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# Gestalt in Motion:

# Wholeness, Systems and Perception in Post-War British Art

World War II developments in the science of visual perception prompted a series of publications in the post-war years that influenced the visual arts in Britain, such as J. J. Gibson's *Perception of the Visual World.* This article looks at the evolution of these new theories of visual perception and how they connect with the application of Gestalt principles to visual arts practice. Looking at the post-war trends towards collage, constructivism and assemblage, I argue that these material approaches were influenced by the contemporaneous and cross-disciplinary debates around Gestalt in the systems age. The crossovers between biology and technology are discussed and placed in the context of the wartime genesis of these debates on organised form.

**KEYWORDS**

Gestalt, Post-War, British Art, Technologies, Visual Perception, Independent Group, Cybernetics

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'If the visual world of the airplane pilot were not in fairly close correspondence with the material world on which he had to land his airplane such as a carrier-deck, the practical consequences could be disastrous. The theories of space perception, therefore, became of more than academic interest in the rapidly developing field of aviation psychology'. J. J Gibson

A World War II pilot, suspended in his plane above the earth, tilts his head from the dials in the cockpit to the panorama around him as he searches for targets, enemies or landing points in the flowing landscape. He must respond quickly; his situation might transform in an instant into a matter of life or death. Man and machine become one, part of an extended system which encloses the plane, its occupants and their immediate environment. The sheer speed of World War II planes posed new challenges for scientists, including James Jerome Gibson who was occupied during the war with the increasingly urgent task of understanding the visual perception processes of pilots.

During World War II, Gibson directed the U.S. Air Force Research Unit in Aviation Psychology. It was in this post that he developed his initial theories of perception as he worked with pilots who were tasked with landing their planes on an aircraft carrier. In addressing this, Gibson rejected the standing theory of vision as an interpretation by the brain of an image caught on the retina.[1]

The issue was speed and motion: for the pilot, perception was dependent on a constant stream of information, not a static image. It was upon this basis that Gibson developed his theory of optic flow. This essentially networked concept of vision addressed that very modern problem of how the brain processed visual information while in fast motion in a rapidly changing environment. Gibson recalled that at the start of the war, perception had become '…a practical problem almost overnight. The skills of aviation began to be a vital interest to millions of individuals'.[2] The existing understanding of visual perception had

been tested and developed from a static point of view; Gibson saw that this did not apply to the pilots as they sped across the sky. Indeed, vision he argued, is never static:

'The theory of the binocular and the monocular cues for depth, perfected eighty years before by Helmholtz, could explain how a pilot might see one point as nearer than another point. But the pilot was not looking at points of colour in a visual field; he was typically looking at the ground, the horizon, the landing field, the direction of his glide, not to mention several instruments, and visualising a space of air and terrain in which he himself was moving – very fast and possibly in a cold sweat'.[3]

Every small tilt of the head or movement of the body adjusts our perspective on the world. For the pilots this process was exacerbated by extreme speed and motion. Gibson's book, *The Perception of the Visual World*, arose from this pertinent process of development.[4] Gibson researched and wrote the book at Smith College after the war. By 1949 Gibson and his wife Eleanor had moved to Cornell University after receiving a large grant from the US Air Force to continue their research into perception psychology.

*The Perception of the Visual World* was first published in 1950 and its scope extended far beyond the biological sciences, aviation and warfare. The ideas held within its pages proved to be popular with visual artists across the world, including Britain. It formed a component of what will be discussed here as a new instability of form in the visual arts; a shift from Gestalt principles to more systems-based approaches that drew in mechanised biology, visual perception in movement and early cybernetics. The Gestalt principle of perceiving wholeness was complicated and blurred by the effects of speed, by increasingly complex systems of communication and also by the catastrophic developments in atomic warfare.

This many-layered problem was already reflected to some extent from the mid-1940s in the influential writings on art, education and vision produced by the New Bauhaus, in the entwined writings of György Kepes and László Moholy-Nagy. The new incarnations of Bauhaus pedagogy in the United States and the

Basic Design movement in the UK created increased debate in art, technology and education after World War II ended. However, the principles of perception that they offered did not include the innovation of optic flow since, at that time, Gibson's research was still in development. In Kepes' *Language of Vision,* for example, he described how 'When a moving object comes into the visual field, one pursues it by a corresponding movement of his eyes, keeping it in a stationary or nearly stationary position on the retina'.[5] It was this principle in itself that Gibson rejected – vision is never static.

While Gibson's book marked a scientific development for our understanding of vision, both Kepes' *Language of Vision* and Moholy-Nagy's *Vision in Motion* both dealt intuitively with the problem of speed and motion in visual perception. Moholy-Nagy considered problems and solutions for art and design education in an age of a 'novelty craze for raw speed', and in which culture 'provides blind motion in the incessant electric arrow and in the movies, perfect symbol for our vicarious age'.[6] The quickening of entertainment and advertising, the speed-lust generated by motorcars and aeroplanes and the changing visual environment together posed new problems for the stability of the visual image. Kepes wrote of the blurring and loss of visual clarity characterised by increasing speed:

'Man, the spectator, is himself more mobile than ever before. He rides in streetcars, motorcars and aeroplanes and his own motion gives to optical impacts a tempo far beyond the threshold of a clear object-perception'.[7]

In the rush of the post-war world, object perception was certainly less secure. For both artists, this instability was a philosophical and a practical problem, a problem of vision changed by faster media as well as by the increasing speed of travel. For the purposes of this article, the issue of speed and movement in relation to visual perception as explored by artists, scientists and theorists after World War II formed a broad field of activity that was philosophically rooted in the problem of organisation. I argue that in the decade following the war, we can observe growing trends towards collage, constructivism and principles of perceptual organisation, particularly amongst the artists of the Independent Group. In addition, the exhibitions that were developed by Independent Group

members in the same period employed interdisciplinary layering, their curatorial approaches resisting the solitary or 'whole' object. These material and conceptual tendencies are profoundly connected with the wartime origins of the new wave of visual studies, subsequently feeding into new theories of visual perception for a technologized world.

**Mechanised Biology and the Organic Whole**

The book *Aspects of Form* offers an insight into the interdisciplinary convergences of Gestalt and its place in post-war British visual culture. It was edited from the proceedings of a symposium that accompanied the 1951 exhibition 'On Growth and Form' at the ICA, organised by Richard Hamilton. The exhibition was inspired by D'Arcy Wentworth Thompson's seminal book of the same title from 1917, which had argued for a more mechanical approach to biology. The exhibition formed the Independent Group's contribution to the Festival of Britain. Thompson's influence upon interwar British abstraction is an established one.[8] Indeed, Thompson's influence was felt world wide – Moholy-Nagy had referenced *On Growth and Form* in *Vision in Motion,* presumably having come across the book during his stay in Britain from 1935-7. Hamilton and Nigel Henderson had read *Vision in Motion* as students at the Slade, before progressing to Thomson, demonstrating the increase in creative and theoretical exchange between mainland Europe, the UK and the United States after the War. Hamilton's exhibition 'On Growth and Form' reflected this influence, while also opening debate about how form is arrived at in art and nature, as well as how form is perceived. Hamilton saw, in Thompson's mechanised biology, a clear parallel with the evolution of technological form:

'Sigfried Giedion's *Mechanisation Takes Command* became a primary source book immediately after its publication in 1948. It was particularly significant for me in that it complemented *On Growth and Form*, which deals with the natural world in just the wide-ranging manner of Giedion's perception of technological form and process'.[9]

Hamilton read Giedion in tandem with *On Growth and Form.* There was a fusion of technological and biological sources in the visual arts following the war, particularly with regard to debating the mechanics of biological form in light of Thompson's mechanised biology. Mechanics are as relevant to the plant as to the machine, to systems of all kinds, since mechanics in its truest sense is the mathematics of motion or forces. This understanding has somewhat paled because of the broader cultural association between mechanics and "the machine", an emblem of the transformative technologies of the modern period. In his introduction to *Aspects of Form,* L. L. Whyte had reflected that:

'The mutual challenge of these two schools, for instance in the old mechanism-vitalism quarrel, was healthy and stimulated progress, *until recently.* But there are signs that this antithesis must now be overcome, that if science is to advance it must discover how the ordering of parts gives form to the whole, in organisms for example'.[10]

The collected contributions to Whyte's anthology reflect a moment of cohesion across the disciplines, as an increasingly systemised approach to form created the problem of limiting and perceiving a whole. Like Whyte, Hamilton saw interdisciplinary parallels developing. Between Thompson's natural forms and Gideon's engineered forms, Hamilton deduced a shared principle of form as process.[11]

**Depicting 'Vision in Motion'**

In the following years, Hamilton explored humanity's changing relationship to technology, the impact of speed on perception and the systemic qualities of the human body. His assimilation of Gibson's theory of perception formed the premise for his 1954 *Trainsition* series of four paintings, in which he explored the flow of landscape as experienced by a passenger on a train, while simultaneously considering the movement of the viewers as they observe the painting. In *Trainsition IIII* (Figure 1) these two shifting visual fields converge. Firstly, the movement of the landscape outside the train window, where a tree

and the line of the horizon form visual anchors in the drift, the direction of which is indicated diagrammatically with an arrow. The second field was the perceptive experience of the viewer, whose movements around the painting itself also formed an optic flow. When the paintings featured in Hamilton's first solo show at the Hatton Gallery in Newcastle, Reyner Banham described them as 'genuinely intellectual paintings, the product of directed cerebration'.[12] He titled his article 'Vision in Motion', in reference to Moholy-Nagy.

While painting this series, Hamilton was working on the exhibition 'Man, Machine and Motion', which took place at the Hatton Gallery and the ICA in 1955. The exhibition predominantly comprised of enlarged photographs that illustrated what Anne Massey has called 'the technical evolution of human mobility'.[13] It illustrated a kind of harmonious power between man and machine and the resultant charged extension of human motion. The exhibition reflected the speed, power and reach of a technologized human race, while at the same time offering a vision of quickening integration, of bodies and machines fusing in shared purpose.

The exhibition reflected the origin of the question that occupied Hamilton in the *Trainsition* series – that is, how in this accelerating world, the artist might convey form. In depicting the moving landscape, Hamilton reduced it to a flow of particles that rush by, dissolving into the distance. The black arrow forms an anchor for the eye and an indication of how to interpret this dissolving view. In his contribution to *Aspects of Form,* Rudolf Arnheim had reflected that while 'the work of art is a "Weak Gestalt"', the 'work of art as experience turns out to be a Gestalt of the highest degree'.[14] Hamilton's painting operates around that locus; the image of a vanishing view scarcely holds together but the viewing experience is a Gestalt act of organisation, aided by the visual anchor of the diagrammatic black arrow.

**Gestalt in the Art School**

If we turn to the experimental 'laboratory' that was the art and design department of King's College, University of Durham, it becomes clear the extent to which theories of perception, including those of Gibson and Arnheim, had a

verifiable impact upon the Basic Design movement in art education, a movement which involved several prominent British artists as teachers.[15] The wider absorption of Gestalt into Basic Design is clear in the multiple art and design exercises based around visual organisation and pattern at Leeds and Durham. The impact of Gibson and Arnheim's systematised psychology of visual perception upon the Basic Design movement was palpable in the pedagogies of Hamilton and Victor Pasmore, as well as Harry Thubron and Tom Hudson at Leeds College of Art. Students of Pasmore created Gestalt images as part of the Basic Design classes known as Positive/Negative at King's College.

The Basic Design movement, like the New Bauhaus and associated pedagogies in the United States, revived and reinterpreted Bauhaus principles for a new age, including abstract explorations of Gestalt compositions. These exercises used the balance of black and white to explore shape-forming in the visual field. This simple trick of the eye is based on the Gestalt ordering principle, in that the brain organises pattern into meaningful form; for example, the composition in Figure 2 explores the abstract balance of positive form and negative space. In the main, these exercises were worked in the abstract, often simply black paint on cartridge paper or torn black paper collaged onto white. These exercises were built around the principle of figure/ground organisation, but they were directed towards the creation of visual balance.

Gestalt perception exercises such as this introduced into the basic courses a focus on the dynamism of shape and form, but also, crucially, the role of human perception in the creation of visual experiences and the transmission of (more than one) meaning. Arnheim's essay 'Gestalt Psychology and Artistic Form' had expressed this:

'Most images have dominant forms which, for one reason and another, demand precedence over others. Certain classical optical illusions suggest that some visual situations present a balance of forces which permit the spectator a freedom of choice. […] the objective is to produce an ambiguous image. It should be possible to read it as black form on a white ground or vice versa with equal ease'.[16]

It is vital to recognise, though, that Gestalt was not simply a formal influence through which to explore abstract shape; it was a far more significant change of values in visual perception. As Arnheim had explained:

'...however, we mean by "form" the outer appearance of things – as we do when speaking of the arts – it is necessary to see that the Gestalt theory deals with form only as the manifestation of forces, which are the true object of its interest'.[17]

Arnheim explored the concept of optic flow with regard to the movement of water, elucidating on the point he made above - that Gestalt was an investigation of forces which created effects, finally noting that 'If we wish to understand the relationship between visual form and the total organism, we must consider the complex interaction of the many forces that make up a person'.[18]

This moment of union between biological and technical systems in visual culture must be aligned with the contemporaneous and interdisciplinary growth systems theory; our ability to perceive a whole is conditional upon our ability to isolate a whole from its surroundings. The 'Gestalt effect' therefore describes the human tendency to form patterns, as well as approaching the single problem at the heart of any system – the composite parts which make up the structured whole and how to define the boundaries of any whole. As Konrad Z. Lorenz commented in his contribution to *Aspects of Form,* 'A whole, in our sense of the word, is a system in which every part influences every other part'.[19] The wholeness of form in our visual perception is dependent on our pattern-recognition tendencies; it is a human tendency to order information into meaningful structures. The underlying principle of the 'structured whole' and the organising (or systemic) principles of human perception were in opposition to the molecularism of predecessors such as Wilhelm Wundt and thus marked the progression towards systemic thinking in the mid-twentieth century.[20]

**Organising Bodies**

With this convergence of biology and technology, it is little surprise that the cultural trope of the cyborg was so marked in the post-war years. Paolozzi's

series of collages dating to the late 1940s, including *Group of Gauls* (Figure 3) layer and distort images of life, art and machine. Paolozzi overlaid the contorted marble body of the Ludovisi Gaul with cogs and pistons, so the act of violence portrayed by the sculpture becomes the action of a hybrid automaton. *Psychological Atlas,* his little seen and crumbling book of collage adapted from the catalogue from a German art exhibition dating from the country's occupation, offers further tense and fractured overlays.[21] In the case of all these early collages, including the *BUNK!* series, the fractured quality has heightened over time owing to their frailty; the thin, curling paper and the yellowing tape. This is imagery held together and no more, a visual system rather than a fully synthesised and stable work of art.

Given that the living - or lifelike - machine was a genuine preoccupation with a generation of scientists, psychologists and engineers, this strain of Paolozzi's practice should be seen as more than a reincarnation of Dada, just as the broader interest in Gestalt in the post-war years must be differentiated from than that of the interwar years. The inclusion of W. Grey Walter's essay in *Aspects of Form* demonstrates the important place early cybernetics held within these debates on form. Cybernetics was forged upon the very problem described in the introduction to this paper – the fusion of man and machine that took place during the war. Cybernetics confronted the possibility that machines would evolve towards (or beyond) the capacity of the human mind and dealt with the design and control of complex living and technological systems. Norbert Wiener was an early contributor to the development of cybernetics and he describes this new age for technology:

'…Society can only be understood through a study of the messages and the communication facilities which belong to it; and that in the future development of these messages and communication facilities, messages between man and machines, between machines and man, and between machine and machine, are destined to play an ever-increasing part'.[22]

Wiener influenced the artists of the Independent Group, notably Lawrence Alloway and Eduardo Paolozzi.[23] He explored the potential gains and problems

for a future society faced with the likelihood of increasingly advanced automata. In a somewhat Utopian vision, Wiener suggests that a society where machines did the work might allow humanity the freedom to pursue knowledge and the arts. However, the 'messages between man and machine' in the wake of the war included the anxious development of radar technologies and computerised weapons. An aircraft radar such as those developed in Britain at E.M.I in the war years could scan the ground and present the pilot with a rudimentary map of landmasses, sea and populated areas. It could indicate points where a weapon should be dropped.

We might also note that radar screens reduced the landscape to masses of dark and light, not unlike the abstract Gestalt collages produced by Basic Design students. The H2S unit was designed at EMI in 1943, shortly before its inventor was killed suddenly in a test flight accident. The pilot now had the real landscape outside the cockpit and, on a small screen, this map of dark and light which simplified and concentrated the view before him. It was a moment of synthesis, man and machine working mutually responsively to an unprecedented degree. Significantly, from 1943 until the end of the war, Richard Hamilton worked as an engineering draftsman for this company in a period of radar and missile development based on analogue computers.[24] Several drawing exercises undertaken by Hamilton's students at King's College bear the aesthetic of the engineer's drawing: machines dissected, the movement of the composite parts being indicated with arrows.

The development of 'thinking' machines was accelerated by warfare and their early uses were limited to warfare. However, the possibilities created by these technologies of war meant that communication between man and machine, formerly the stuff of high fantasy, became a vision of the future. If a machine was capable of communicating complex information then technology had entered a new age of two-way interaction. Machines could extend vision, radically enhance speed, they could perform complex mathematical functions. Cyberneticists were, immediately after the war, occupied by the vision of replicating the function of the human brain in machine form; Ashby's *Design for a Brain* of 1960 led this development of early cybernetics, marking the distinctly biological early

evolution of British cybernetics as opposed to the research deriving from military applications in the USA. It is important to note, however, that despite this apparent difference, both lines of development originated from the war. In *Design for a Brain* Ashby himself described how cybernetic studies in feedback started with engineering in the war, during which development was 'stimulated by the demand for automatic methods of control of searchlight, anti-aircraft guns, rockets, and torpedoes, and facilitated by the great advances that had occurred in electronics', all of which featured complex systems of self-adjustment.[25] His book was a work of biology, engineering and philosophy, addressing the question of whether a machine could function to the level of the human brain while simultaneously considering what this concept meant for future societies. In the true spirit of the cohesive bio-technological approaches that emerged in the post-war years, he offered a mechanical view of the brain while exploring how we might engineer a machine that could mirror biological approaches:

'I hope to show that a system can be both mechanistic in nature and yet produce behaviour that is adaptive. I hope to show that the essential difference between the brain and any machine made yet is that the brain makes extensive use of a method hitherto little used in machines. I hope to show that by the use of this method a machine's behaviour may be made as adaptive as we please, and that the method may be capable of explaining even the adaptiveness of Man'.[26]

By the end of World War II, developments in the psychology of perception were enmeshed with the broader concern of how systematised communication technology might change science and culture. In an observation within *Language of Vision* that anticipated the collaborative mode of working that would shape his late career at M.I.T., Kepes commented that:

'The order of our time is to knead together the scientific and technical knowledge acquired, into an integrated whole on the biological and social plane. Today there are hardly any aspects of human endeavour where the concept of interpenetration as a device of integration is not in focus'.[27]

Kepes' treatise on vision anticipated the increasingly interdisciplinary and networked age ahead, in which process would rise to prominence. At the same time, we might see the Second World War genesis of General System Theory, analogue computing, wartime logistics and weaponry as a measure of the cross-disciplinary problem constituted by the disruption of the Gestalt principle of the unified whole as the systems age began. Ashby observed that 'As the organism and its environment are to be treated as a single system, the dividing line between 'organism' and 'environment' becomes partly conceptual, and to that extent arbitrary…'.[28] As W. Grey Walter described in *Aspects of Form*:

'This is certainly a systems perspective on perception, and the lessons on Positive/Negative Form must be understood in this broader context of perceptual flow, force and balance. 'The most complex organic pattern known is the nervous system of man, containing something of the order of ten thousand million nerve cells. Many of these cells and their processes, the nerve fibres, are arranged in intricate three-dimensional patterns, related to the receptors and effectors of the body, but a proportion of them have little apparent fixed organisation. Around the stem and branches and foliage of the nerve-tree is draped a diffusely-connected network'.[29]

Like many British cyberneticists, Walter's background was in biology. As the new field of cybernetics sought to understand the function of the human brain in order to replicate it in the form of a computer, a new understanding of the similarities in behaviour of both biological and technological systems evolved. The intricate complexities Walter describes above pose the living body as a living machine, a system of interacting patterns and processes.

**Fragmentary Visions at the ICA**

The undercurrent of tension around new technology arose from its conflicting identity; it had a legacy of destruction in the very recent past, but it persisted after the conflict ended to become the great, hopeful light of social and economic change. This legacy of darkness, fear and tension that extended into the Cold War has overshadowed the fact that post-war artists responded variously to the social and cultural implications of technological change, not just through the portrayal of fear. According to Julian Meyers, Nigel Henderson's *Head of a Man* (Figure 4), which was exhibited as part of 'This is Tomorrow' at the ICA in 1956, 'stares, wide-eyed and slack-jawed, at the ruination of the world around him,

features blurring and chest heaving'.[30] In this collage of photographs, the face and shoulders of the man emerge from fragments of rock face and cracked mud plain, a distinctly desolate and apocalyptic landscape which speaks of ruination. The collage was displayed in the shed-like structure within *Patio and Pavilion,* Group 6's contribution to the exhibition. Paolozzi and Henderson between them created a landscape of sand and rubble, a kind of archaeology of the present, which Meyers described as 'a primitive, pre-technological wasteland […] the scene of a technological apocalypse'.[31]

Catherine Spencer describes the IG's preoccupation as 'characterized less by ethnographic fieldwork than by an anthropological emphasis on the underlying configurations of a given culture'.[32] Given the interdisciplinary convergences outlined here, it is little surprise that the discipline of anthropology was in itself changing in response to post-war culture; Margaret Mead, for example, applied cybernetics to her vision of the future of the discipline.[33] The problem of how anthropologists might contribute to a technologized future led to a reassessment of the problematic polarizing and historicising of cultures both living and dead as a result of existing anthropological methodology. The anthropological past was thus reassessed, networked, reconnected to the living world. Furthermore, an astonishing trend for using Science Fiction as anthropological teaching material emerged in the US and the UK.[34] In this way, anthropology addressed the fluctuating convergences of technology, cybernetics and production that followed the war. Even anthropology itself wanted a place in the future, recognising the problem of trapping cultures in time like flies in resin, while the same cultural traditions were, in some cases, still vibrantly alive. We might see Group 6's dystopian archaeology as resisting fixing time through layering references to past and present.

In the archaeological wasteland of broken symbols created by Group 6, it is the viewer who must pattern-seek. Meaning is relational, constructed of fragments, artefacts and remains. *Head of a Man* operated in the same way; the image was a system of parts, holding together through the perception of the viewer. It was fragments bound into a whole, a vision constructed from pieces that might scatter into nothing. It was part of a larger trend in both image making and

sculpture in which composite parts were amassed together into rudimentary human or animal forms.

**Wounded Bodies and Condensed Form**

During the 1950s, Richard Hamilton devised a series of anatomy exercises at King's College in drawing and construction, including collage and assemblage exercises based on the human head. These were heavily indebted to Paolozzi, who later took up a fellowship there in 1962/3, leading to further exchange of ideas between the two men. Hamilton credited this series of exercises to Paolozzi, for reasons which are immediately apparent. When interviewed by Richard Yeomans, he noted that:

'If you put any kind of lumping of an object into a roughly spherical shape, and you put them on a stalk, you immediately think of a head. I do not know that Paolozzi would have approached it in quite this way but he certainly made quite a lot of assemblages in collage material. If you made a Victor Pasmore shape, and made it with bits of cut-out car engines, like Paolozzi, it always looked like a head because it had a base. In fact that is probably the distinction. If you put a pyramid at the bottom of a Victor Pasmore shape, you would immediately think of it as a head. It has to float and be isolated to think of it as a shape and not a head'.[35]

This strain of figurative work is grounded in the Gestalt principle; any assemblage of forms and objects that has the basic visual properties of rounded mass upon a stick is visually understood as a head, such as Paolozzi's *Automobile Head* (Figure 5), a simple rounded shape filled with assembled images of car engines and parts.

The common use of mechanical imagery for depictions of the human form by Independent Group artists indicated that technology was, after the war, encroaching upon social and cultural life too. In a short article for the *Architectural Review* John McHale wrote of a world extended by technology:

'Culturally a period of enormous expansion and exploration; the whole range of the sensory spectrum has been extended — man can see more, hear more, travel faster — experience more than ever before. His environment extensions, movie, TV, picture magazine, bring to his awareness an unprecedented scope of visual experience'.[36]

The hybrid humans depicted in McHale's collages such as *Machine Made America II* (Figure 6) have a pop sensibility. In addressing the changing realm of visual culture in an increasingly technologized society, McHale saw that the increased speed and reach that technology offered changed not only how the world must be depicted, but also, vitally, how it was perceived. McHale continued:

'Such accelerated changes in the human condition require an array of symbolic images of man which will match up to the requirements of constant change, fleeting impression and a high rate of obsolescence. A replaceable, expendable series of ikons'.[37]

In the tide of mechanically reproduced advertising images, meaning was relational, layered, built of the perceptual paths and patterns each individual formed through the mass.

Many of the sculptors that exhibited at the British Pavilion of the Venice Biennale in 1952 had also been exploring Gestalt during the early 1950s. William Turnbull's *Head 2* (Figure 7) lies horizontal, with the dense, loaded quality of a grenade. The deep gashes in the surface hint at rough facial features and simultaneously at scarring and damage. This was the sculptural style that Herbert Read famously branded as the 'geometry of fear' at the Biennale as he looked at the carbonised, reduced or skeletal forms before him. The Biennale was a year after the Festival of Britain, but the sculpture displayed there told a different story from the monumental, stoic, figurative sculpture that had decorated the capital. Robert Burstow writes that

'Given the former associations of geometry with proportion, perfection and purity, Read's application of the term to an art of deformation, despair and hybridity had the gloomy implication that formal, social and political unities were no longer imaginable, let alone obtainable' [38]

There is another kind of geometry at play in this facet of sculptural practice – a simple geometry between the ruined surface and the implication of physical, moral or philosophical ruination.

Burstow comments that '…'the 'geometry of fear' overshadowed the geometry of hope'. It is certainly true that the compelling darkness of Turnbull's *Head 2* masks an equally compelling narrative on sculptural form, wholeness and

perception. Beyond the scarred surface of *Head 2,* there is powerful and simple wholeness, a reductive sculptural language that relies upon the perceptual powers of the viewer in order for a rough, densely built ovoid to become a head.

During the 1950s, Paolozzi had created a number of welded figures from salvaged mechanical junk. The robot-like assemblages he created were simply mechanical scrap re-constituted into a humanoid form, and yet they were instantly recognisable as figures (Figure 8). Paolozzi himself remarked that during the 1950s, he and his contemporaries were working in a cold war mentality.[39] Taken in this context, the process of assemblage or collage to create form from torn and broken parts is both practical – working with the heaps of metal scrap left by the war – and representative of the devastation of the previous decade. Paolozzi listed some of the elements that ended up as composite elements of his sculptures:

'Dismembered lock. Toy frog. Rubber dragon. Toy camera. Assorted wheels and electrical parts. Clock parts. Broken comb. Bent fork. Various unidentified objects. Parts of a radio. Old RAF bomb sight. Shaped pieces of wood. Natural objects such as pieces of bark. Gramophone parts. Model automobiles. Reject die castings from factory tip sites. CAR WRECKING YARDS AS HUNTING GROUNDS'[40]

In this extraordinary list we see the detritus of domestic life coupled with the detritus of war, a catalogue of broken machines and objects that would contribute to the fractured surfaces of his welded figures and busts. The process of taking wax imprints from lost, broken and fragmented forms created a balance of delicacy and weight in his depictions of intricate, heavy automata.

In formal terms, it is the Gestalt organising principle which makes us recognise these fragmentary parts as human features: interpreting a collection of machine elements as human is entirely dependent on our perceptual process. Two dark, empty sockets piercing a rough circle of welded machine parts are only be recognised as human because of this most basic organising instinct. In *Aspects of Form,* Gombrich reflected that 'We know that there are certain privileged motifs in our world to which we respond almost too easily. The human face may be outstanding among them'.[41]

Many of Paolozzi's early sculptures were assembled for him by a welder, in part owing to Paolozzi's lack of studio facilities in the period.[42] The welder would work from detailed drawings in which Paolozzi mapped out the structure for him. This kind of assemblage from composite pieces holds a strong relation not only to Gestalt, but also to systems theory. As noted earlier, in one of the few existing articles referencing the place of systems thinking in art of the period, Erik M. Stryker wrote that both Paolozzi and Lawrence Alloway engaged with early cybernetics and systemic approaches to bodies and architecture.[43] Stryker highlighted the violence of *St Sebastian II* (Figure 9), the gaps implying the wounds left by arrows, the scratched, battered elements which created the body, the robotic form referencing the popularisation of science fiction in the era. Like Turnbull's *Head 2,* this dense, blackened humanoid relies on a Gestalt perception of reductive form. While Read's famous summary of this strain of sculpture accurately evoked the poetic and thanatic qualities of these objects, we might also consider their reliance on Gestalt perception as a formal development prompted by the same technologies that the artists were reflecting.

Lynn Chadwick's nightmarish maquette for *Winged Figures* (Figure 10) occupies the same ravaged territory, while also recalling, in its sharp outline, Rorschach's ink blot perception tests. Like the inkblots, Chadwick's two robotic winged figures, joined at the genitals, rely upon our visual tendency to organise form into the shapes of the human face and body. While it is easy to read the dystopian terror of technologized war in these hybrid creatures, from a material perspective we might also view them as a sum of their parts; composite units that together allow us to perceive a whole.

Chadwick's *Winged Figures* illustrate the preoccupation with the fusion of man and machine which drove this mode of condensed Gestalt. Similarly, Elizabeth Frink's *Harbinger Bird III* (Figure 11) brings to mind the damaged fuselage of an aircraft, as well as the stark silhouette of a crow. In both Frink's multiple depictions of birds and Chadwick's many winged figures, the human form converges with that of an aircraft, while retaining a sense of vulnerable physicality. We might recall here Arnheim's comment that 'Certain classical optical illusions suggest that some visual situations present a balance of forces

which permit the spectator a freedom of choice…'[44] In the Gestalt image-making such as the abstract exercises explored earlier, the masses of black and white created visual tension. When we consider the Gestalt of sculptural form, then the same rule of balanced interplay applies. These hybrid creatures are built on a balance between the biological and the mechanical. Often in gendered pairs, Chadwick's winged figures have substantial bodies that taper to sharp insect-like legs, wings extended or folded, always imperfectly geometric. They capture the fusion between man and machine that characterised the technologies of the age.

From Matter to Motion

In his concluding statements of *Mechanization takes Command,* Giedion describes the problem of the whole in a technologized world:

'As mechanization moved towards its peak, biologists recognised the deadlock into which the mechanical attitude toward research was leading them. Experiment had already proven that an organism was not entirely resolvable into its components, that it consisted of more than a simple sum of its parts'.[45]

Giedon described the problem of demarcation that emerged from increasingly systemised approaches to research, a problem Ashby described in terms of the artist, commenting that the '…bones in a sculptor's arm can be similarly regarded either as part of the organism or part of the "environment" of the nervous system. Variables within the body may be justifiably regarded as the "environment" of some other part'.[46] In an age of increasingly complex systems, both living and technological, any concept of wholeness was dissolving, replaced instead with networked actions, reactions, meanings, possibilities and processes. Giedion plotted the importance of transformation and movement as an ideological influence as he explored the origins of mechanisation, aligning stillness with reductionism and movement with contemporary sciences. He writes:

'Movement, the ceaselessly changing, proves itself ever more strongly the key to our thought. It underlies the concept of function and of variables in higher mathematics. And in physics, the essence of the phenomenal world has been increasingly regarded as motion-process: sound, light, heat, hydrodynamics,

aerodynamics; until, in this century, matter too dissolves into motion, and physicists recognise that their atoms consist of a kernel, a nucleus, around which negatively charged electrons circle in orbits with a speed exceeding that of the planets'.[47]

Giedion aligns the speed of progress in the twentieth century with the physicists' understanding of the world, which he described as 'motion-process'. This physical world in constant flux has clear relevance to the exploration of perceptual processes across the sciences and arts. Matter dissolves into motion; the work of art holds together only in the restless eyes of the viewer. The prominence of Gestalt in the post-war visual arts was part of a multidisciplinary convergence in which the increasing speed and technological complexity of contemporary life made the perception of wholeness unstable, relational, systemised and, ultimately, a trick of the mind and the eye.

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[1] Gombrich "Review of James J. Gibson and the Psychology of Perception by Edward S. Reed" 13-15
[2] Gibson *The Perception of the Visual World* 59
[3] Ibid., 59
[4] Ibid.
[5] Kepes *Language of Vision* 171
[6] Moholy-Nagy *Vision in Motion* 166
[7] Kepes 176
[8] Juler "A Bridge between Science and Art? The Artistic Reception of On Growth and Form in Interwar Britain, c. 1930-42" 35-48 and *Grown but not Made: British Modernist Sculpture and the New Biology*
[9] Hamilton *Collected Words 1953-1982* 12
[10] Whyte *Aspects of Form* 3
[11] Hamilton 12
[12] Banham *Vision in Motion* 3
[13] Massey *The Independent Group: Modernism and Mass Culture in Britain 1945-59* 83
[14] Arnheim "Gestalt Psychology and Artistic Form" in Whyte 196-208
[15] Williamson "Recent Developments in British Art Education: 'Nothing Changes from Generation to Generation except the Thing Seen" 356-378
[16] Arnheim 206 in Whyte 209-222
[17] Ibid., 196
[18] Ibid., 208
[19] Lorenz "The Role of Gestalt Perception in Animal and Human Behaviour" 159 in Whyte 157-178
[20] See Arnheim (1954) and (1974), Gibson [1950] (1974), Koffka (1935) and Wertheimer (1945)
[21] Stodard "Eduardo Paolozzi's Psychological Atlas" 51-61
[22] Wiener *The Human Use of Human Beings* 16
[23] Stryker "Parallel Systems: Lawrence Alloway and Eduardo Paolozzi"

[24] Hamilton was an employee of EMI 1942-45, the period immediately after their first patented missile designs.
[25] Ashby *Design for a Brain.*
[26] Ibid., 1
[27] Kepes 77
[28] Ibid., 40
[29] Walter *Activity Patterns in the Human Brain* In: Whyte 179
[30] Meyers *The Future as Fetish* 83
[31] Ibid., 82
[32] Spencer "The Independent Group's 'Anthropology of Ourselves'" 314–335
[33] Collins "No Anthropologist Aboard the Enterprise" 182–188.
[34] Collins "Sail on! Sail on!: Anthropology, Science Fiction, and the Enticing Future" 180-198
[35] Hamilton in Yeomans *The Foundation Course of Victor Pasmore and Richard Hamilton 1954-1966* 257
[36] McHale "The Expendable Ikon" 82
[37] Ibid., 82
[38] Burstow "Geometries of Hope and Fear: The Iconography of Atomic Science and Nuclear Anxiety in the Modern Sculpture of World War and Cold War Britain 53 in Jolivette
[39] Whitford "Interview with Eduardo Paolozzi" Artists' Lives Project.
[40] Kirkpatrick. *Eduardo Paolozzi.* 31-32
[41] Gombrich. "Meditation on a Hobbyhorse" in Whyte 209-228
[42] Pearson *Eduardo Paolozzi* 36
[43] Stryker "Parallel Systems: Lawrence Alloway and Eduardo Paolozzi"
[44] Arnheim quoted in Whyte 206
[45] Giedion 718
[46] Ashby 40
[47] Giedion 28

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