he does this, however, and not to titillate his audience. He does it so that at no instant would he be inept, indifferent, so that no “note” would lack the dynamics scored into it. The audience does not admire each individual “note” a performer plays. Rather, it is caught in and by the flow of his work, quite unable to relate to individual “notes” – unless it wants to run the risk of losing touch with the whole. Yet again, we find ourselves contemplating “getting less to get more”.

² Our understanding would gain much by considering his lucid terminology: “the through-line of action”.

³ See Richards, T., *Al lavoro con Grotowski sulle Azioni Fisiche*, Ubulibri (Milano) 1993, p. 99-100

In neuroscientific terms we have an idea what happens in the performer – this continuous process of organisation transfers the supervision of the “score” away from cognitive control to the control of the motor sectors, allowing each micro action to come to execution as a consequence of stimuli fired by the primed micro action preceding it. It is as we function “in life”, where we very often do not think of the step we are about to take next, of the knife I am about to pick up to cut up the food in my plate⁴. The score’s firm and highly complex structure enables rigorous control. The constant re-fragmentation, however, ensures that the priming is ever fresh, that the responses are ever unpredictable – in short, it ensures that flow is.

We need to make a crucial distinction here in order to see our path more clearly.

In performance, the process is a technical one born out of the requirements of the performer’s work.

In the eventhood of everyday life, it is a totally different matter.

For the observer, the process is one of description of what is perceived – it is what is observed by the observer... and the description is something made for the observer’s purposes, for him to attribute meaning.

For the doer, the matter is completely different. It is the same as that initial score of the performer, where the event is in flow, evolving, developing “obliquely, by traction”.

It is here that performance allows us to gain insights into the wonderful complexity of what it is to take action, to be human, therefore; and these insights are different to those which other disciplines afford us.

The problem of discussing this subject (and the interest of discussing it in the course of an inquiry of “what it is to be human”) is resultant to the unique nature of performance.

In painting, representation may be of landscapes, or still-lives; it could be of human subjects, in action, posing or interacting. The actions of the artist, however, have nothing to do with the actions of those subjects. The actions of the artist consist of handling brushes, oils, varnishes, pigments, canvas or other primed surfaces. There is no possibility of confusing (con(-)fusing) the actions represented with the material actions of the artist’s execution. The two are – and are fully seen and agreed to be – totally different. In performance, the doings of the roles being performed seem to be one and the same as the work of the artist performing them, because the “actions” of the roles seem to be one and the same as the “actions” of the artist. But they are not. The action of a performer is the construction of the embodying of the action of a role. It is not the action of the role. One way of seeing this clearly is to look at consequences.

Actions in the true flow of eventhood, as everyday-life actions are, have consequences that are unlike those theatre-making brings in its wake. In the events of everyday life, unpredictable consequences are those one does not expect as the outcome of a particular action or sequence of actions. Flow, in everyday life, shocks us by the occurrence of actions and events that we fail to anticipate from having observed those that would have seemed to precede them. Flow in performance works in a fundamentally and totally different manner.

In performance, that which qualifies to be called “unpredictable” is *the manner in which* a performer executes an action. It is not the action itself. For example, everybody knows well before it happens that Mercutio will be run through by Tybalt’s rapier when Romeo intervenes to separate them. There is no unpredictability in that. What could be (indeed, ought to be) unpredictable is *the manner in which* the performers playing Tybalt, Mercutio and Romeo will execute the actions around that event. It will touch nobody if the execution of any of those actions were to betray any one of the trio to have been *anticipating* the event. Nobody will be touched if those actions are not executed *as if* not one of the trio knew how he and the others was going to execute them, *as if* each one of them were unprepared, *as if* each had not

⁴ We actually start off most of our actions a good 0.5 seconds before we actually know that we want to carry them out. See Libet, B. (1996). *Neural Processes in the Production of Conscious Experience*. In M. Velmans, M., (Ed.), *The Science of Consciousness* (pp.96-117). London: Routledge. In a 1992 CIBA Foundation symposium for 28 of the world’s top philosophers and scientists, Max Velmans himself had in fact stated that consciousness is too late, or too much in delay, with respect to the taking of action.

rehearsed them. What flow brings about in performance is admiration, profound surprise and a being at one with the artist performer. It is the same with the painter's "freshness" of work – what that brings about is a sense of being at one with the artist painter, and not a sense of pity for the beheaded St. John Baptist, for example. What flow brings about in performance is this being at one with the performer – for his being able to rise above the mere representation of a sequence of planned, technically analysed and knowingly structured actions, as he juggles feverishly with present and remembered stimuli, responses, resonances, intentions, allowing us instead to behold him being in those actions, such that they could possibly appear to be occurring in a manner that has all the freshness and the flow – precisely – of all the unrehearsed events and actions that occur in everyday life.

And this process is there, engaged in under laboratory conditions, in the technically organised context of the performer's work upon himself – it is waiting for us, ready to make itself available to be studied, reflected upon, in that laboratory that we call performance. It is open for us to inquire in this unique manner into "what it is to be human", harnessing different disciplines in a joint inquiry charged with opportunities.

In the early years of the 20th Century, however, it was too premature for theatre-makers to build bridges with scientists, although the books of Secenov, Pavlov and Bechterev were on Stanislavski's bookshelves and Meyerhold did exchange views with Pavlov. The theatre-makers of the early 20th Century did move out of the strict confines of their discipline, however, to also embrace a different discipline. As a consequence of the extreme demands for rigour which they made upon themselves they became what I call the "double artist": reflecting upon their creative act to document it, they ended up creating books from their documentation process, thus becoming authors. It was not authors of play-texts that they became, however. That was what the traditional link between theatre and authorship had always been – that, and the commentaries of philosophers and of literary theoreticians upon the work of play-wrights. The theatre-makers became authors of theoretical works that are poetics. They made theatre... and then, much as they did in the praxis, they looked back at their own work, they reflected upon it, fragmented it, dissected it, analysed it, studied it; and they put it together again, crystallising it into a new artistic object, a book that analyses whilst at the same time being an artistic object, a literary work – and that approach of theirs was taken up by the theatre-makers who came after them, with the practice growing and accentuating further the iterative nature of the performer's work.

Indeed, the performer writing on what he would have done revisits that doing, re-elaborating it. His act of writing would have in(-)formed him anew, changing his outlook, even his performance. There is a dynamic two-way passage; on the one hand there is the making by means of the action that analyses (and that is the performance) and, on the other hand, there is the making by means of the word that analyses (and that is the documenting, the writing). Both are actions that analyse – a performance articulates in performative actions the performer's reflections upon his own self, whilst his act of writing articulates, in words, his reflections upon his performative work. The performer emerges as somehow challenging the edges of consciousness. "One cannot work creatively and at the same time observe oneself", Stanislavski advises, as does Ivan Illich. The performer appears in the guise of a scientist who chooses as his object of study himself and his own work – scientist and guinea-pig in one. He appears to be the embodiment of the very process of iteration, and that would appear to be touching some key aspect of consciousness.

Two-hundred years ago, in the four pages constituting his brilliant essay *On the Theatre of the Marionettes*, Von Kleist said it all. In 1877, in the celebrations marking the first centenary from his birth, he was hailed as having been a hundred years ahead of his time. In 1977 they said he had come into the world two hundred years too early. One year after he wrote the essay on the theatre of the marionettes, he shot himself. That was in 1811, he was not yet 34 and he felt few could understand him. In that which we would seem to hold as our most precious asset, our consciousness, von Kleist, in this essay, identifies our deepest flaw. Consciousness is iterative, it strengthens our learning capabilities, it enables us to be the only beings able to engage in deuterolearning, or learning to learn. Consciousness also pulls us out of the present, however. It brings us to look at what was and at what will be. In thus makes us come out of the present, and so, out of the creative moment – which is why Stanislavski says those words up there. It is only in retrospect that the creative act is recognised as having been such.

RM In the physical laws of life (and we *are* talking about the two major laws of physics, which basically are the laws of life) the two major laws are Quantum Theory, which means what goes on at the electron level, and Einstein's Theory of Relativity. Now. It is probable that both these laws are not completely right, because one needs to unify them. One is talking at the level of electrons and the other is talking at the level of the cosmos. There is one universe, so there probably is one law that binds us all together. If we look at these laws, what we see is that if we want to find out about the properties of a particle in one moment in time (and a particle is like an electron: it moves), then you either get to know about how fast it is travelling or – *and not both!* – you get to know where it is located in space. You cannot have both together. So the matter of not being able to be creative while at the same time observing oneself is not only something related to neuroscience – what we are talking about are the laws of nature here, and the laws of nature, whether you like it or not, govern the way neuroscience does operate and the way in which performance needs to operate. This is a crucial point. But – there is yet another crucial point.

If we look at the great thinkers in physics and mathematics, every 25 years one emerges. For the past 30 years there has been no one. Timing is crucial, and what needs to be done is unify Einstein's laws of relativity and quantum theory. I am no physicist and no mathematician. But I believe that this context needs to be kept in mind, when one talks of neuroscience and performance.

JJS Making improbable links when one would have glimpsed an improbable but possible connection could set things in motion. The arts and the sciences are actively seeking to bridge what for centuries appeared to be the unbridgeable. In so doing, the light they shed upon each other could be extraordinary. One of the major reflections of brain research *is* on consciousness. It is so also in philosophy of course. And it is markedly so in the field of performance – it has been growingly so, for certain, since Diderot wrote his treatise on the paradox of the actor, although it attained a level which it had never touched before (at least, in the West) with Stanislavski. Since then it has never looked back. One of the main attributes of the performer is presence. His is a work in the present, a work on presence. Consciousness necessarily pulls the mind out of the present, making it look back, “consciously”, on an event in the past (or on an event that is still to occur). As a consequence it pulls the mind out of the creative event, which is, markedly, in the present.

At this point, having established certain parameters, we intend to open up some windows that might allow glimpses into certain key aspects of the discourse of theatre making. We will not engage any of them in depth, however, for what we will be trying to do is to map out an interesting network of links between them, which will in turn help us in the inquiry we are here engaged in.

First – an important historical moment, the birth of Greek tragedy in the sixth century BC. It happened at a very particular point in time. It was a time when a fundamental question was being posed – whether man was indeed a puppet in the hands of the gods living on Olympus, whether man was indeed nothing but a channel for the will of the gods to fulfil itself. Free will is posed as a possibility. What we are here considering is not a neat shift, but a changing world view, an event emerging from tensions and struggles going on in different spheres of human experience, not least of which being the emergence of the Polis as a state based on 'reasoned' laws, a continuing struggle which may still be in process. The emergence of Greek tragedy is a reflection of this cataclysmic self-questioning which constitutes a challenge to established order. It seems to emerge precisely from this very humus, together with yet another drastic change then taking shape in the very language itself, possibly also reflecting the same challenging self questioning: what today is referred to as “the middle voice” had then started falling into disuse. It is difficult today to explain this very particular form of verb, for many contemporary languages simply do not have it – it has died out. It is a form of verb that is neither active nor passive. It indicates, in a way, a particular relationship between two subjects where action is reciprocal, where the event takes place, rather than it resulting from an action being done – but even this is not a satisfactory discussion of the form, which cannot really be grasped easily in our times and context, where the concept is alien and where the language does not provide it for utilisation. The best one can do in a short space as this is to give a (rare) example of it and then to refer listeners and readers to further reading on the territory. One example which is invariably given is “I went into the river to bathe.” My going into the river is an action of mine, but the event of my losing the dust and perspiration with which I had gone into the river and which may have constituted the very reason for my going into the river, cannot be truly described as an action of mine – in part, for sure, it was the

flowing of the river that cleaned away the dust from me, in part, also, it was my staying in the river in order to allow that to happen. The middle voice holds back from assigning agency, from attributing responsibility for an action, from indicating an act that is willed. It was precisely this holding back from attributing responsibility that was being challenged, and this questioning of responsibility is at the core of Greek tragedy⁵. It concerns, therefore, the allowing of something to happen.

In contemporary performance terminology this could be the equivalent of Grotowski holding that a performer cannot work *so that* creativity will come about. The only thing the performer can do is to work, and then wish, hope, that creativity will be manifest. It is the performer being channel, to word it with Grotowski. It is his “descent of grace”, which permits the event to occur in the performer. It is, also, his “true expression is that of a tree – it expresses, because it cannot want to express”. Ingemar Lindh put it as “the amen principle”, the “so be it”. The performer needs to work on the “amen principle”, he ought to prepare himself for the action to occur in him. In my work I speak of “working on the possibilities of intentions”, working and allowing intentions to be born of the work, working and allowing events to arrive... but where do events arrive from, in the performer? “One has to allow the song to sing him”, Grotowski would reply. Recently Richard and I came to word it as follows: “the work of the performer may be describable as ‘deciding’, unknowingly, on the basis of a process of deliberation which is engaged equally unknowingly.” There is a process of deliberation which the human being engages unknowingly and that process of deliberation, occurring unknowingly, leads to a decision being taken – equally unknowingly. We have seen what science is telling us on deliberations taking place at levels not accessible to consciousness, as we have heard Benjamin Libbet and Max Velmans telling us. No matter how unknowingly it is taken, however, still it qualifies as being a decision – the cutting of the binds keeping one in a state of indecision (and at the root of the word “decide” lies the Latin word “*caedere*”, to cut). It is a decision one is not even aware of having taken, however. At the same time, this “allowing things to happen” is not to be construed, either, as being something that undermines the importance we all attach to our “freedom of will”, which is, however, very often bandied about in too facile a way.

Is it here that the performer’s creativity resides? Is it in his putting into question his own freedom of will? Is it in his allowing himself, in performance, to be channel, in his allowing events to occur through himself, in response to changes in context, to new stimuli, to creative moments of his colleagues – anchored in the rigour of his structure but open, within that rigour, to allow a response to emerge from the channel that he is, in resonance with the new impulse generated by that new stimulus – perhaps without his even saying “I did that”? In the performer, that is the discipline one yearns for.

Recognising creativity as residing here in the performer may be tantamount to recognising what it could mean to be “Human” – poised half way between animals and gods. The work of the Performer upon himself seeks to heighten the possibility of his allowing action to proceed from an unawares, though highly refined, deliberation of a myriad intentions. Training appears to be aiming for this unique way of being. It may be tantamount to recognising, also, that it could be something of this kind that the human being may have “forgotten”. If, then, that were to prove to have been the case, seeking now to “recuperate it” (or, at any rate, working for it knowingly) might lead to an ulterior empowerment. This neither being active nor passive, neither subject nor object, this “state of being in between”, reaches out to the work of the performer upon himself. The work of the performer upon himself seeks to potentiate this possibility, allowing the action to proceed from the performer’s unawareness – but without it losing its integrity within the structure and without it losing its refinement. Training appears to be aiming for this unique way of being in life. The performer could be reaching out for this frontier... and if that is the case, then the neuroscientist observing him at work could be in a position to “see”.

RM In the light of what I said previously, in observing the performer, the neuroscientist would strive to discover what kind of question could be asked of the situation for him to be able to gain some insight. What

⁵ For further reading on the middle voice itself, as well as on Greek Tragedy and the middle voice see, for example, Vernant, J.P., *Myth & Tragedy in Ancient Greece*, Zone Books (MA) 1990; Gonda, J., *Reflections on the Indo European Medium*, in *Lingua*, Vol. 10 (4), Elsevier (Orlando, FL), 1960, p. 30; Llewellyn, J., *Heidegger’s Kant and the Middle Voice in Time and Metaphysics*, Perusia Press (Coventry), 1982, p. 113. Heidegger, M., *Being and Time*, Harper Collins (NY) (revised) 1962

type of questions can I pose? What kind of questions can I ask of neuroscience, and what kind of questions can I not ask?

I do not pretend that science can answer all the questions. What it could enable us to do is to at least get a glimpse into what is perhaps going on in this business of human action.

There is another important point that must be made. What neuroscience does is that it measures outcomes, it measures behaviour. It does not attempt to measure what is going on – it is very difficult to do that. We consist of a few billion neurons, nerve cells. The number of connections – synapses – is in the order of trillions. It is very much like the amount of wires in the telephone system of the USA and South America put together, all those wires, packed up in there. When you do one simple thing, like paying attention, you believe you are doing one thing at a time, but what you are doing is something like having eighteen simultaneous conversations at the same time. We must be careful with this, because it is easy to come under the spell of neuroscience. We must keep the context in mind. I measure behaviour, with neuroscience... but I measure behaviour based on verifying principles and on theoretical models. I come from a discipline in which my rats give me my answers – some of my answers. There are questions that I cannot ask my rats. What I can do is to ask them to perform. That is crucial, because whether we like it or not, the rat has exactly the same parts of the brain that we have – exactly the same. There thus is a main reason why we work on rats – although many constantly question the use of animals in science, and I am a humanist scientist, so I understand that position – but the reason for doing it is that the parts are the same in us and in the rat, exactly the same. They might be wired up differently, but the brain parts are the same. There is the frontal cortex, which is as not as big as ours is, catering for thoughts, abstract thoughts, but the sub-cortical areas, where things are processed, through which one likes or dislikes things, for example, are the same in rats, flies, cockroaches and us. The interesting thing now is that from a genetics point of view, the number of genes in the human being is 30,000 and 70% of those genes are required to make our brain. In a fly there are 20,000 genes – most of them the same as what we get in a human being, and probably those 10,000 less are the ones that make our brain. From a genetics point of view, and from a neuroscience and physiology point of view, it is crucial to ask questions that I can answer by doing research on animals. At the same time, however, I realise that I cannot ask my rats questions about feelings, and so I have to devise experiments very carefully to try to get at the particular answers. Basically, I have to operationalise my experiments.

Then there is the problem of translation – and I will give one simple example. When I look at depression I have a model. How does one model depression in a laboratory? One cannot ask the rat whether it woke up depressed. One fundamental thing about depression common to both rats and humans is the ability to feel good, to have pleasure. I can ask questions of a rat about pleasure, and I can do that quite simply – I can ask him, for example, to choose between drinking three solutions, one solution could be just water, another could have sugar in it, to make it nice and sweet, and the third could have salt in it. The rat will choose, and most rats will, like us, choose the sweet solution. I then can look at the brain to see what happens when he chooses the sweet solution. Then I can make him “depressed”, for example by changing his partner, or I can disturb his feeding routine, such that what happens in his life is very similar to what happens in my life when I get depressed... when I miss my plane, for instance, when I am delayed, when my salary this month does not suffice for my expenses – very similar depressants to those I model in our rat. Then I can go and see whether my rat still drinks the sweet solution. And he doesn't. His drinking pattern gets disturbed too. So I can ask particular questions about depression, and bad mood, by operationalising the thing I really want to look at and then looking at the behaviour and at the activity of the cells in the animal.

I cannot, however, stick electrodes in a performer, but there are methods now which scan, like the NMR, like PET scans, like Magnetic Imaging, which basically allow us scientists to look into the brain. All that these techniques can tell us, however, is that while the subject is conducting a particular task, that part of the brain is more active than the other. That is all it tells us. Nothing else. There's another interesting thing we can use now, which is being used in patients – I can provide a little box that can send out electrical signals, very similar to a heart pacemaker, and what I would be doing now is altering the way the nerve cells communicate with one another. It's interesting, and I can do that, but I don't know what the behaviour is going to be. The interesting thing is that I can do this in patients that have problems with the way the signalling goes on in the part of the brain, and I can use it to correct the signalling...

The size nerve cells is 10^{-6} of a metre. They are microns. This is the sort of work I do in my laboratory, in which I look at particular cells and see how their characteristics change when I would have applied a particular drug. The interesting thing is to see now, because of my work with John, what may happen to these particular cells in the rat if now I alter their behaviour through a form of training which I design in reflection of the behaviour I choose to select from what I see in the performance of the actor.

The results I want to talk about now are from an experiment we have just finished after three months of work. The question we asked was “can I shift my rats preference for the sucrose solution by altering the circuits in the reward paths of the brain?” And what our findings say is yes, we can do that shifting pretty well. The way the brain is now mapped, I can know exactly where it is that I may want to put a drug in. If I want to put it into the pleasure area I can do so, going to the exact site. The techniques in science are there now, enabling us to work around quite a bit of what it is we understand of Human behaviour.

I think the big shift we have to do – and this is what I see as exciting in what I try to do with John – is that the type of questions we ask are now not about pathology, nor about any “normal” habits. What we think we are doing is asking something about what it is to be human, and the fundamental question is one – how is it that learning takes place in the performer? Because learning, at the end of the day, is all we are about.

I wish to add a tail-end comment on “being Human”. What John and I are doing now, here, today, is reading each other’s intentions and seeing them as models for our subsequent contributions to this dialogue. The exciting thing about Rizzolatti’s discovery, the Mirror Neuron System, is that Rizzolatti may have perhaps discovered the basic mechanism through which we are able to do these wonderful things.

This makes the times we are living in remarkably exciting. The bottom line is that what makes us human is this ability to learn. From my end, I am profoundly interested in the learning, because it touches the core of my own life-long research, the matter of pleasure. Learning is profoundly related to liking, because in life, you only do things (or you do things better) if you like doing them. If you don’t like doing them, then you don’t do them – I don’t like ironing my shirt, but I like to be sitting down in a caffè in Piazza Maggiore drinking a Campari, as we did yesterday afternoon just after we arrived and I will choose to do it more and more were I to have the opportunity. That is a basic mechanism; that is how we are “wired up” – we are “wired” either to like things or not to like things. And if you like things you learn better and you do more of them whilst if, on the other hand, you dislike things, you will do less of them and the less likely you are to learn about them. That is how, at a very basic level, the ant, the mosquito, the cockroach, is wired up – and we are wired up like them. Exactly the same.

JJS – it is worth keeping in mind that to make art is to work within the rigorous constraints of a discipline. It is clear, indeed, that one of the building blocks of any praxis of the arts is the pleasure the artist experiences in engaging in that praxis. It is not only the pleasure, however – the pleasure and the discipline. The rigours of the constraints of a discipline govern whichever art form one were to wish to consider. In any artistic praxis there would seem to coexist that which would appear to deny us the fruits of pleasure, i.e. discipline, and, on the other hand, that which would give us pleasure – the creative act. Art provides the territory for this tango between what seem to be opposites, this trembling frontier, this intensely dynamic interstice between two vibrant possibilities. This territory is a goldmine for the sciences to look into, in its efforts at inquiring what it means to be human. This seems to bring us back to that fundamental question I asked Richard 14 years ago, the question with which we started out on this collaborative route – could it be that it is the endorphins that allow the performer not only to engage in this training regimen which Eugenio Barba labels as being “inhuman”, but to actually learn to enjoy it? Is it that performers actually learn to find pleasure in the tremendously demanding rigours of their training, learning to find pleasure in the discipline, in their own self-discipline, in these routes to creativity?

This brings us to this third part of our talk – where we shall speak of three grammars.

There is an innate grammar, that of speech. A new born child is born with this grammar. No mother can teach grammar to her child. A child is born with such a grammar – not the specific grammar of a particular language, but grammar itself, as a linguistic foundation. This grammar is innate. One is born with a

disposition for it... and then, one is only able to fulfil that disposition by furthermore acquiring, by assimilation, by “deuterolearning”, the specifics of a particular grammar appertaining to a particular language. The newborn child can do this only by activating that base which s/he is born with, such that it can learn how to learn it so as to be able to speak. This is a process which only the child can activate – within the context that child is born in, clearly, but only that child can activate it. No mother and no teacher can do anything about teaching it to a child. And the child learns to speak – without learning what a noun is, or a verb, an adjective, an adverb, an article, a phrase, a clause... What the child does is learn how to speak. And that is all there is to it. What happens later, however, is very interesting for our purposes. At a later stage, the child starts learning grammar systematically. It starts learning what a verb is, what a noun is, what adjectives, adverbs, articles, phrases, sentences, are... all the way to the most refined aspects of grammar, figures of speech, metaphor, simile, analogy, oxymoron, paradox, irony, metonymy, synecdoche... the entire gamut of the rules which are at the foundations of language. S/he learns them knowingly now. The child would already have been using them, of course, but s/he would not have known anything *about* their usage. S/he would have been using them unknowingly, but then, learning about their usage, the child acquires an ability to refine its usage of them, becoming gradually able to (knowingly) try to write poetry – something it was not able to do before. Learning how it is that it can organise that which it already did helps the child elevate its way of speaking to the level of the poetic. Without learning the intricacies of the discipline of language the child cannot aspire to generate poetry. It can, of course, have those little flashes of the poetic in its way of speaking. But those are elusive moments, flashes of magic; they have little to do with the knowing effort directed towards the generation of the poetic.

Let us now consider action. We are the only beings that can model our actions on the actions of others. No other living being can do this. Only the Human Being can observe another’s action and strive to reproduce it as a model. Many animals can copy a role model’s choice (of an object, for example, or of a location). They cannot, however, teach their young. If an animal notices its young about to do something dangerous it could try to block it physically, thus stopping it from being able to do so. It cannot, however, teach it to do differently. Only Man (including the infant) can form a mental representation of a visually perceived action and then try to act similarly, to “produce an action conforming to the representation”. Man’s brain equipped itself for this second (much higher) level of “imitating”. Asks Premack: “Could language evolve in a species in which the young cannot imitate the action of the speaker?” Speech is man’s great invention. Recording speech by complex symbolic systems is another. All these great achievements of our ancestors, however, are built on the great foundations of a unique capability of ours – our capability to take Action. Action is at the foundations of our being human. All our great discoveries and inventions are *necessarily* analogic developments from the primacy of Action⁶. Only we Human beings can understand a way of doing something and learn it – by modelling our actions on the actions of others.

M. W. Donald discusses this in a manner which is highly illuminating within the context that Richard and I are striving to design here. He posits three stages of transition en route to the emergence of the Human Being, and these stages shed great light on the performer’s being an excellent locus of inquiry into what it is to be Human. Donald says: “The first transition introduced two fundamentally new cognitive features: a supramodal, motor-modelling capacity called mimesis, which created representations that had the critical

⁶ This section builds on various neuroscientific discoveries; W. H. Calvin, in *The Emergence of Intelligence*, in *Scientific American*, n. 271 (4) Oct. 1994, pp. 79-85, (1994) says that improbable as it may seem, the brain’s planning of ballistic movements (fast, precise actions that once initiated cannot be modified, e.g. hammering a nail) may have promoted language, music and intelligence; David Premack discusses recursive learning in *Is Language the Key to Human Intelligence?* (*Science*, 303, Jan 2004, pp 319-320). Grammatical structures for voluntary action (and, by analogy, those for music and speech) are considerably innate. Subtending Memory and learning, motricity often proceeds unbeknown to us; Rizzolatti (*Pre-motor cortex and the recognition of motor actions*. It appeared in “Cognitive Brain Research”, 3, 1996, pp. 131–141), Gallese (*The inner sense of action: agency and motor representations*, “Journal of Consciousness Studies”, 7, n. 10, 2000, pp. 23–40) discuss mirror neurons: when we observe intentional actions, specific pre-motor cortex sectors become active – those that are active if we perform those same actions – we participate *actively* in observed actions of others Schlaug and Steinmetz revealed brain plasticity in pitch perfect, professional musicians; see for instance, G. Schlaug, H. Steinmetz *et al*, *Increased Corpus Callosum Size in Musicians*, in “Neuropsychologia”, 33, 1995, pp. 1047-1055.

The discourse is too vast to be tackled here.

property of voluntary retrievability. The second transition added two more features: a capacity for lexical invention, and a high-speed phonological apparatus, the latter being a specialized mimetic subsystem. The third transition introduced external memory storage and retrieval, and a new working memory architecture.” Donald then proceeds to outline the crucial difference between ape intelligence and human intelligence: “The limits of ape intelligence seem to be especially evident on the production side of the cognitive system. Bright as their event-perceptions reveal them to be, they cannot express that knowledge. This limitation stems from their inability either to actively shape and modify their own actions, or to voluntarily access their own stored representations. This might be why they cannot seem to invent gestures or mimes to communicate even the simplest intention (see, for instance, Crawford, cited in Munn, 1971). They can learn signs made available by human trainers, but they do not invent them on their own; nor do they seem to consciously “model” their patterns of movement, in the sense of reflecting on them, experimenting with them, and pushing them to the limits, the way humans do. This seems to indicate that they are far less developed than humans in at least two areas of motor control: the construction of conscious action-models, and the independent voluntary retrieval of such models.” It is this ease to access motor-memories voluntarily, without needing to depend on a trainer that enables the human being to rehearse and refine his skills and operations... in a manner which, for the ape, is not even possible in simple operations - because its “cognitive system remains primarily reactive, designed to react to real-world situations as they occur, and not to *represent* or *reflect on* them. Thus apes are not good at improving their skills through systematic *rehearsal*. The contrast with human children in this regard is striking: some apes might throw projectiles in a fight, *but they do not systematically practice and improve their throwing skill, the way human children do*. The same applies to other kinds of voluntary action; *children actively and routinely rehearse and refine all kinds of action*, including facial expressions, vocalizations, climbing, balancing, building things, and so on. While *apes may have the same basic repertoire of acts, they do not rehearse and refine them, at least not on their own*. In fact, it takes an incredible amount of training - of the order of thousands of trials - just to establish a single reliable naming response in chimps, and even those very context-specific responses remain reactive and episodic: for example, 97% of Kanzi's signing consists of direct requests (Greenfield & Savage-Rumbaugh, 1990). Until hominids were able to model their actions and their episodic event-perceptions, and access those representations independently of environmental stimulation, they, like all higher mammals before them, were locked into an episodic life style, no matter how sophisticated their event-perceptions had become.” And Donald adds: “the first truly human cognitive breakthrough was a revolution in motor skill--mimetic skill--which enabled hominids to use the whole body as a representational device”.⁷ The primacy of Action stands out in crystal clarity.

Let us now consider the innate grammar of action. Nobody teaches a child how to touch its own face. The child knows how to do it, just as it knows how to rub its eyes to open them. We are born with an innate grammar for action. Nobody teaches us how to walk. Yes, of course, some parents do try, in their impatience at seeing their offspring walk early, but one walks only when one is ready to walk. And that is all there is to it. Nobody teaches one how to swim. Careful - I am not referring to competition swimming, but to plain, ordinary swimming - how to keep afloat, in fact. How are children enabled to do that? Simple - a hand gently supports us at the small of the back, another underneath the head and we are simply told that look, we do not sink. And as our confidence is established, we finally learn to stay afloat with no support, coming to do it on our own, which is the first step to learning to swim. Yes of course one can try to teach the child how to actually engage in the actions of the breast stroke, or the crawl. But those are mere refinements of the process, really: for that to be possible the “learning to swim” would already have been achieved on one's own. Once again we are back at “relearning the grammar so as to make poetry”, because the learning of the breast-stroke, or the crawl, are equivalent to relearning grammar's refinements so as to be able to “swim poetically”, let's call it. Of course, many things we learn on our own do not quite qualify as “actions” - not in the sense we are discussing the matter here. Those doings, however, “contain” in themselves the very foundations of what we are calling the grammar of action. To consider action in the sense we are discussing it here we need to climb a little further up the ladder. We have to consider, for instance, the child learning how to reach out precisely to grab an object it wishes to hold, or to do something - however simple - with that object. Nobody can really teach a child to do that, no matter how

⁷ Donald, M. W. “*Précis of Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*”, Cambridge University Press, 1997. <http://www.bbsonline.org/documents/a/00/00/05/66/> (Italicisation is by the authors of this paper.)

much some try to accelerate its growing up! In those self-learned actions (and there can be no doubt now that those are actions) there are all the grammatical laws that child will ever need for all the complex actions it will take in its entire life, as it “graduates” from learning to grab Lego blocks, to hurling them and then to building edifices with them, thus learning to use that grammar “poetically”. And so we come to the performer.

What the performer does is to take up all the niceties he already knows of human action to organise them into a sophisticated corpus that could serve him in his tasks. He gives names, categorises and catalogues what he already knows, laboriously evolving a highly complex grammar of action with which he may render action poetic. At that stage the scientist may observe, asking what it could mean to be creative in action.

I wish to close by citing one point from a multi-point footnote in Stanislavski’s unfinished book of Ethics for the Performer. Stanislavski is on his death-bed, and he says to his sister “What a pity, the most important book of all, and I will never finish it...” And there is this footnote, with 31 points in it. And point 21 goes “What use is it to create beauty on stage only to then go out in your life and destroy it?”

This is what interests Richard. Because his interest in pleasure is not rooted in pleasure for its own sake, but in the cruel actions we human beings do to each other. And he asks himself – how is it that we manage to find pleasure in that?

This is why the performer trains. By means of his iterative work upon himself he tries to intervene on as many as possible of those faculties which – and he knows it! – he is already holding in rein. He knows that he already is in control of all those faculties, and now he tries to intervene upon them to refine and empower them. He tries to potentiate to its limits that which – he knows – makes him a Human Being. It is for this reason that the Performer is the ideal locus for science to inquire into what it is to be Human.