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Observe the neurones

Between, above and below John Donne

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Ever since I discovered John Donne's poetry, as a schoolgirl in the 1950s, I have been trying to work out why he is so very exciting. The short-story writer Frances Towers remarked that women reading Donne's love poems feel seduced; which was true of the girl I was, though odd, since he wrote "Hope not for mind in women" and described them as, at their best, "mummy posset". He also speculated that women might not have souls, since there is no record of God having breathed one into Eve. Nevertheless, his great love poems stir both body and mind in an electric way that resembles nothing else.

As a student, I puzzled over T. S. Eliot's dictum about the "dissociation of sensibility" that had occurred since the time of the Metaphysical poets. "Tennyson and Browning are poets and they think, but they do not feel their thought as immediately as the odour of a rose." What precisely does it mean, to "feel your thought"? It seemed to me that Tennyson, who was despised when I was a student, felt his thoughts much more immediately than the Metaphysicals. Christopher Ricks indeed claimed that Tennyson thought precisely with sensuous images, fusing sensation and thought. The imagery of trees in *In Memoriam*, for example, contained in the musical chain of stanzas, is a thought process made up of imagining the objects. Each tree changes all the other trees.

Two examples:

And if that eye which watches guilt
And goodness, and hath power to see
Within the green the mouldered tree
And towers fallen as soon as built

(XXVI);

and

Old Yew, which graspest at the stones
That name the underlying dead,
Thy fibres net the dreamless head,
Thy roots are wrapped about the bones . . .
And gazing on thee, sullen tree
Sick for thy stubborn hardihood,
I seem to fail from out my blood
And grow incorporate into thee.

(II).

These are part of a painful meditation on dissolution and the permanence of death.

The conceit of the eternal eye which simultaneously sees the green tree and the mouldered one is metaphysical in its startling intensity. But I feel it works -in conjunction with all the other living and dying trees in the poem -by making the reader imagine the tree in his/her body -the tree is grasping the dead man, its roots are grasping "the dreamless head", the poet is failing "from out my blood" and is becoming the old (mouldering) tree. This is thinking with the senses in the mind. The trees are as immediate as the odour of roses. I don't think this is almost ever true of the way Donne's poetry works - on my mind at least.

Nevertheless, I have come to see that Eliot may have meant something quite different -he confused the

issue with his example of the rose odour, for reasons I shall come to. Donne does feel his thought. But what he feels -and makes us, his readers, feel -is the peculiar excitement and pleasure of mental activity itself. It isn't smelling roses. It is being aware of, and delighting in, the electrical and chemical impulses that connect and reconnect the neurones in our brains. Thought is material, according to neuroscience. I think of it in terms of Sir Charles Sherrington's description of the waking brain, the "head-mass" as "an enchanted loom where millions of flashing shuttles weave a dissolving pattern, always a meaningful pattern, though never an abiding one . . .". The pleasure Donne offers our bodies is the pleasure of extreme activity of the brain.

He is characteristically concerned with the schemas we have constructed to map our mental activities - geometry, complex grammatical constructions, physiology, definitions. He is thinking about thinking. (And about smelling roses, but he is not immediately inducing us to smell any in our imaginations.) Reading Jean Pierre Dupuy's extraordinary account of the 1950s meetings of the cybernetics group, which discussed minds and machines and what it was to be human, I came across a remark by a neural network designer about puns. Perhaps, this scientist said, we delight in puns because the neurone connections become very excited by the double input associated with all the stored information for two arbitrarily connected things or ideas. Perhaps we enjoy this excitement. It occurred to me, reading this, that complex metaphors produce infinitely more subtle versions of this excitement and pleasure. I started to think -to use a double entendre that is very pertinent -about the play on words, the play of light on a landscape, the mind at play. I know that this excitement is the primitive thing at the source of why I want to spend my life writing and thinking. I do not have a message to give to the world, I do not wish to seduce or persuade, I want to think as fast as possible, in as complex a way as possible, and put the thinking into verbal forms.

I think I knew even as a schoolgirl that Donne excited me because he was a pattern-maker -with language. The other poet who has the same qualities of excitement is Wallace Stevens. The geometry of the lights that portion out and give form to the meaningless dark water in "The Idea of Order at Key West", the sections of "Notes Towards a Supreme Fiction" -"It Must Be Abstract", "It Must Change", "It Must Give Pleasure" -are part of the mental mapping I am reaching for. I think both Donne and Stevens describe not images, but image-making, not sensations but the process of sensing, not concepts but the idea of the relations of concepts. I like glass because, as Herbert said, you can look at it and through it simultaneously.

I think of both Donne and Stevens as "glassy" poets, as Herbert himself is not, because he is too much of a perfectionist, his poems are made objects, their form is what they are and contains them. Donne and Stevens make skeletons of poems.

It has been much easier to think about this aspect of poetry since there have been increasing quantities of information available about the myriads of neurones in different areas which fire when things are perceived, are reinforced by connections with previous perceptions and previous connections, and make up the constantly changing matter of mind which Jean-Pierre Changeux calls "'L'Espace de travail' neuronal". Changeux's neural work space is itself part schema, part description of what goes on in our brains when our minds are at work. In it there are millions of cells with connecting dendrites and long questing axons, some of which can cross into the opposite hemisphere of the brain. In L'Homme neuronal Changeux describes the construction of a mental object, which is a physical state created by the activation (correlated and transitory) of a large number of neurones from different layers and areas of the brain. This mental object can be represented by a graph. He then describes an increasingly complex sequence of mental objects.

a) The primary percept is a mental object whose graph and activity are constructed by direct contact with the external world.

b) The image is an object of the memory, "autonome et fugace", whose evocation requires no contact with the environment. It can only exist autonomously if there exists a "couplage" (coupling or linkage) of neurones in the graph which is stable in time and already exists before it is called up.

c) The concept, like the image, is a memory object, but has only a weak or even no sensory content. It is the result of the recruitment of neurones present in areas of association with multiple sensory or motor "specificities". The passage from image to concept follows two distinct and complementary paths - the "elagage" (pruning) of the sensory component, and the enrichment due to the combinations resulting from the way the mental objects are linked.

d) The "proprietes associatives" of mental objects allow them to link themselves spontaneously and

autonomously. They are constrained by the "mode de cablage de la machine cerebrale" which in fact imposes its own "grammar" on the linking of mental objects.

Elsewhere Changeux refers to the combination of neurones in concepts as an "algebra", derived from the isomorphs of perceptive acts. He describes language itself as a system of arbitrary signs, constructed as a vehicle for the communication of concepts in a society. Language has to be learned (laid down as stable neural linkages) in a "long apprenticeship". Changeux distinguishes this social language from the "langage de la pensee" -concepts derived from images derived from percepts - which is "permanently connected to the real" ("branchee sur le reel").

Changeux sees mental activity as a kind of musical rhythm of firing cells, and has a very specific and beautiful image -both a description and a metaphor -which Donne would have loved for its combination of the precise and the random. The cerebral cortex is organized in cellular crystals which establish local connections over millimetres, which are superposed on contacts at distances of centimetres or decimetres. The long axons reach out as far as the opposite hemisphere. This organization is at the same time precisely localized and delocalized. The mental object is, he says, "entre le crystal et la fumee" -between crystal and smoke. Quite different parts of the system fire when the thinking subject is simply perceiving, and when he or she is struggling with understanding or forming concepts.

I do not imagine that we are yet within reach of a neuroscientific approach to poetic intricacy, although Semir Zeki has made interesting observations on the relations between certain abstract works of visual art and neurones in the brain that detect movement, direction and colour. But I was convinced on reading Changeux that the neurones Donne excites are largely those of the reinforced linkages of memory, concepts, and learned formal structures like geometry, algebra and language. There is a kind of poetry that is mimetic of primary perception, and that is not -except in very special senses -what Donne is doing. I thought I might get help from cognitive psychologists about why we take such pleasure in complex metaphors. But the work they do on metaphor appears to be largely directed to understanding how metaphor fits into "normal" cognition and social construction of communication. They like to work on hidden dead metaphors, and construe from these metaphors rules about why we like to link things. In terms of Donne's fantastic webs of language it is not helpful to have it made clear how automatically we use military imagery for normal argument. The fact that the direction "up" in language describing human emotions represents a positive, while "down" is usually bad, is of great interest in terms of the human body firing perceptual neurones and making language from images and concepts. But the psycholinguists are not much interested in the complex play of words.

On the other hand, I was very excited by Elaine Scarry's dizzily ambitious *Dreaming by the Book*. Scarry's brilliantly original project is to describe a kind of grammar or algebra of the instructions by which a writer causes a mental image to be constructed in the mind of a reader. She is mostly interested in novelists and epic poets setting scenes -from Homer to Tolstoy to Hardy. She analyses phenomena like mental solidity or mental spaces, the description and evocation in the mind of movement and colour and flesh. She has various names for the constructive instructions -"Radiant Ignition", "Rarity", "Addition and Subtraction", "Stretching, Folding and Tilting", and "Floral Supposition" (she offers complex explanations for our human preference for describing flowers in detail). Her chapter on "Radiant Ignition" immediately made me think of Donne and Stevens. Radiant Ignition for Scarry is the verbal calling up of sharp bright lights in the mind -which she says is a way of focusing the imagination which will then see a scene. The interesting thing about brilliant lights in both Stevens and Donne is that mostly the excitement is simply in the brief radiant ignition. There is no following expansive imagined scene. The poetry is perhaps about this mental tool and its excitement, not about particular lit faces or fields.

Take, for instance, "Air and Angels". It has a crescendo of radiant ignition. "So in a voice, so in a shapeless flame" we are told, angels affect us. The mistress is first perceived as "Some lovely glorious nothing". Love, in the second stanza, can inhere "Nor in nothing, nor in things / Extreme and scatt'ring bright" -a phrase unforgettable for its combination of an abstract adjective ("extreme") with the concrete visual stimulus of "scatt'ring bright", which is ambiguously linked to the mistress's every hair. We readers see neither angel nor woman -though the woman is present, as often in Donne, in a string of nouns: "thy lip, eye, and brow". We see mental flashes.

There is a kind of bodily imagination of the embodied soul. Donne's soul "takes limbs of flesh and else could nothing do". At the end of the poem we imagine the embodiment of the angel which takes "face and wings of air, not pure as it, yet pure". In the first part of the poem the bright light and the angelic presence were the woman. Now it turns out that her body is the sphere in which Donne's love may be

enabled to "do". At this point the difficulty of the syntax at first hides the barb (if you are a woman). "Just such disparity / As is 'twixt air and angel's purity, / 'Twixt women's love and men's will ever be." Donne began by a complimentary comparison of his beloved to an angel. He ends by claiming that she is the airy sphere which clothes his purer spirit. The syntax imposes a reading which the sense is not quite expecting. The pleasure is in untangling it.

"Air and Angels" is a poem haunted by the brightness of the unseen, the embodying of the bodiless. And the embodiment is, as also often in Donne, the embodiment of a central consciousness in a circle or sphere. If you think in terms of mapping the concepts arising from the images arising from the percepts of bodily space, it is arguable that you are reading the ghostly -or angelic -image of a male body inside a female one. There are other poems in which the abstract forms of geometry are used both for the argument of the ideas, and for immediate bodily images. Take the famous compasses of "A Valediction: Forbidding Mourning".

These too appear after one of the most beautiful images of radiant ignition in literature. The two souls of the lovers are really one, and endure "not yet / A breach, but an expansion, / Like gold to aery thinness beat". We see and don't see the beaten gold - which is impossible as a solid because its thinness, like the shapeless flame of "Air and Angels" is aery. As in that poem Donne follows the arresting brightness with the geometry of the stiff twin compasses -in which again, the male and female elements oddly appear to change places. (The solidly sensual adjective "stiff" is one of those ambiguous fleeting evocations of the senses.) It is the male soul which runs obliquely in a circle. It is the female soul which sits in the centre and "grows erect as that comes home".

Again, in this poem the disembodying of the body has been carried out by a list of nouns -the lovers "inter-assured of the mind / Care less, eyes lips and hands to miss". The mention of eyes, lips and hands of course evokes some sort of imaginative response to these things, even as they are dismissed. They are the surfaces. In the centre are the erect twin compasses, in a just circle, made of two lovers "inter-assured of the mind". It is hard to say how -to go back to Eliot's feeling thought -those compasses represent human love and human certainty of reciprocal love. But they do, and they do it by evoking mental processes of conceptualization and mapping that are somewhat remotely to do with sex and affection.

There are more examples of this kind of geometric intensity of abstraction. "Love's Growth" works by using a string of disparate conceits to make what looks like a rhetorical jeu d'esprit. It contains one of Donne's rare references to the natural as opposed to the human or metaphysical world. (Though this, it is worth remarking, follows a ghostly radiant ignition, in the idea that stars in the firmament are not enlarged, but shown, by sunlight.) "Gentle love deeds, like blossoms on a bough / From love's awakened root do bud out now." This comparison depends on a simple identification of the root of a plant in spring and the male body aroused. It has more in common with Tennyson's trees than most of Donne's metaphors, and is at home in a poem which argues that "Love's not so pure, and abstract, as they use / To say, which have no mistress but their Muse".

But Donne immediately follows this rare comparison with flowers and boughs with another conceptual image of the containing circle:

If, as in water stirred more circles be
Produced by one, love such additions take,
Those, like so many spheres but one heaven
make,
For they are all concentric unto thee.

A remembered observed physical image of water; a linking with the concept of the cosmos; a ghostly graph of female pleasure, or joint sexual pleasure. This is followed immediately by a jokey reference to taxation.

The mind has to fire in every direction it can.

A concentrated example of Donne at play with our capacity to make mental links and reinforce them wildly is "The Cross". Historically, this poem is about a dispute in the Church as to whether to abolish the sign of the cross in baptism and other things. Theologically, it is about the omnipresence of the crucified Christ in the macrocosm and the microcosm. Poetically, it uses perceptual frames and bodily imaginings, as well as linguistic patterning and punning, to make a graph of the world which demonstrates the pervasive presence of crosses. It begins with an image of Christ's body as the cross,

or the cross as the image of that body. "Since Christ embraced the Crosse itself, dare I / His image, th'image of his Crosse deny?" The cross is the instrument of torture and death in the abstract form of the human body -here Christ is seen "embracing" the abstract shape of his death, so that the poet cannot afford to deny the power of "th'image". Later in the poem Donne uses the bodily experience of the cross as concept, very simply.

"Who can deny me power and liberty / To stretch mine arms and mine own cross to be?"

What he is saying here -in terms of the theological controversy -is that the idea of body as cross is so automatic that it cannot be proscribed. In terms of the mental imagery he is demonstrating that we abstract our sense of vertical and horizontal from our own bodies (as he says also in "Good Friday Riding Westward", when he extends the crucified body to the spanning of the poles). But in "The Cross" he moves from his own body echoing Christ's to a mad bravura demonstration of the brain's power to detect -or confer -abstract forms as it pleases:

Swim, and at every stroke thou art thy cross
The mast and yard make one, where seas do toss.
Look down, thou spiest out crosses in small things;
Look up, thou seest birds raised on crossed wings;
All the globe's frame, and sphere's, is nothing else
But the meridians crossing parallels.

Later still he remarks that the brain in the skull is itself contained in a bony structure crossed by a cross: "And as the brain through bony walls doth vent / By sutures which a cross's form present".

It has to be said that this is nonsense at any level of logic except the brain's pleasure in noticing, or making, analogies. The birds' wings are crossed at one particular moment of human perceiving attention. The meridians are geometers' patterns imposed on the globe to make a map of it. Only at some very primitive neurological level of finding horizontals and verticals is all this coherent at the point where some primitive and deep perceptual order gives rise to the connections and reinforced connections which make concepts, and lead to this kind of mental pleasure in the process of connection itself.

In the second half of the poem (which is not one of Donne's best or most successful) Donne superimposes grammatical and linguistic graphing on his visual patterns:

. . . therefore cross Your joy in crosses, else, 'tis double loss, And cross thy senses, else, both they, and thou Must perish soon, and to destruction bow.

He instructs his reader to "cross" his or her inclinations, and then triples the pun: "And cross thy heart; for that in man alone / Points downwards, and hath palpitation". The heart is a downward-pointing shape, and is also the seat of human desires, pulling man down to Hell, whereas the head Donne described in a sermon as "erected to heaven". This is an extreme version of the metaphor noticed by the psycholinguists, the badness of "down" and the goodness of "up" - originating in the idea of the body as a cross perhaps. Donne has also played with the superstitious idea of "crossing the heart" and also the religious gesture of doing so. What he has certainly done is make an elaborate graph, in Changeux's terms, of images and connections with which to construct a world of ideas -derived oddly and distantly from percepts.

Both geometry and grammar are wild in "The Cross". I would like to add that some of Donne's most beautiful effects are derived from the foregrounding of the difficulty and complexity -and density -of grammatical constructions. I am thinking not only of his long verse paragraphs, as in "Love's Infiniteness", but of difficult structures like the whole of "The Dream", where the meaning (which is not difficult to understand) has to be waited for, and puzzled out, through the syntax. Donne rhymes more than most poets on a delayed/hanging part of the verb "to be". "I must confess, it could not choose but be / Profane, to think thee anything but thee". The poem is about the real and the dreamed or imagined, so the verb to be is important. The beginning of the following verse is syntactically awkward, and once understood, powerful in its assertion of the reality of the "being" of the woman.

Coming and staying showed thee, thee But rising makes me doubt that now, Thou art not thou.

The double thee and the double thou offer a verbal image of the simultaneous possibility that she is identical to herself, and real, or that there are two, one only dreamed -thee or thee, thou or thou. It isn't

a poetry of soft flesh -it's a poetry of the puzzling head -but it is powerful and erotic.

I think Donne's poetry is paradoxically easy to learn by heart and to retain over long periods partly because of this syntactical play. If I try to remember verse -or even prose -I have known by heart, what comes back first into the mind is the rhythm, the beat of iamb or trochee, or the break of regularity. Then I seem to remember the connecting words -participles, prepositions, conjunctions -followed by the verbs. The nouns come last, and proper names, which should be the most particular, are curiously elusive. It seems to me possible that this search for the remembered piece of language (concept, image, idea) first finds the deepest and strongest neuronal reinforced links, where the firing of the cells is surest, most frequent and steadiest. And if this is so, it is a possible reason why Donne's games with grammar (and complicated rhythms) are primitive as well as difficult. They are the feeling of thought.

Donne himself was interested in physiology, in the sinewy string his brain let fall, in the propagation of lovers by the reciprocal pictures in their eyeballs.

My final speculation concerns mirror neurones. Mirror neurones are neurones recently discovered in the frontal lobes of monkeys which have the capacity to fire not only when the monkey performs an action, but when it observes the same action performed by another monkey. V. S. Ramachandran and others have speculated that human culture may derive from the communicative possibilities of this ability to internalize the bodily -and mental? -states of other humans. We have neurones that feel in the mind what we see others feel with their fingers or tongues.

One of Donne's most evocative erotic poems in terms of language and mirror neurones is the elegy "To His Mistress Going to Bed", particularly the couplet "License my roving hands, and let them go / Before, behind, between, above, below". Elaine Scarry discusses these lines in terms of her aesthetic instructing category "Addition and Subtraction":

. . . the general phenomenon -a verb that appears to describe motion within the text that instead prompts and describes the arrival of a picture in the imaginer's mind -can be recognised in . . . many places. Half in the imperative and half in the voice of petition, John Donne addresses his mistress for permission to let him move his hands across her undressed body -"License my roving hands and let them go" but it is also the imaginer who is being solicited to make the picture of Donne's hand move across the picture of the woman's body, a sense of movement achieved by a sequence of five stills, five locations on the woman's body -Before, behind, between, above, below

Scarry remarks in a footnote that Donne immediately follows the five stills with a line of awed exclamation that tells us the pictures, whether or not we quite realised it, did indeed successfully get made: "O my America, my new found land . . .". It is as though he had said to the reader, Please do this, and a moment later, Thank you for doing that, and in the momentum of being thanked we had the impression of the pictures having been successfully made.

Scarry has noticed what is important about this very sensuous image -it is, like Donne's uses of her other imaginative marker, bright ignition, stopped off. He starts an imaginative process, and leaves the reader to carry it through, or to respond to the marker. I do not see the succession of adverbs as "stills" at all, partly because I do not expect Donne to make a picture, and partly because they are like Donne's other erotic lists -"lips, hand and eyes", "thy lip, eye and brow" -parts of speech evoking a sensuous graph. I think -though this cannot be proved, and for that reason is merely a hypothetical folly -that Donne's adverbs of a flow of movement, like his enumeration of parts of an imagined face, are an appeal to mirror neurones. And the mirror neurones that respond to "Before, behind, between, above, below" are not picture-making neurones, but locations on the body of both writer and reader. They are the more powerful because they are purely brief firings in the mind of its deep habit of imagining motion in the body, and linking these images to other emotions, to form concepts and map them with grammar.

This is an edited version of an essay in The Cambridge Companion to John Donne.