A C[o]unt of the Womb

Brad Borevitz

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I think of writing a book of flyology illustrated with plates if I ever invent a method of flying. – Ada Augusta Byron King, Countess of Lovelace, age 12 (qtd. in Campbell)

It makes sense to start here, not with Turing this time, but with Lovelace, since in imagining the computer's genealogy as beginning with Turing, we erase a gynecological inheritance and substitute a homosexual one.[1] The rub is always in the imagining. My own prurient pleasure in supposing that the technical efflorescence of computation is somehow at its heart a turgid project of homoerotic romance serves a certain lust that proceeds my interest in that machine–if just barely. What the countess seems to know, even at age 12, is that invention requires both illustration and writing–not just writing, but a whole science–as its supplement.

The awkward neologism "flyology" may as well be "fuckology" for its betrayal of the place of desire within the machinery of creative production. The condition of invention is as miraculous as (virgin) birth: Lovelace's conditional final clause places the diagrammatic and

[1] This essay acts as an interrogation of the assertions I have made elsewhere regarding the queerness of computation, which may be summarized as follows: The conceptualization of computation relies on a notion of emptiness that can be serially filled and evacuated. This lack has its ultimate reference in the biographical loss by Turing of his dear friend Christopher Marcom. The sad event inaugurates an emptiness which moved Turing to cruising (serial sexuality – a compulsion to fill and void ones heart, hand, mouth or anus), from there to computation, and finally to infamy.

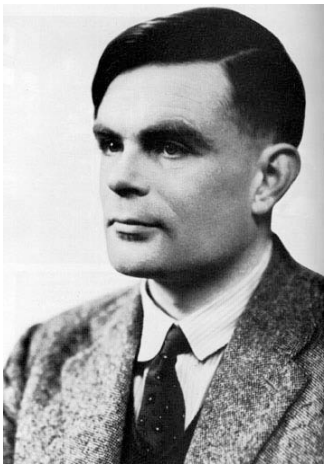
textual explanatory apparatus in a dependent relation to invention, an appurtenance like the afterbirth. Or, perhaps, the opposite is true, for she thinks of writing first–her desire is for writing– and writing, obviously, is illustrated, since the most handsome books are furnished amply with plates. Invention is the condition of her desire–for her desire must have a place, a reason for being. If this is what she must invent, isn't it equivalent to romance? She imagines the place for her project. She imagines a self-sufficiency in producing both the place and project– maybe less romance than a masturbatory fantasy. As things turned out, it was another who provided a place for her writing as the supplement of his own placeless project[2]: Babbage.

Ada was asked by Charles Babbage to translate Menabrea's memoir on his Analytic Engine and to add to it her own notes, which, as published, make up the majority of the text. Babbage and Lovelace had been corresponding and collaborating on the work of the Analytic Engine for a while, and even after their very first meeting, he readily admitted that, "She seems to understand it better than I do, and is far, far better at explaining it" (qtd. in Rheingold). So Ada's place of writing, her domain of expertise, is doubly enclosed: first by the adoption of Babbage's invention as a substitute for her childhood fantasy of the self-produced flying machine, and second by her notes subtending Menabrea's exposition on the Engine.

Babbage's Analytic Engine was the subject of her new science. This machine preceded Turing's by a century, and although its form differs vastly from that of his Universal Machine, Ada Lovelace could be credited with arriving at some of the same crucial insights about the nature of machine "intelligence" that are attached to Turing's theorization of his own device: the interrelated principle of machinic universality and the technique of programming. These ideas

[2] Placeless because he was unable to build the machine for lack of financing. This deficit was eventually the grounds of a falling out between Babbage and Lovelace who refused, at a certain point, to write an appeal for funds for him.

can, in turn, be seen to have their roots in the Jacquard-loom, the punch cards of which served as a model for Babbage's technique of notating and entering configurations for the engine. Ada writes poetically of this borrowing that, "the Analytical Engine weaves algebraical patterns just as the Jacquard-loom weaves flowers and leaves" (in Menabrea). She connects the work of the Engine to the work of the loom and thereby stakes a claim for the Engine as feminine territory. The mythos of weaving is steeped in the perfume of femininity and even the brutal mechanization of the loom by the industrial revolution does not dislodge the mistress from her relation to the instrument, though it does manage to invert her authority over it. The same metaphor of weaving also introduces an aesthetic note into the machine since it weaves the decorative in imitation of nature and produces its own nature in following the rule of maths and logic[3].



It is possible to invent a single machine which can be used to compute any computable sequence. – Allan Turing

Although Turing had the solution of a particular mathematical problem on his mind, in retrospect, this is the "ground-breaking" assertion of his 1936 essay, "On Computable Numbers ..." He calls the machine "universal," and as he asserts its possibility he actually invents and describes its precise mechanisms together with a whole mechanical cosmology; the Universal Machine is a subset of the devices he terms "Computing Machines" which is a subset of those called "Automatic Machines." How different is this "it is possible to invent" from Ada's tentative "if I ever invent?" Turing hides his certainty, and his

[3] Lovelace was tutored by De Morgan, one of the foremost logicians of the day, and her husband, the Baron, Lord King, was also a noted mathematician.

authorship, in the passive construction of the statement, while Lovelace makes hers a dependent conditional. Still, invent she does; it is not the invention which she invents but its theory, and this theory anticipates Turing's[4]:

> The Analytical Engine... is not merely adapted for tabulating the results of one particular function and of no other, but for developing and tabulating any function whatever. In fact the engine may be described as being the material expression of any indefinite function of any degree of generality and complexity ...

Here she says essentially the same thing as Turing: there is a machine that can do it all. She describes its mechanisms and its methods. Moreover, she is quicker than Turing to assert that the machine is capable of applications beyond mathematics:

> it might act upon other things besides number, were objects found whose mutual fundamental relations could be expressed by those of the abstract science of operations ... for instance ... the engine might compose elaborate and scientific pieces of music of any degree of complexity or extent.

And she attends to the limits of the machine as well:

> The Analytical Engine has no pretensions whatever to originate anything. It can do whatever we know how to order it to perform.

Turing, since his original project is exactly about limits–the limits of provability as translated onto his definition of the mechanically calculable–is very explicit about what cannot be done by the universal machine:

> ... there can be no machine R which, when applied with the S.D[5] of an arbitrary machine M, will determine whether M ever prints a given symbol ...

Which is to say, in the characteristic abstraction of mathematics, a machine cannot be used to determine the outcome of the operations of certain other machines; there are numbers that cannot be calculated and there are tasks which the Universal Machine is incapable of accomplishing.

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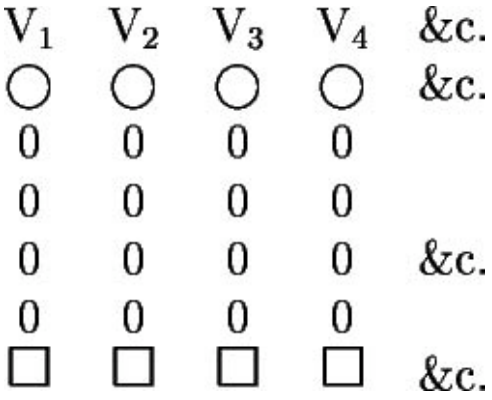
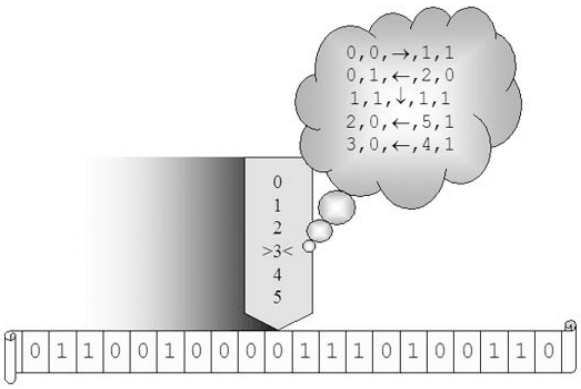
[4] There is apparently some evidence that Turing was familiar with Lovelace's work when he wrote (later) about artificial intelligence, but it is not clear that he knew her work when he wrote the 1936 paper.

[5] Standard Definition: a mathematical description of the machine.

This is, in fact, a stronger statement than Lovelace's but its domain of applicability is different. Her statement has been called "Lovelace's Objection" and applied not to the problem of computability, but rather to that of artificial intelligence, later also a topic of Turing's speculation, where it serves as a counterweight to his optimism about the possibility of that invention.



Analytic Engine[6]



Turing Machine[7]

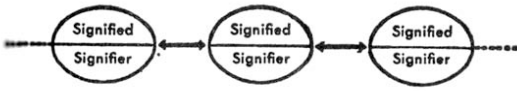
> *But above all, we can conclude that there is no structure without the empty square, which makes everything function.* – Gilles Deleuze (Deleuze, 51)

Deleuze proposes the empty square as the crux of structure, that thing which articulates two itinerant series, the one modeled on the signifier and characterized by excess, the other, the image of the signified and typified by lack. His concept is an elaboration on Levi-Straus's paradox, that which belongs simultaneously to two opposed series: *mana*, something, it, etc. It is both the object without a place and the place without an object.

The Turing machine resembles this generalized semiotic structure. It consists of the conjunction of two series inside of a container. One series is made up of states out of a set of finite possibilities, the order of which proceeds by means of a determinate set of rules. The other

[6] Source: Menabrea
[7] Source: http://digitalphysics.org/Publications/Petrov/Pet02a2/Pet02a2.htm

is a series of symbols arranged in time along a potentially infinite ribbon of inscription, where the value of the symbols is dependent on their order:

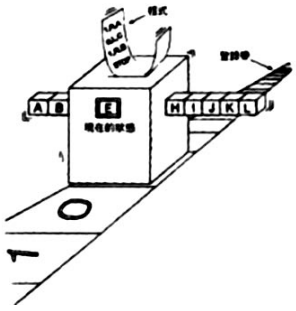


Series of Signs[8]

> We may compare a man in the process of computing a real number to a machine which is only capable of a finite number of conditions ... The machine is supplied with a 'tape' ... divided into sections (called 'squares') each capable of bearing a 'symbol'. At any moment there is just one square ... 'in the machine'. The 'scanned symbol' is the only one of which the machine is, so to speak, 'directly aware'... (Turing)

The work of the machine is accomplished through carrying out one of three possible operations. It can erase or print a symbol on the scanned square, move one square to the left or right, and change its configuration. The rules, which govern what operation the machine carries out, are given in a table of behaviors, indexed by the configuration and symbol. In each moment of discreet time, the machine acts according the operation described for the encounter of the state it is in with the symbol that is in it.

In the machine, a relationship of supplementarity attains between state and symbol, as the state, through the operation of the table of behavior, requires the symbol and brings it to presence within itself. But the presence of the symbol in the machine, is what causes the evacuation of the machine, or the substitution of a new symbol. The machine is the play of presence and absence of a series of symbols according to a logic determined in the table. Or the table is the machine as a surface that constitutes the particularized logic of its own habitation by symbol and state. The machine *is* a container–an empty square.



Turing Machine as Container[9]

[8] Source: *Course in General Linguistics*, pg. 115
[9] Source: http://episte.math.ntu.edu.tw/articles/sm/sm_30_11_2/page3.html

The Analytic Engine has a structure that also relies on the square as a figure of containment. But in the Engine, rather than the simple conjunction of two series at a singular event horizon, there is a complex conjunction of multiple series and many empty squares. In her diagram (above), Lovelace depicts the mechanisms of the Engine as a matrix of places and place-holders. Each vertical column of the accumulator represents a running sum: the circle is the place for the sign (positive or negative), the square is the place for the symbol of the variable assigned to the column, and the zeros are placeholders for the digits of the sum. Not unlike in Turing's model, it is the application of a mathematical artifice which provides a governance to the mechanics of the system and makes it able to compute.

These systems, or at least or especially their explanation, rely, metaphorically or structurally, on the figure of the empty square. And they rely as well on some notion of rules. We recognize these items as the constituent elements of computation: data structures and algorithms. If we accept Deleuze's assertion, we should give priority to the square: it is that which makes everything function. Without a place, there is nothing about which one can make rules determining presence and absence. The square inaugurates the possibility of presence, the possibility of rules, the possibility of invention. From an inverted perspective, the rules could be said to be what constitute the boundary of containment. What is containment if it is not a logic of relation? A square exists as an image and it exists as a function–a function of containment, *i.e.* a rule of containment. The rule of containment defines insideness and outsideness. The degree zero of state is that status of presence or absence of which all other possible states are an elaboration. But state and rule can be conceived as an association that does not necessarily entail containment. Indexicality might name this conception of association. Rule could simply be

thought of as a relation, and figured as a line, a vector rather than a square. It is possible to diagram the Turing Machine so its explanation is performed in this way.[10]

Significantly, Lovelace in her exposition on the Engine also recognizes how the mechanism of linking is what creates the power and the possibility of the engine as a tool for analysis and that this linking creates a language:

> In enabling mechanism to combine together general symbols in successions of unlimited variety and extent, a uniting link is established between the operations of matter and the abstract mental processes ... A new, a vast, and a powerful language is developed for the future use of analysis, in which to wield its truths ... (Menabrea)

But she does not employ a our favored symbol of conjunction.

The empty square is a metaphor which points to a function and has no essence in and of itself. The empty square function may be the condition upon which computation rests but the figure of the square is not necessarily its only possible figuration. The specification of the function involves not surprisingly a strange series that consists in figures of paradox. The aleatory nature of relation mobilizes and empties figures of association.

This does not undercut our obvious reliance on a particular figure of absence which seems to possess a suspicious connotative efficacy in its deployment within language and as a visual figure. What is at stake in the use of the empty square? (This is the yet unwritten question which motivated the present essay.) A clue to answering lies in the relation of two series that have already been circulating within the text to describe both the mechanisms of computation and the aspirations of our protagonists. These are: the series of creation, including invention, birth, production, etc.; and the series of rule, including conditionality, boundary, possibility, etc. The two series are clearly gendered opposites that correlate with Oedipal principles. In this light,

[10] See the first diagram of the Turing Machine included above.

the phallic implications of rule and the womblike form of the empty square become obvious. Another series, the series of relation, whose terms include all variants of containment, contiguity, and distance, spring from the condition of difference, the gap that attains between the other two series.

> *[O]ne might be able to interpret the fact of being deprived of a womb as the most intolerable deprivation of man, since his contribution to gestation–his function with regard to the origin of re-production is hence asserted as less than evident, as open to doubt. ... It does not seem exaggerated, incidentally, to understand quite a few products, and notably cultural products, as a counterpart or a search for equivalents to woman's function in maternity.* – Luce Irigaray (23)

Now, prompted by Irigaray, we might put the name "womb envy" on our suspicion of the mechanisms of the empty square. Technology, as easily as culture more generally, could be seen as a compensatory masculine production triggered by the lack of a womb. The problem of the phallogocentric system that she unmasks is that the place of woman is usurped for the purposes of man. The unacknowledged reliance of Western metaphysics on a repertoire of feminine metaphors is a kind of theft. And the system relegates woman to a place of invisibility which functions as a mirror for the masculine logic of the same.

For Irigaray, the feminine is always the ultimate reference of creativity, origin, place, and ground; this essentializing foundationalism reverses the hierarchy of phallogocentrism, but it introduces a strained fixity within the operation of her metaphorics. If one finds the basis of metaphor to lie in a formal homology, then a link between the shape of the square and the shape of the womb is suggestive. But Irigaray's consistent use of morphologically determined metaphors (lips are another example) do not fully explain the insistence on the woman's body as their definitive source. With the woman's body as a kind of transcendental signifier, it becomes difficult to understand the possible equivalence of whole range of other ontological metaphors

for containment that are not necessarily gendered: the body as a whole contained in its skin; the body as a tube defined in terms of its digestive tract and major orifices of ingestion and excretion; the orifice as a generic container unto itself or the orifice in all its specificity, each with its own attendant formal and connotative complexity; the body as contained in the world, etc. A free play of signification is arrested by the stubbornness of her metaphorical fixation. The imaging of metaphorical operations as on the one hand a theft and a hiding of blindness, and on the other as recuperation of the proper is paradoxical. Though, it is not metaphor, per se, that is the problem, but only certain metaphors and certain uses; there are good metaphors and bad ones–good uses and bad.

Metaphors circulate within language and form chains of substitution and–or which is–signification. But metaphors have a use that exceeds their linguistic efficacy. Metaphors enable the technical just as they enable the linguistic. The metaphorical use of containment to underwrite the possibility of computation is just one example. George Lakoff theorizes the role of ontological metaphors, those derived from our embodied experience, as constitutive not just of particular metaphorical tropes but of our most basic cognitive functions and concepts. Regarding the metaphor of the container object, Lakoff writes, “Human purposes typically require us to impose artificial boundaries that make physical phenomena discrete just as we are.” The container has the status of metaphor which implies that its deployment is an imposition, a projection which is the concomitant of an instrumentalizing gesture.[11]

The question of use, opens up the problem of metaphor as substitution by focusing on function rather than form. Lévi-Strauss' application of Saussurean linguistics to myth employs the following algebraic diagram: "$\mathbf{F_{a(x)} : F_{b(y)} :: F_{x(y)} : F_{b(a-1)}}$" read, “the x function of a is to

[11] The imposition of containment is clearly related to separation as in vision (figure/ground) or as described by Foucault in relation to various modern disciplines ...

the y function of b as the y function of x is to the inverse a function of b". The structure of myth is like that of the sign in that they both form a series. Each item is subject to replacement independent of the complimentary term on the other side of either the single or double colon. The presence of terms in any of the spaces within the formula is tentative and tends to slip out with the result that the remaining term demands a supplement: it becomes empty. This structure introduces a notion of rule. A mythic symbol must be equivalent to its related term in some particular way. The grounds of equivalence are factored through the concept of function. The particular sense of a term, as established by function, acts as a constraint for the subsequent relations. These relations, like the associational links that form the paradigmatic dimension within Saussure's logic, create chains of formal connections along trajectories determined by a typology of use.

This trajectory towards a generic view of containment, possibly un-gendered, and described in a language of instrumentality seemingly well suited to a discussion of technology, appears from a certain perspective to be promising. But, is the lure of the generic, as a solution to the problem of difference, a symptom of masculine blindness to that difference, one more gesture of erasure that fails to account for the way that breasts or a womb change the experience of embodiment? Is accusing Irigaray of missing something in her cleaving to woman, equivalent to the phallic gaze which refuses to see her? Or, is there a radical potential in the embracing of a notion of containment by the masculine body–not a containment on the model of the womb, but a containment that cannot hold; not a containment that gives birth to the new, but a containment that grasps and releases, that receives and sends?

One insight that we ought to retain from Irigaray is that the problem of difference is always subtended by the problem of gender. Gender provides such a strong and fraught paradigm

of difference that its pull is singularly unavoidable. To gesture at making containment generic does not resolve the issue of a relation between the varied members along the signifying chain. If it is Turing's ass which is to provide the model for the empty square of his machine, his ass is not thinkable separate from the cunt of Lovelace–from which she counted out three children in her short life. This is not to say that the ass is a cunt, or the cunt an ass–to say that would be to commit the error which Irigaray accuses metaphysics of perpetrating. The containment function of the ass is like the containment function of the cunt. And like the containment function of the empty square, these allow a constructive seriality; a conjunction/disjunction machine that does work–not necessarily work as production, but work as change and work as information and analysis.

Cultural construction is certainly not the exclusive domain of masculinity, even if particular and valued domains have historically been cites for feminine exclusion. The history of the last hundred years is inscribed with the work of change wrought by women in those same domains. While containment is sometimes imagined as the carceral–*e.g.* containment as an exile to the domestic sphere–it is also imagined as the grounds for the possibility of the new: birth/invention. Invention may have a mother, but that mother is not necessarily a woman. Lovelace found her place, the ground from which to extend her desire to write, in the belly of a man. This is not to erase her genius by founding it on a man's project, but to assert that foundation is a function which anything might serve.

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