



reading difference/seeing pattern: the representational language of the genome

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In 1970, performative artist Vito Acconci produced a work entitled *Trademarks*. In this piece he documented a process of self-marking or self-mutilation by deeply biting his own palm. The palm was subsequently printed, revealing both the negative impression of his teeth and the palm print. While the act speaks of ownership of the body, of pain, and of the anxiety associated with puncturing the skin, the print speaks of identity in its reference to dental records and finger printing. The print is a palimpsest – a trace of an action. It resembles the original matrix from which it was printed; yet it is laterally reversed, and so at once equivalent and different. A print exists simultaneously in 2 states – as image and as matrix. As a mirror it sets up a binary division between object and image; real and illusion; physical and metaphorical. It is not the act, yet rather an interpretation, or representation of it. However, the original act is of equal significance and so the work exhibits a paradigm shift from art as representation to art as lived experience. The relationship between these two art products provides an apposite introduction: that of **analogy** (equivalence) and **difference** (opposition) in relation to the genomic body. The connection between art and science has been the subject of much recent debate, yet rather than attempting to discuss links between their modes of production; the intention here is to draw on a common discursive language.

In recognising that science and its interpretation are never free from the social-historical environment in which they are constructed, and that meaning is produced, this essay intends to examine some of the historical and theoretical frameworks that establish “visual modes” of interpretation. Visualisation occupies a central role in the formation of public perception and has persuasive power, able to shift understanding of what is “natural”. **Analogy** and representation are ideologically driven and at the same time the primary means through which visual knowledge is communicated. The colonial construction of Africa through otherness also has import for the application of the framing terms of sameness and **difference** in the present. In examining these seeming antitheses it is suggested that they both inform a third category – that of **patterning** or repetition.

Analogy is the relationship between word and image. It is seen as the proportion that exists between two things – a system of ordered relationships articulated as similarity in **difference**. It is a mediator – an in-betweenness, positioning the visible in relation to the invisible (Stafford 1999: 9-10). Analogue systems are subject to intrinsic degradation. They consist of replicas that are never exactly faithful to the original and exhibit built-in mutation from a master positive. The detrimental effects of **analogy** on the 19th century approach to body science are well documented. Race and gender **differences** were seen as analogous and scientists proceeded to generate data on the basis of these analogies. The common association of women with nature and men with culture were easily accepted, as they were congruent with dominant cultural expectations. Notions of ‘lower races’ and women were conflated: lower women of high races and lower race women were seen to exhibit similar pathologies (insanity and sexual promiscuity). Measurement became an important tool for the analogical science of **difference** (Gould 1981) and phrenology found a comparative reference for skull size and intelligence, which was naturalised through metaphor (the description of “Negroid” and female skull types as foetal or infantile).

In contrast to socio-medical illustration, where the politicisation of the body is more apparent,¹ the iconography of the genome is more neutral as the anonymity of the diagrammatic provides a seemingly dispassionate distance. Common visual representations include the double helix, series of code, and the stripes of the autoradiogram and the popularisations of these representations serve to domesticate the genome, without necessarily providing useful insight into its implications. For this reason, **analogy** or visual metaphor seems to have more currency in describing the genome.

The Cartesian definition of the body is that of one which occupies space, whereas the digital archive and genetic map exist over time. Ceccarelli indicates that mixed metaphors are actually of value in that they extend the limit of their singular and often simplistic and reductive form (Ceccarelli 2003). The analogies of the map and code are simultaneously substantial (territory) and immaterial (code), pictorial (blueprint) and primary (book). Metaphor is an interaction between vehicle (metaphor) and tenor (subject) and contracts **differences** as vehicle and tenor are understood only in relation to each other.

HFE-HBB
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Each 30cm diameter

1. Much anatomical representation portrayed the female body as other – outside of the norm. Furthermore the symbolic division of anatomy into the feminine nervous system and masculine musculature, further reinforced stereotypes.
2. The similarity between humans was so overwhelming that it became the rationale for the conclusion that *anyone's genome would do for generating the map*. As a result, twelve anonymous humans were selected – a number that is not entirely without symbolism.
3. He identifies four principle aspects to difference: identity (undetermined concept); analogy (determinable concept); resemblance (determined object of concept); opposition (relationship between determination within concepts) (Deleuze 2001:28).
4. Studies by the University of Utah of *Alu* polymorphisms revealed four distinct ‘racial’ groups. Similarly, studies at Stanford University revealed five groupings (Bamshad & Olsen 2003: 53).
5. Although sickle cell anaemia is commonly believed to be exclusive to black populations, it is also carried by Turks, Yemenis, Indians, Greeks, and Sicilians. As inheriting one sickle cell allele confers resistance to malaria and thus provides a selective advantage in malarial regions, the mutation spread to successive populations along the trade routes where malaria was common. It is then not a marker of skin colour or race but rather of having ancestral links to malaria areas (Adelman 2003).

6. Identification of single nucleotide polymorphisms (SNPs) that are associated with susceptibility to common diseases are tested with varied responses to drugs in population groups.
7. In 2003, the Howard University Medical School in Washington announced its intention to build a gene bank to collect and store the DNA and family health histories, of about 25,000 people who identify themselves as African American in order to look at why this group is more prone to disease than white Americans (Healy 2003).
8. African Americans have among the highest rates of hypertension in the world. This was long assumed to be genetic, a "marker" of their nature, but then it was found that West Africans have among the world's lowest hypertension rates. A focus on race as innate biology, as genetic difference, would lead health professionals and policy makers to overlook social factors that might contribute to African American hypertension and heart disease (Adelman 2003).
9. Population geneticists use ancestral tree diagrams to show the relationships between indigenous groups. Despite different markers, the tree corresponds to racial groups as 'self defined ancestry is highly correlated with genetic clusters' (Burchard, et al. 2003).
10. Morrison Institute for populations and resource studies. www.stanford.edu/group/morrinst/hgdp.html
11. Genetic variation is due to SNPs, which occur every 1000 bases. Neighbouring SNPs are often not separated during recombination and behave as a single package. There is limited variation throughout populations, as blocks tend to move together (Wellcome Trust News: 13).

Mixed metaphors become expansive and complex as they form a system of broader associative reference.

A map provides an index by which to determine power and exercise control: it refers to ownership and actualises the division of territory. This colonial legacy that saw a world of empty space to be possessed and exploited (Wood 1992) is particularly pertinent in light of what has become commonly termed 'bio-colonialism'. The greatest human genetic **differences** are seen in geographical separation and in this way territory becomes associated with genetic ancestry. Mapping is concerned with naming and bestowing of identity and the mapping of genetic markers refers to a place of origin, or provenance, implying a naturalised space. In addition to this, the testing of mitochondrial DNA recognises the value of "origin" and "**difference**" in genetic material. Here chromosomes become continents, regions are mapped, and patterns of distribution defined.

The relationship between **analogy** and **difference** is a subtle and complex one. Equivalence has seemingly positive attributes, whereas opposition is interpreted as negative. However, these polarities are mediated by resemblance, similarity, metaphor and mimicry. If equivalence and resemblance are the means by which the genome is popularly visualised, **difference** is the means by which it is popularly theoretically and clinically constructed. Although humans are believed to be 99.9% genetically identical and the HGP is ostensibly concerned with similarity rather than **difference**,² by constructing a frame of "normal" reference it automatically generates an abnormal "other". In this way it is inextricably bound to concepts of **difference** and lends itself to a distorted public understanding.

Although genetic traits may be exhibited in an on-off pattern, the discourse is not a simplistic binary. Post-structuralism has made a significant contribution in challenging the positing of **difference** as opposition. **Difference** exhibits an asymmetry in that the polarity of negative and positive may not mirror each other exactly and embraces a dualism in that two things are at once the same and different. **Difference** itself is held in the space between the metaphor and the object – the space that links two otherwise independent entities.

Deleuze (2001) writes that **difference** is the moment of self-determination where one thing actively distinguishes itself from another (that does not distinguish itself from it).³ **Difference** and sameness is at the heart of post-colonial discourse,

particularly unsettling the binary between colonised and coloniser wherein implacable discursive opposition is seen to be produced. These are necessary not only for construction of the outsider, but for the identity of the insider as well. Recognition of **difference** is how living organisms distinguish themselves from others and immunity is based on a sense of selfhood at micro-organic level. Taxonomy is based on a system of oppositional **difference** and resemblance and this hierarchical system has obvious negative consequences. Linnaeus in *Systemae Naturae* classified four human types that are incidentally not entirely dissimilar to the groups currently identified in genetic research.⁴ Once different types were established, it was an inevitable reductive leap to conflating physical and social characteristics, with trajectories leading to determinist and eugenic theories.

Racial determinism provided "authentic" and "scientific" evidence for social development, moral and intellectual capacity, and physical qualities. Social Darwinism used natural selection as legitimate grounds for the discrimination of a population group, while early eugenic notions suggested that natural selection would create purity from diversity and that selective breeding would result in the extinction of "lower" races. This determinist attitude still persists and is seen in Murray and Herrnstein's infamous *The Bell Curve* (1994) that used IQ to prove mental inequality, ranking black populations on the lowest rung.

It is recognised by genetic research programmes that the use of race as a determining factor is extremely problematic and this has resulted in endless proclamations that there is little genetic basis for race and that "race does not exist", that it is an entirely social rather than biological entity and that **differences** within races are greater than those between races. The Human Genome Diversity Project has denied the existence of race and claims that it is only interested in "populations". Despite this, however, information generated by the HGDP is used in the popular imagination to reinforce racial and gender prejudice. With reference to genetic markers that associate hereditary diseases with particular ethnic groups, countless right wing groups track purity of race (sickle cell anaemia and haemochromatosis being common markers of blackness and whiteness respectively).⁵ Race has been used as a powerful indicator of human identity and more specifically skin colour has become a site of racial fixity. Geneticists are quick to point out that there are no significant racial correspondences between phenotype and genotype, however, the identification

of race in terms of genetic disease is seen as critical in the use by epidemiologists to anticipate risk populations. All discussion of the ontology of race is framed in terms of disease and susceptibility.⁶

Genes that exhibit "normal" traits are ostensibly harder to find, whereas the abnormal traits are easier to identify. This leads to a concentration on the anomaly – the characteristic outside of the norm. A concern with genetic character traits in certain groups tends to naturalise them, at the same time reinforcing the perspective in which to interpret those traits. The correlation of markers for racial background with behavioural outcomes seems to allow a new era of scientific justification for theories of racial and ethnic differences in social behaviours. As social inequality has been attributed as the main reason for health disparities in the past, the suggestion of genetic causality seems to reintroduce race as a meaningful rather than an anachronistic division.^{7,8}

Deleuze (2001: 1019) writes that generality is a view in which a term may be substituted for another. Repetition however is neither exchangeable nor substitutable. In pattern the image is reproduced exactly, yet, although the concept is the same, the production results in a dynamic disequilibrium. Only at the end does the pattern reveal itself and belie the process. Pattern is a system in which the system itself determines the **difference** between various entities. Similarly, by concentrating on both uniqueness and sameness within a group, the HGDP looks for pattern to regulate **difference**.

The Enlightenment in 18th century Europe introduced natural history as a distinct field of knowledge, displacing the idea of Adam as a common ancestor, whereas the African Eve of genomic research reintroduces the myth of common origin. A search for a common ancestral descent and homology is simultaneously one for pattern and fixity. Although it is intent on a common past, it is perhaps dangerously close to the fairly recent anthropological imagination that sought the authentic, unchanged and aboriginal.⁹

The Human Genome Diversity Project aims to document the genetic variation of all human species worldwide. It claims that variation "helps us understand the genetic makeup of all of humanity and investigates common lineages." In reference to phenotypical characteristics it states, "these differences, apparent only at the genetic level, can still be used to help understand relationships between different populations."¹⁰ In its focus on indigenous populations it reinforces biological typing. Similarly, the International Hapmap project seeks to map ancestral lines with reference to four discreet world population groups.¹¹

It is not their independent achievement, but through their complicity that **analogy** and **difference** result in a stasis. **Analogy + Difference = Pattern** can also be viewed as the intersection of **horizontality** (**analogy**:expansiveness) with **verticality** (**difference**:narrowness), resulting in the balanced grid. In art terms, the modernist grid is seen to collapse the spatiality of nature into a constructed surface. It is restricted and repetitive, ordering and mapping experience. The grid is resistant to change and thus any enterprise that relies in this axis is doomed to reiterate the past.

Returning finally to the incised palm of Vito Acconci. Although the piece refers to aspects of **difference** and equivalence, it is not prescriptive in its analysis. It provides one of many readings of what the body may mean and how it may be read. It is in this expansiveness that art provides a valuable counter to what may be the over determinism of science. Much current art production has rejected preoccupations with innovation and originality and artists are concerned with authorship, ownership and the transformation of the physical body as content. In the awareness of its own history and discourse, it is self-consciously critical of its own mode of production. Although tracing the past is part of the endeavour of bioscience, as long as it is primarily focussed on innovation without acknowledging how its discipline is historically and politically constructed, it may be unconscious of the past ideologies that it recapitulates.

- References
- Adelman, L. 2003. Race – The Power of an Illusion. California Newsreel. www.newsreel.org
- Bamshad, M. & Olsen, S. 2003. *Does race exist?* Scientific American. December.
- Burchard, E. M.D., Ziv, E. M.D., Coyle, N. Ph.D., Gomez, S. Ph.D., Tang, H. Ph.D., Karter, A. Ph.D., Mountain, J. Ph.D., Pérez-Stable, E. M.D., Sheppard, D. M.D. & Risch, N. Ph.D. 2003. *The Importance of Race and Ethnic Background in Biomedical Research and Clinical Practice.* New England Journal of Medicine. 348:12. www.nejm.org at Stanford University. (p1170-1175)
- Ceccarelli, L. 2003. *Rhetoric and the field of human genomics: The problems and possibilities of mixed metaphors.* (1-10). www.gene-sis.net
- Deleuze, G. 2001. *Difference and Repetition.* London: Continuum.
- Gould, S.-J. 1981. *Mismeasure of Man.* New York: W.W. Norton.
- Healy, M. 2003. *Exploring the genetic link between race and disease.* Oct. 9 2003, Los Angeles Times.
- Stafford, B. 1999. *Visual Analogy.* Cambridge, Mass: Harvard University Press (p9-10).
- Wellcome Trust News. *Joining force: toward a haplotype map of the human genome.* Issue 34 Q1, 2003.
- Wood, D. 1992. *The Power of Maps.* London: Routledge.

