

BINARY CODED PERFORMANCE

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Good evening. Now I am no mathematician but I would like to talk about a couple of numbers that have been troubling me lately, and they are zero and one. Now first, let's take a look at zero. Now nobody wants to be a zero. To be a zero means to be a nothing, a nobody, a has-been, a zilch. On the other hand, just about everyone wants to be a number one. To be number one means to be a winner, top of the heap. The acme.¹

Like Laurie Anderson, I too have been troubled by numbers zero and one. But my approach to the problem posed by these numbers is unlike the one taken by Anderson in her brilliant piece *Zero and One*, quoted above. The question I would like to pose is just how performable these numbers are. For Anderson, the answer to this question is tied to the popular use of these two numbers as expressions of people's attitudes to success and failure, where success might be understood to be performative in the widest sense of the term. In the idiomatic use of zero and one expressed above, an opposition between winners and losers becomes the *sine qua non* of a contemporary society in whose either/or logic gain and positive output rule. Felicity is hereby measured by what people *do*: their doing is translatable into measurable performance within the metric systems imposed by social, political or economic standards of capitalist production. What for Laurie Anderson is a tongue-in-cheek observation about contemporary society's obsession with being Number One, and the achievement of measurable performances that guarantee Number One status (which Jon McKenzie famously dubbed 'perform or else')² for me is a question of the potentiality for the body to render these numbers into encoded signs.

The performance I have in mind is therefore quite different; it is one that is tied not so much to the mechanics of production but to the use of the body as a codifying and sign-productive machine, both in technological and choreographic terms. In what follows, I will discuss whether numerical code, or more specifically a binary code, can be used as a code language that can be staged or choreographed, thus overlapping body and machine. Is it possible to think of textualities or written inscriptions on whose exhortation

performance is realised, but in such a way that it is not necessarily word-based? If so, might this open brand new possibilities for performance, inasmuch as choreographic or theatrical media is subsequently derived from non-worded types of inscription. Let us call it a binary coded performance: performance for actor and machine. This is precisely the aim of a choreographic workshop developed by The Configur8 Project in 2010 entitled *01 Digital Flesh*, which I will discuss in due course, and which takes gestural forms of binary counting as the basis for stagework that translates bodily gestures into machine readable code.

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It is not enough to say that performativity is a 'doing with words', or that 'our word is our bond', as J.L. Austin famously put it, for increasingly, the development of new technologies and new computer readable languages are forcing us to see that our bond lies elsewhere. The bond of words and word-based communication is not all there is to the performativity of language, in the broadest sense of the word. When speaking of 'doing' something with language, or indeed rendering a written language into a result or output that might be said to be performative, nothing stops us from realising that this doing could be extracted from a number-based language like mathematics or computer language. In other words, if performance is a force of language that is independent of worded text, then it could be actualised as the representation of non-worded textualities, i.e. mathematech or hyper/cybertext.

If indeed it is possible to perform by numbers, or at the very least to find in numerical scriptures a basis for performance, then the performance of Numbers One and Zero is no longer limited to the appearance of these numbers as social characters that are representative of a current obsession with high performance, or 'being Number One'. The reason why these numbers are performative is not only because they might be read as indicators of failure and success in social, economic or political contexts, but also because they have a functional role to play as binary opposites: thus, 0 and 1 perform functions or physical states that might be readable both by machines and humans, and which might produce a series of outputs that might be rendered into a technological or indeed aesthetic means of communication.

00010

Film director Peter Greenaway notes in his book *Fear of Drowning by Numbers* that 'counting is the most simple and most primitive of narratives- 1 2 3 4 5 6 7 8 9 10- a tale with a beginning, middle, and an end and a sense of progression- arriving at a finish of two digits- a goal attained, a denouement reached' (1989: 23). Taking the argument further, I will argue that counting is in fact a basic form of performance. Seeing as an elementary understanding of number may be said to stem from the division of the body into extremities or body-parts, I will argue that rather than being abstract or virtual objects, numbers are indeed performable insofar as they can be finger- or body-counted. In other words, one way in which numbers might be said to be actualisable is by virtue of the physical act of counting with fingers, body-parts

or physical objects. Counting is an ordering procedure which can only be realised once the count is *enacted*, whether mentally or out loud. In other words, counting is not synonymous or equatable with a written sequence of numbers or a narrative, as Greenaway thinks, but with the *act* of numbering, which teases out a relationship between the physical object, the action of counting, and the number. In sum, a counted number or an ordinal is a number that has to be performed in relation to an action, a doing, a process that brings the mathematical object into existence within a given sequence of events.

So whereas a narrative is dependent on mental and physical faculties that are interpretative, such that narrating a story places demands on a number of subjective procedures like describing, judging, or imagining, the count is a mechanical process that places no such demands. Narrative cannot do without the word, but counting can and indeed must. A count may be performed mechanically, by an artificially intelligent machine. This is why a numerical performance like counting does not place demands on an agent that *interprets* or gives personalised meaning to these numerical signs. What matters is that they may be *performed*. In this respect, Brian Rotman claims that there are languages that derive their significance, value, and strategic or instrumental interest, not from their meaning but in the fact of their taking place, and in the subsequent psycho-social-corporeal effects that they induce and could only induce as a result of having actually occurred (2008: 51). This occurrence is important as the manner, style, and force of what he calls 'gestural prosody' (2008: 51). This is why Rotman can write: 'numbers and their passage to the limit exist only through the *performance* of counting- that is to say, what constitutes their form as abstract objects follows from this determination' (2000: 148). The gestural prosody, in this case, is given by the lifting of the finger or the pointing action or the tapping. Counting is a mechanical performance.

00011

The assumption that counting is the natural progression of a number from a given point, say 1, to a point at infinity (∞), often helps impose a myth of disembodiment on the counted number. Here is a theological interpretation of number that Rotman considers to be highly problematic. When assuming that counting is in fact a basic form of performance (and here I make use of the word to refer to a theatrical or choreographic performance as well), this invocation to continue counting endlessly *ad infinitum*, which also invokes a ghost agent in numbers as soon as we start to count, or as soon as we are faced with the countlessness of numbers, is ultimately undone. Rotman resolves this by what he calls 'counting with non-Euclidean fingers' (2000: 125), which is an understanding of iteration and extension, or a mode of repetition that produces a different configuration of the most basic mathematical element, a number, and by extension, its most simple arithmetic functions. What is emphasised by non-Euclidean counting, according to Rotman, is not the immateriality of infinity, but on the contrary, the materiality and embodiment of the counter. In other words, rather than being non-physical entities which exist prior to any human intervention, numbers and their functions 'are always part of the larger and open-ended human initiative

of constant becoming- an enterprise never free from choice, contingency, the limits of our (always material) resources, and the arbitrariness of history' (2000: 123-4).

As a form of performance, then, counting becomes susceptible to specific techniques and historically specific technologies, to materialities of communication and mediation, to contexts, to contingencies, to culture. Numbers become susceptible to the bodies that are counting, to the actors and actants on whose fingers these numbers are actualised. Number historian Georges Ifrah corroborates this by arguing that numbers grew alongside a certain materiality used to inscribe them, and a certain physicality or even the mannerisms employed to communicate them (2000: 3). In other words, this historical approach to counting forces us, much like Rotman's notion of counting with non-Euclidean fingers, to rethink the count in relationship not only to a universal history of number, but also in relation to alternative histories and alternative geometries, and the peculiarities and abnormalities of the body on whose fingers the numbers are counted. It forces us to recognise that there is a normativity imposed by standard notions of the Euclidean or Vitruvian body. This ten-fingered, four-limbed, one-headed and gendered body contains a master numerology on the basis of which a standard metric system, a one-best method, and a universalising discourse on number is installed. And yet, this metrology might be troubled and queered by more problematic body-types and bodily numerologies that do not subscribe to the same numerical norm. After all, what kind of numerical system might be derived, say, from twelve-fingered hands, or bodies with phantom limbs?

00100

Numbers arise as they give value or function to concrete objects, to everyday things, as well as ideas and abstract constructions or formulae. When speaking more specifically about number-acts, or a doing with numbers, then numbers could be said to emerge from concrete objects or concrete events. Even so, the number-act itself does not represent these objects, they do not signify them. Counting sheep says nothing about the quality or nature of the counted object: the sheep. In other words, while the number is reliant upon the concrete object (sheep) and the concrete event (jumping) to which it owes its function and its purpose (to make the counter fall asleep), it is immediately independent of it, for it does not say anything about that object or event. So although numbers can and indeed often emerge from material or physical processes, either to give them a sense of quantity or value, numbers are not intended to be the representation of concrete objects or events, like words are. A price does not describe a good. Rather, the numbered price gives a value, a quantifying degree to that object.

What is perhaps most unique about numbers is that there is no sense-making prior to number. There is no precedent or antecedent to a number that needs to be explained or clarified. A number is self-explanatory, self-contained, and because it functions in-itself, it is meaningful per se. Because they operate as signs in-themselves, even though number-acts are derived from a concrete object or event, they can be communicated without need for further contextualisation. Thus if I were to say: I counted sheep, and I counted 45 of them, the number-act is meaningful in-itself. I do not need to explain

what counting to 45 means, because the count explains itself. There are no two ways of interpreting the sum either. The number is a self-actualisation, unlike the word, which demands a context, an interpretation, a placement whereby signification might be activated and contested. When reading a number one does not ask what is meant by 0 and what is meant by 1, no less than when we come across these numbers in a phone-number or id- these numbers simply help perform functions, operations, calculations, mechanical actions. Their significance, value, and strategic or instrumental interest stems not from their meaning, nor from the contestedness of their meaning, but in the fact of their taking place. For this reason, numbers are naturally given to performance. They *do* something, as oppose to *mean* something. In the example given above, the number has a felicitous or infelicitous outcome. I counted to 45, and I fell asleep. The number did something, in the same way that an arithmetic calculation does something, namely, to produce a new numerical sum out of the addition of the previous two: two and two ~~is~~ has been known to be ~~four~~ five.

00101

The link between embodied praxis and numbers is evident even from a general etymological inspection. The Latin words *digiti*(fingers) and *articuli*(joints) came to represent ‘units’ and ‘tens’, respectively, by the middle ages, whence *digiti* in turn came to mean the signs used to represent the units of the decimal system (Ifrah 2000: 59). Karl Menninger further emphasises this point when he argues that finger counting is a predecessor of written numbers, and that traditions of finger counting in Europe constitute a rich oral tradition upon which number reckoning and the very notion of number and number calculation in the West were founded (1969: 201-3). Now then, although many ancient finger-counting systems have been marginalised in modern societies by Arabic numerals and conventions of number notation, dactylonomy was the predominant system for number reckoning in many pre-literate and literate cultures, in some cases producing educated finger counting methods that are far more complex than any contemporary finger-gesturing counting technique.³

In the Far East, for instance, finger counting served for centuries as the only available system of manual communication and gesturing of numbers and basic arithmetic operations.⁴ The same could be said about the communication of numbers in Europe, where one of the earliest recorded versions of finger calculus is due to the eighth-century Anglo-Saxon monk the Venerable Bede. In a chapter of his ‘On the Reckoning of Time’ entitled ‘Counting and Talking with the Fingers’ (*De Computovelloquela Digitorum*), Bede describes a kind of manual speech that can be expressed by finger gesturing. Bede’s account is a description of a system of finger counting that had already been in place since at least the Classical period; indeed, there are allusions to finger counting both in Greek and Roman literature.

Sir Richard Paget estimated that by combining various postural movements of the upper arm, forearm, wrist and fingers, it is feasible to produce the staggering number of 700,000 distinct elementary signs, an estimation that would make the human hand overwhelmingly more versatile than the mouth (in Pallasmaa 2009: 43). In this fully way, numbers can be

seen to be abstracted gestures and body parts. Numbers are not entirely cut off or removed from the self-same gesturing and embodied act that is so essential to the arts of rhetoric, theatre and even dance. The gestural and chirological power of the human hand is therefore relevant both to the communication of numbers through signs, and the mechanical communication of these by use of the hand as tool, from where more complex procedures for calculation and counting may be derived.

So the importance of the body, and more specifically the hand, in the acquisition and transmission of elementary mathematics can hardly be exaggerated. Georges Ifrah writes that the human hand is an extremely serviceable tool and constitutes a kind of 'natural instrument', well suited for acquiring the first ten numbers, as well as elementary arithmetic. In other words, because there are ten fingers and because each can be moved independently of the others, the hand provides the simplest 'model collection' that people have always had, so to speak, to hand (2000: 22). Ifrah further points out that as the thumb is set at some distance from the index finger it is easy to treat it as being in 'opposition' to the elementary set of four, and makes the first five fingers an entirely natural sequence. Five imposes itself as a basic unit of counting, alongside the other natural grouping, ten.⁵In other words, the grouping of numbers into tens, which lays the foundation for the decimal system used today, is derived from the fact that the human hand has ten fingers. Thus one could go as far as saying that this number system is, in the historical sense described by Ifrah, derived from the performative act of finger-gesturing and number-reckoning through hand signs. And in the same way that each of the fingers is actually different from the others, so that the human hand can be seen as a true succession of discrete units or numbers, so the more abstract notion of counting is obtained by the progressive adjunction of one number to the preceding unit. Counted numbers are thus abstracted fingers.

Ifrah's conception of the hand as a serviceable tool and a natural counting and calculating instrument resonates with Finnish architect Juhani Pallasmaa, whose work *The Thinking Hand: Existential and Embodied Wisdom in Architecture*, further explores the role of embodiment in human existential reactions, experiences and expressions as well as the processes of making and thinking. Knowledge and skills reside, according to Pallasmaa, in the senses and muscles, in the 'intelligent' or 'thinking hand', to extent that thought might and indeed should be understood as a physical and material process whereby ideas can be understood to be hand-made objects. Ideas emerge from the manipulation of linguistic tools and embodied communicative practice. Pallasmaa further argues that the development and refinement of tools, especially linguistic tools, can be assumed to be related to the emergence of subjectivity and purposive thinking. Before fully fledged language comes what Pallasmaa calls 'thinking in terms of tools' i.e the realisation of mechanical connections and the invention of mechanical means for mechanical ends (2009: 35). To put it differently, thinking is determined by the usage of tools, material and linguistic, and the skills and knowledge derived from tool usage. The hand, therefore, might play a crucial role in the development of tooled culture, whose thinking is made possible by manipulation and manufacture of objects, by hand-made tools and

handy procedures that encourage purposive thinking and subjective meaning. Thought is handmade.

The actualisation of number thus comes about through the gestural performance of a quantity, and in more complex ways, through mathematical processes that can only come about as a result of some gesture being performed, whether physical, haptic or virtual. Pallasmaa radically challenges us to seek out ways to re-embody our institutional systems through holistic integrative thinking, whilst encouraging us to think of thought as a handled operation. It is through linguistic tools that are operated by hand, that the discursive unfolding of written and gestured language is made possible. In this sense, what is being discussed here is a way to mine the archaeology of discursive formation from a physical site, the body, and the processes of instrumentalisation that occur in the instrumentalisation of culture.

Finally, using the term 'tool' in its widest possible sense to signify any engineered instrumental means of mediation, educator and philosopher Ivan Illich argues that what characterises a tool is what makes it distinct from its user. By contrast, he argues that a system lacks this distinction because it integrates its user within it. In cybernetics the discursive system, metaphorically, becomes a network and an ecosphere whereby the computer becomes increasingly identified with the embodied self.⁶ And so the hand, which is the bridge between the body and the disembodiment of communicable signature, is made extensive through the use of the computer tool. An extension of the hand, the computer thus becomes operative not only through hand-gesturing and hand-typing, but also through mechanical processes that are also extensions of the binary operations performed by the pointing and folding of fingers. Computerised or digital culture, like any tooled culture, establishes an inextricable link between hand, tool, and communicable sign.

Hence the term digital is applicable to numerical computation. Digital computing refers to the technologies of computing by digits or numbers. With the development and recent spread of computer technology, the sense of the word digital has been extended to include every aspect of the processing of information by machine in which any entity, numerical or not, and whether or not representing a variable physical quantity, is given a discrete representation. It is interesting to note that even in the contemporary use of the term, the connection between hand, tool and sign remains. The hand operates the computer, to produce meaningful signs through physical action, gesture, and movement. The computer is, in many ways, the potential of the hand, a hand to the power of technological infinity. The digital thus refers not only a technology of discrete numerical entities, but also the technology of finger operated machines. Digit becomes a slippage where the distinction between finger and number is blurred, just like in the ancient traditions of dactylonymy or finger counting.

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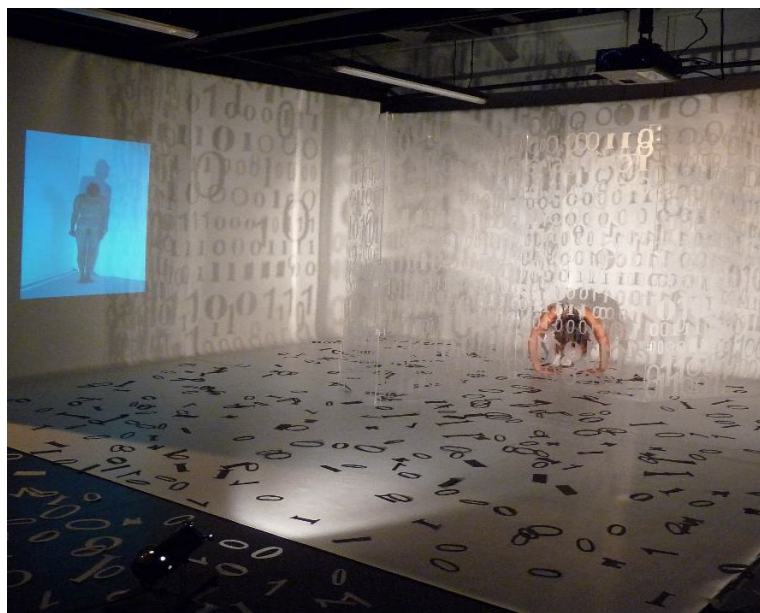
What follows is a brief discussion of *0 1-Digital Flesh*, (henceforth *01-DF*), a fifteen-minute choreography conceived by the author and Juley Hudson (*Configur8 Project*), and presented at Brunel University in September 2010. *01-DF* is a visual art performance that explores the kind of intimate

relationship between bodies and counted numbers that I have discussed in this paper. The choreography is based on a finger-count technique known as binary-finger gesturing, with which one can count binary numbers from 0 to 31 using one hand. The piece thus functions as a finger and body count where the natural division of the hand, and distinctions in two discrete bodily positions, serve as the organising numerical logic that provides a sense of progression, of completion, and the limited temporal frame within which the piece might be said to unfold. To be more precise, because there are 5 fingers in the human hand, one can count only 32 binary numbers in one hand. This then provides the temporal magnitude of the piece. The temporal magnitude of the piece, thus programmed in relation to the quantity of numbers to be counted (32), results from the naturally limited scope the body has, given the limited number of fingers in one hand. To simplify even further, the magnitude of the piece is defined by bodily finitude- thus the performance of numbers in *01-DF* goes on only as far as the body can go. At that point where the body encounters its own limit, the choreographic sequence ends.⁷ I will explain in more detail below how the counting is actually performed.

Before I do so, it is important to note that binary numbers have an appropriate translation as objects of opposition and conflict in dramatic language. Thus, the opposition between 0 and 1 is a dramatic device, much like in Laurie Anderson's piece (quoted at the beginning of this article). The opposition is present even in the historical origin of this number system, which in its original form was not so much binaristic, but bipolar. The idea of a binary numeral system or base-2 system, which is due to the 17th century German mathematician and philosopher Gottfried Leibniz, is inspired by a symbolic notation consisting of two types of line, representing oppositional forces in nature, which was used by the Ancient Chinese. Taking the continuous line (—) to represent the Male or active polarity in nature, and the broken line (- -) to represent the Female or passive pole, Ancient Chinese religion could write a symbolic language that described combinations of these forces in hexagrams that conveyed dramatic contrasts and changes in nature. Whilst the Yin-Yang philosophy described in the *I Ching* or *Book of Changes* uses the distinction of the sexes to formalise a language that describes polar or seemingly contrary forces interconnected and interdependent in the natural world, Leibniz saw this opposition as a mathematical one. Likewise, whilst in the Chinese system the two symbols form a bipolar representation of the supreme and ultimate totality, for Leibniz, binary numbers provided a universal language, a *mathesis universalis* that would effectively bring about a unification of people of all countries and races. With this in mind, Leibniz proposed a permanent symbolism to be applied in the first instance of logic, which he put forward as a doctrine of proof. Whether it was a matter of reasoning or discovery, Leibniz wanted to reduce the combinations of ideas to the combinations of their symbols. The scope of Leibniz's work was extended, and the power of symbolism doubled, through the use of binary numbers, which reduced to the figures 0 and 1, repeated over and over again, the notation of any number expressing the result of a measure (length or duration) experimental or theoretical.

00111

With this in mind, 01-DF seeks to develop a language that is inscribable both in human bodies and technological devices- in other words, it depicts a unifying language that expresses, in the opposition that is central to its binary logic, a dynamic within this universalising logic of binarism, which can be dramatised or which can be rendered into corporealised and technologically-mediated performance. This idea of a fundamental opposition, which stems from the binarism that is being communicated in and through the performance, functions in such a way as to impose on every element within the performance a sense of polar and dramatic opposition. One way in which this notion might be translated from the mathematical and philosophical sphere to performance is by identifying polar opposites in the philosophical and mathematical sense, as the notion of the theatrical double, which is an important and recurring paradigm in theatre practice, and which can be given a spin in the notion of the digital double. Digital double, the 'I' that alters the ego via a screened projection of selfhood, is thus a representation of a number that is not fully corporealised, a zero being against which number one, or oneself might be binaristically paired off. This idea is further emphasised in 01-DF by the fact that there are two performers on stage: one performing live (actualising the idea that is Number 1), the other a digital double, if you like, represented as a digital-video projection, which represents 0 (See Picture 1, below). Both these dancers are female, which means that the opposition in this performance is not rendered, as in the ancient bipolar philosophy, in terms of a combination of active and passive forces in nature equated with a gender difference. The focus here is not a distinction in gender, but the difference between a live experience of the body, and one which is technologically-mediated. This is the crucial opposition to be performed, and it is through binary numbers that the distinction becomes actualised, for the simple reason that both bodies and computers can read a strip of binary numbers.



Digital double in *01 Digital Flesh*, by Configur8. Performed at Antonin Artaud Building, Brunel University, September 2010 (photo by the author)

01000

To achieve this totalisation of the mediated body and the live body, this unification of the body and its digital double, *01-DF* stands on the basis of what is evidently a mathematical universal: namely, the repetition of numbers in sequence, using a language that can be uttered and read both by the human body and by a machine. Thus, the polarisation is not so much between the live body and the digital one, but between the human body and the machine, which reads the movement of the dancers and translates their positions into coded stimuli that are machine-readable. This leads to a re-axiomatisation of performance, at least in the theatrical sense, for instead of beginning with a text, we end with a text, produced by the computer. Thus, the starting point of the performance is not a given text but the body: the outcome is a text, read by the computer, which is extracted from the binary gestures and binary movements of the dancers as a sequence of digits 0 and 1.

It is important to note that binary code suits computers to a tee because of the ease with which physical systems in two states (perforation, passage of current, magnetisation) may be symbolised as ones or zeros. Owing to its straightforward implementation in digital electronic circuitry, binary coding is now used internally by all modern digital computers. The way modern computers process information is by a discontinuous and variable physical phenomenon which can be represented in a one-to-one manner in a discrete form, namely by digits or other symbols subject to precise laws of combination, which thereby form what is called a code. The subtitle of this article is in fact the title itself, only transcribed into binary code. Likewise, the numbers of the sections into which this piece has been broken down can also be translated into binary code or strips, as follows:

00000= 0
00001= 1
00010= 2
00011= 3
00100= 4
And so on...

In electronic logic, a logic level is represented by a voltage or current, depending on the type of electronic logic in use. By associating 1 with energised state and the digit 0 with its unenergised counterpart, and by suitably connecting several transistors together, a computer's logic gate performs a logical operation on one or more logic inputs and produces a single output. To return to *01-DF*, there is an important cross-over between the machinic capacity, which enables computers to translate currents into codes, and the capacity bodies have to translate bodily positions and finger positions into the very same codes. In both cases, there is a universalising mechanic that allows both human bodies and machines to speak, and thus perform, the same language, and the same choreographic sequence. And because there is a kinship between physical and machinic processes, the relationship between number, body and machine goes beyond the etymological connection between 'digit' (meaning finger), 'digit' (meaning

number), and 'digital' technology. The connection remains as an enduring relationship between tool, number and finger, which is sustained by the dynamics of performance, that is, by the fact that communication must be acted out or staged.

01001

Whereas the codification of computer languages into digital code is universal in modern computer systems, the capability of a body to speak such a language is not. In other words, digitalisation is a formality in the case of digital technology. The same cannot be said about the body, which is not commonly read in terms of a mathematical language. In everyday situations, a body communicates most readily in terms of gestures and movements that are either vaguely codified, or which have no codifying standard as such. What is important is that a body can, through a given technique or formal system, function as a bio-code, a biometry, a living mathematics or living machine that is able to speak binary code. As an aesthetic experiment, what this codification of the body does is but to reiterate a natural appearance of code within the body, which is to be found at the level of genetic codification. What matters in a performance like 01-DF is not the subjective investment of the performer, which might lead to an informal or irregular expression that is unique and singular to that performer. What matters is not what each performer can do differently, but what they can all do in the same way, using the same code. Thus, the performer must necessarily move in the most impersonal way possible, in the most machinic and codified way possible, so as to convey the movement in a total way, in the sense that it might be understandable both by a human and a computer.

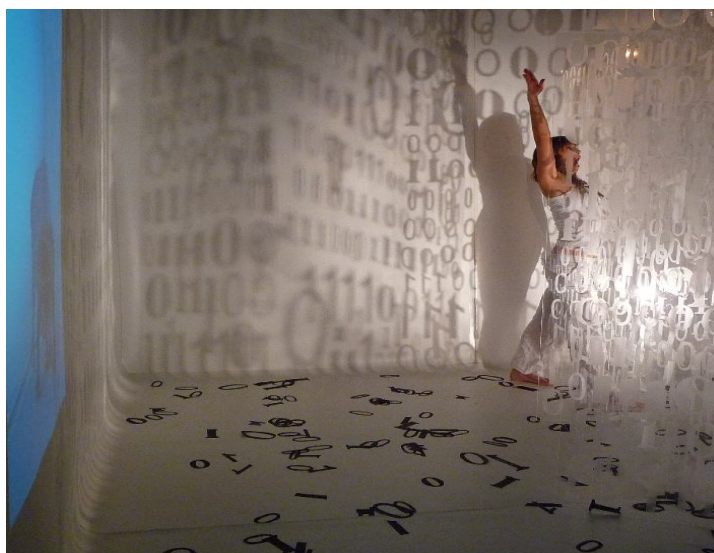
To achieve this, not only is it necessary to develop a choreographic technique that achieves aesthetic qualities derived from very simple, austere, and almost mathematical movements. It is also necessary to give a power of interpretation to the computer, to humanise the computer if you like, in order to give the computer the power to read and write the text that is the end-product of the performance. In other words, in having the polar opposites played out by human body and computer, the polarisation necessarily leads to an interdependence and inter-relation between the two, where some qualities of the former are transferred to the latter and vice versa. Finally, what counts is not the complexities and layers of subjectivity that make us all different, but the very basic codes that allow us to function like genetically mediated machines. The question is to see whether at this micro level, at this mathematical level that takes the body to a simplicity that is almost abstract, there is also an aesthetics that might find its realisation as an engaging moment on stage.

01010

The performers move between two alternating positions, which predictably, may be termed Positions 0 and 1. On the one hand, these movements are simple enough so as to be machine readable, through movement tracking or motion capture. At the same time, these positions are graphic enough to be interpretable by an audience, in the sense that the

dancer resembles the written form of these numerals, in their conventional Arabic notation (see Picture 2, below). Whereas Position 0 indicates an absence of gesture, or off-gesture, Position 1 has the performer standing upright, with right arm in the air and her hand frozen in a binary number gesture. The dancer moves from her crouching position (0) to her standing position (1), performing a gesture every time she reaches the latter position. This movement is repeated 32 times, thus obtaining a full count in one hand, from 00000 (Number 0) to 11111 (Number 31).

Two counts are being performed simultaneously: one with the body, which is performed as the dancer moves from positions 0 to 1. The second count is obtained with the fingers, which the dancer only performs whilst in position 1. Position 1 in fact indicates that a new number in the count has been obtained by a new configuration of the fingers in the dancers hand, which by an alternation of folded or pointed fingers produces a finger sign version of a binary strip. Now while the body-count is simple enough, it only consists of a movement from crouching position or position 0, to a standing position or position 1, the finger count is more elaborate. It might be helpful, at this stage, to say a few words about the method used in this performance.



Counting position (Position 1) in *01 Digital Flesh*, by Configur8. Note how all fingers are raised. The number being performed is thus 11111 or number 31. (Photo by the author).

Finger binary is a standard system for displaying binary numbers on the fingers of one or two hands. The way finger binary works may not be as straightforward as a simple finger count from one to ten explained, but it is not complex either. Either way, a wordy explanation could be dispensed with by a very straightforward practical demonstration, which of course I cannot do. A hefty definition will have to suffice: using anatomical digits (fingers) to represent numerical digits, one can obtain binary numbers if and when a finger is given only two possible states: raised or folded. Each successive raised finger represents an increasing power of two. The rightmost digit (thumb) represents 2 to the power of 0 (Number 1). The digit to its left (index) represents 2 to the first power (2), the third finger represents 2 to the power of the second power, and so on. With palms oriented toward the counter's face, the values of each finger in the right hand are shown in the table below.

	Thumb	Index	Middle	Ring	Pinky
Power of 2	0	1	2	3	4
Value	1	2	4	8	16

Table 1. Numerical Value of each finger in Finger Binary

To the extent that one can display a binary number with a finger gesture, one can also go as far as counting with binary fingers. Thus binary finger gesturing makes use of the human hand as if it were a binary strip made up of five positions. Counting in binary fingers requires changes in each position from right to left. Starting with all fingers folded in a tight fist gesture, we have the number 0. By raising the furthestmost finger to the right, that is the thumb, we have number 1 (00001). By raising the index and folding the thumb, we have Number 2 (00010). By raising both thumb and index we count three. And the count proceeds thus. The performance of binary finger counting is thus a movement from right to left, where changes occur in the position of the fingers. This movement, which is always realised as the raising of a finger, or else the raising and folding of a finger, amounts to a performance. The written form of this performance, which amounts to the text produced by the computer reading the performer's movements, is: 00000, 00001, 00010, 00011, 00100, 00101, 00110, 00111, 01000, 01001, 01010, 01011, 01100, 01101, 01110, 01111, 10000, 10001, 10010, 10011, 10100, 10101, 10110, 10111, 11000, 11001, 11010, 11011, 11100, 11101, 11110, 11111. These thirty two strips are equivalent to the numbers 0-32, and to 32 finger gestures, where each position in the strip is a finger and where 0 is represented as a folded finger and 1 as a raised finger. By transposing the logic of ones and zeros to folded and stretched fingers in one or two hands, binary numbers can be thus gestured and counted in one hand from 0 to 31. A more lengthy version of this piece would see the dancer commit to a two-handed performance, in which case the dancer would have to dance up to number 1023.

01011

My concern in this paper, and the practical work discussed here, focus on the possibility of reprogramming the notion of digitality. Instead of speaking of the digital as that which relates generically to new technologies, especially computer technologies, the digital might also refer or come to express the logic of binarism and digitality at a corporeal semiotic level. The aspect of digitalisation that concerns me, therefore, is not technological per se. Instead, I am interested in exploring how the technological impinges on the formulation of new languages and new formal systems of communication felt at a corporeal level. By transforming the material social and cultural possibilities of communicable messages, technology not only changes means and dynamics of communication, but also the actual languages and types of embodiment we use to communicate. Assuming that the digital is thus more than a technology, but a language, a culture and a conditioning of the body, one might begin to ask how this language then functions at the level of artistic production. In

other words, one might begin to ask what a digital performativity is, what a digital aesthetics or a digital poetics is, insofar as the digital, when seen as technologically-oriented language rather than mere technology, can be uttered for the sake of an effect or a doing. What can this doing amount to in the artistic sense of the word? What can we do, artistically or choreographically speaking, with digits? Finally, the consideration of what the digital is, remains inconclusive when limited to the technological possibilities that digitalisation offers in the development of new devices and machines. The digital is inscribed at the level of discourse formation and practice through its functions at the linguistic and corporeal semiotic level. Taking the argument yet further leads to the conclusion already intimated above: if digitality is a language, and one which may be relayed as much by computers as by human fingers or numerical digits, then the question is pruned open: what kind of performance praxis may be rendered with this language? The question is crucial because it allows us to speak of digitality not only in terms of what this technology 'does', performatively speaking, in order to maximise output. What is at stake here is something other than the productive power of technology. The question here is not *how much* technology can improve, say, accuracy, speed, efficiency. There is also the question of the performance of the digital, that is to say, the possibility of discovering what the *qualities* of this language are, and as such, what it might render poetically, aesthetically, choreographically.

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Notes

¹ See Laurie Anderson's *Zero and One*, available at:

http://wn.com/LAURIE_ANDERSON_ZERO_AND_ONE

The full text of this performance is available on Anderson's retrospective *Stories from the Nerve Bible* (1994)

² See Jon McKenzie *Perform or Else: From Discipline to Performance* (2001).

³ On a similar vein, ethnomathematical research has shown how important the use of body counting is in a number of so-called non-literate cultures. For instance, tribesmen in Papua New Guinea and the Torres Straits Islands used their eyes, nose, hips, and other parts of the body to count to numbers as high as 41. Numbering could be performed by simply indicating the point on the body that corresponded to the correct number of objects. Unfortunately, because body-counting is not a written or notated form of numerical communication, and because in many cases permanent records were never kept, many sign language systems and embodied mathematical forms of communication like the one used by the people of Papua New Guinea have been lost, or supplanted by numerical notation. See Georges Ifrah, *The Universal History of Computing: From the Abacus to the Quantum Computer* (2001).

⁴ The Chinese, for instance, have a method of finger counting involving the use of one hand to signify the natural numbers 1 through 10. This method bridges the many dialectical problems posed by spoken Chinese, inasmuch as the pronunciation of certain numbers can be confusing when faced with dialectical differences. In Korea, meanwhile, a number gesturing system known as Chisanbop, which is an abacus-like finger counting method used to perform basic mathematical operations, was created in the 1940s so as to enable counters to display all numbers from 0 to 99 with both hands.

⁵ Ifrah further argues that the almost universal preference for base ten comes from nothing more obscure than the fact that we learn to count on our fingers, and that we happen to have ten of them. We would use base ten even if we had no language, or were bound to a vow of total silence: for we could use our raised fingers to count out the first ten in silence. In sum, one can say that the hand makes two complementary aspects of integers entirely intuitive.

The hand is an ordinal counting tool. See Georges Ifrah, *The Universal History of Numbers: from Prehistory to the invention of the Compute* (2000).

⁶ See David Cayley, *The Rivers North of the Future: The Testament of Ivan Illich* (2005).

⁷ Considering the performer takes 10 seconds to perform each number gesture (the choice of length is intended again as a reflection of the human limitation to count to 10 with both hands), the piece thus naturally yields its temporal length (320 seconds), which, given the sequence is repeated twice, results in a total running time of 640 seconds, or 10 minutes. The piece was repeated 10 times in the course of 1 day. The recurring numerological pattern behind the piece is thus evident, indexing how profoundly the digits 0 and 1, and the digitality of the human hand (10 fingers) is installed in the overall logic of 01-DF.