Forthcoming in: *Leonardo* journal, 2023/4

(Accepted January 2023)

The Drive to Draw: Perceptual Attention and Communicative Intention

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Abstract

The emergence of cave drawings c40,000 years ago is explained as an 'external hard-drive', alleviating biological constraints on brain capacity by preserving shareable information about predators and prey necessary for survival during a period of expanding social networks, ultimately leading to humans becoming the globally-dominant species. Theories of visual perception, fundamental to any pedagogy of drawing, are reviewed. Modes of visual 'attention' are discussed, defining the difference between 'focused' and 'distributed', and relating both to intentional communication through drawing, the progenitor of writing. The article argues that drawing facilitates an intelligence of seeing, a *visualcy*, as important as literacy and numeracy at all levels of the educational curriculum. A pedagogy of drawing is proposed, illustrated with examples.

Introduction

> Speech and drawing are nine-tenths of humanity. [1]

We have been making marks on surfaces intentionally for c500,000 years. These beginnings, applied to portable items such as shells, bones and stones as well as our own bodies, ultimately led to symbolic artifacts: material and neuro-cognitive means of consolidating wider social interactions through shared cultural meanings, as well as satisfying our innate need for decoration, identity, along with other, more ephemeral modes of communication such as dancing and singing within an emerging socio-cultural context. In the early stages of the Upper Palaeolithic (UP) period, loosely defined as between c40,000 and c10,000 years ago, we began to draw the animals which shared our environment [2].

The ability to spot those animals, predators or prey, which had themselves evolved so as to visually merge with their surroundings, is itself an evolutionary necessity for human survival in the balancing act we call ecology. Our apparatus for seeing the world, consisting of eyes and brain, is adept at attending to abrupt changes of tone and texture (what I shall call 'contrast boundaries' in the context of drawing pedagogy) and the vertices (in the mathematical sense: a junction of two or more lines in a network) visible as one surface occludes others, forming patterns resembling T or Y which, when recorded in drawings, become what John Willats [3] termed "T-junctions". Such perceptual primitives embedded in the structure of the arrays of light arriving at the eyes and picked up by a brain attuned to what Gestalt theory identifies as principles of 'good continuation' and 'closure', are construed as edges, affording recognition of the camouflaged animal. Why our ancestors then began to depict those animals on cave walls is the more intriguing question, explored below, as 'The Drive to Draw'. But first, the spectrum of theories proposing how we see and make sense of our world is summarised. Why? We take our vision for granted when we should take it apart. The visible evidence of such deconstructions in the form of drawings can make the familiar strange - a prime function of art. Drawing is the most direct, economic means of exploring vision, re-construing perceptions and sharing fresh insights: anyone involved in the practice or pedagogy of drawing would benefit from an understanding of the fundamental human faculty of vision, without which the concept of drawing is meaningless.

A Summary of Theories of Visual Perception [4]

Visual perception theories have been classified in two ways: 'bottom-up' and 'top-down'. Bottom-up theories assume a one-way processing of the stimulus, from the retinae to the brain's visual cortex. James J. Gibson is the foremost advocate, his 1979 *The Ecological Approach to Visual Perception* argues that information about our environment and our

position within it is structured within the arrays of light arriving at the eyes, and that we have evolved to react directly in response to that information.

Top-down theories assume that perception is a constructive process, arguing that the retinal stimulus is ambiguous, requiring further processing *via* knowledge already stored in the brain to augment our understanding of what we perceive. Richard L. Gregory's 1970 *The Intelligent Eye* represents this *constructivist* approach, assuming the necessity for an interpretation of perceptual stimuli in order to act within and upon the environment.

Gestalt theory, first proposed in the 1920s by Kurt Koffka and Max Wertheimer, and re-evaluated by Johan Wagermans *et al.* in 2012, could be construed as between the two, rejecting both the constructivist view that prior experience plays a dominant role, and the view that the mechanisms of perceptual organisation are directly perceived; instead, Gestaltists argue those mechanisms are derived from unlearned processes of interaction between brain structure and the structure of the stimulus.

Two other approaches should be mentioned here: David Marr's 1982 *Vision* introduced a computational theory, and Semir Zeki, a pioneer in the study of the visual brain, researches a biological basis of aesthetic experience in his 1999 *Inner Vision. An Exploration of Art and the Brain*, asserting on page 12 "The function of art is…an extension of the function of the brain – the seeking of knowledge in an ever-changing world."

Pertinent to a pedagogy of drawing is the reconciliation between the two main classes (ecological and constructivist) offered by Joel Norman in his 2002 article which labels two visual systems operating within the cortex of the brain: the 'dorsal' system processes motion and spatial information, (ecological approach), and the 'ventral' system identifies and processes pattern, form and colour information, (constructivist approach.) Both systems overlap in the type of visual input they process, but they process this information for quite different purposes. The major difference between the two is not in the visual information they

process, but in the transformations they perform on the available visual information. Such an amalgam of theories can satisfy the constructivists' position of cognitive mediation, and also satisfy the Gibsonian, ecological position which argues for a direct theory of picking up information.

Derek Hodgson also ameliorates the direct aspect of Gibson's theory:

> …the direct sensory experience of Gibson, although it might at first appear not to depend on much internal processing or representation, in reality, depends on evolutionary instantiated modes that determine what and how particular kinds of information deriving from the real world are processed. As a result, some Gibson supporters accept the view that a degree of processing is necessary for vision to proceed. In this sense, the 'automatic' evolutionary-defined algorithms that the visual system employs to achieve visual discrimination can be interpreted as corresponding to Gibson's 'formless invariants'. Thanks to the fast acting nature of these invariants, it might seem that perception is immediate but modern neuroscience has revealed that this occurs within 150-200 microseconds, involving a complex hierarchy of stages. As a result, Gibson's theory can now be accommodated within the context of modern neuroscience. [5]

For the purposes of this article, centrally concerned as it is with the practice and pedagogy of drawing, this re-evaluation of Gibson sustains aspects of his concepts which remain relevant to those activities. The logic underlying the constructivist, indirect theories of perception that Gibson criticised is based on Newtonian physics. The assumption that the visual stimulus requires elaboration, either by memory or innate psychological processes, is the result of the constructivists' understanding of the relationship between time and space based on the assumption of time as a single dimension with a direction from past, through present, towards the future. Such a linear concept implies a succession of discrete moments in time which gives rise to the notion of 'snapshot' vision. Since no single snapshot can describe its own past or future, the onus of accounting for the perception of the events experienced falls upon the mental processing of the perceiver. Gibson [6] proposed that the stimulation we receive at our eyes has a richness that makes available information specifying the environment as it changes, and as we move through it. Such a position implies the rejection of Newtonian

concepts of time and space in favour of Einstein's concept of the space-time continuum in which *events*, occurrences over time, replace discrete moments of action linked together in a chain. It also implies a rejection of the rationalist split between organism and environment in favour of an ecological approach which recognises the dialectical relationship between the two.

The Drive to Draw

> It is well known that the natural features of cave walls (grooves, cracks, rock edges, concavities and convexities) were frequently utilized as constituent parts of animal representations. [7]

When vertices in the network of cracks and fissures in the cave walls came to an Upper Palaeolithic viewer's attention, those patterns would have stimulated a visual system evolved to pick up similar cues experienced in the wider environmental context. But to augment them to a level of iconic recognition by the skilful use of pigments and drawing tools would require a *drive,* stimulated by the need to preserve and share communicable information conducive to survival, information not amenable to storage by any other means. Derek Hodgson suggests:

> …material culture provided an external source of information that was able to transcend the limitations of brain size in the sense it came to serve as a kind of surrogate cortex available to the community at large, referred to as an exogram [8]

'Material culture' here includes drawings; 'community at large' infers the increase in size of social groups at the beginning of the UP period, as scattered bands of hunter-gatherers began to congregate in social networks, often at sites of spiritual significance with the concomitant problem of communication across the larger groups. The meaning of 'exogram' [9] relates to the need to externalise information held in the memory, a need for a cultural device capable of storing information outside the brain, rather like an external hard-drive, accessible to the cultural group. Hodgson [10] argues that due to the biological costs involved in further brain expansion, a natural limit was reached , sometime around 40.000 years ago, that triggered the need for an external means of preserving information more permanent than speech and gesture. A visual system evolved to pick up information in the arrays of light arriving at the eyes, prompted by the patterns of vertices on cave walls evoking similar patterns experienced in the wider environment would stimulate a potent means to share, within and across the

larger social groups, important information conducive to survival that could also be assimilated and expanded by future generations: hence images, in the form of drawings. Much later, only c5000 years ago, systems of non-iconic marks were developed, symbols derived from those perceptual primitives which were the basis for drawn representations. Patterns of edges, T , Y, for example, became the beginnings of alphabets from which selections could be combined to communicate meanings agreed within the social group; the advent of writing. Drawing preceded, and facilitated writing [11].

It is worth noting here that drawing's prime function was to preserve and share information. The notion of drawing as a means of self-expression is a relatively recent indulgence. The rise of mass-democratisation and mass-industrialisation in the late eighteenth and early nineteenth centuries may be cited as factors in the development of a European Modernist aesthetic. One consequence of this, during the later nineteenth and early twentieth centuries, was a burgeoning consciousness of the dialectical relationship between the masses and the individual. Faced with such overwhelming mass-social forces, the psychological need for individual identity became crucial. Challenges to the Academy's analytical objectivity gave rise to more pragmatic approaches to drawing and art production in general, based on the notion of the subjectivity of the individual eye. Reality, already challenged as a given absolute, was construed more as an individual subjective experience, to be expressed through non-objective, non-Academic means. The distortion of drawn visual elements was deemed to express a disturbance of emotions; both figurative distortions and non-figurative, abstract work, in which the work itself became subject-matter in its own right, as with Wassily Kandinsky from the first decade of the twentieth century, through to the American abstract expressionists of the 1940s.

Perceptual Attention

Attention is a prime requirement of all perceptual and cognitive activity. With our limited capacity for processing the wide range of perceptual stimuli from our environment all at once, we have developed "attentional mechanisms" [12] which direct us to concentrate on the information most relevant to our environmental situation at any given moment.

Charles Eriksen and James Hoffman [13] were the first to distinguish between 'focused' and 'distributed' attention, their parameters being specific objects within the visual scene, or the wider scope of the visual field under attention. Bence Nanay [14] suggests expanding the model to include 'properties' of singular objects; as well as attending to the general scene and the objects within it, we can attend to the attributes of specific objects such as their size,

colour, texture, shape and edges, and can shift our attention from one property to another, while still focused on one object. His definition of 'object' embraces more than a single entity: a landscape for example, made up of a variety of objects including trees, rocks, and buildings, might engage the focused attention of a viewer. Nanay [15] proposes four states of attention:

1 Distributed attention to objects, and focused on their properties

2 Distributed attention to objects, and distributed across properties

3 Focused attention to objects, and focused on properties

4 Focused attention to objects, and distributed across properties

For example, sorting a trayful of multi-coloured pencils into their grades of hardness, 2H to 6B, would involve state of attention 1. Admiring the general pattern made by the variety of colours and shapes distributed across the whole tray involves state 2; noticing that one pencil is shorter than the rest involves state 3; noticing that a single pencil has been chewed at one end and needs sharpening at the other, involves state 4.

These levels of attention have much potential for the teaching of drawing.

Intention: communication through drawing

Betty Edwards' book *Drawing on the Right Side of the Brain* [16] was the first to relate an understanding of how the brain works to the specific practice and pedagogy of drawing, informed by the work of neuroscientist Roger W. Sperry. More recent research [17] has indicated that both hemispheres deal with visual information: the division of functions is one of degree, or bias. As our attention varies, so each hemisphere becomes activated. The left hemisphere (LH) scrutinises detailed attributes of specific objects we may attend to, with an ability to recognise those objects from a number of angles in a number of different contexts, expediting familiarisation and interfacing with language at higher stages of the LH so that we eventually 'look through language', the word-symbol conflating the subtle variations across the range of similarly-labelled objects; thus the LH has been described by Gazziniga *et al.* as the 'interpreter'. The right hemisphere (RH) is concerned with a general awareness of the complete visual scene. It is more sensitive to differences in overall pattern across a wider field of view, a composite of objects in spatial context, made up of figures and 'negative shapes', those spaces between objects, an attitude I describe as 'looking without language', most useful when drawing.

Gibson [18] argued that we actively acquire information by virtue of eye/head/body movements affecting the structure of the array of light arriving at the eye. This is performed

at different degrees of attentiveness, differences between specific kinds of information disengaged from among the totality of information available in the array at the eye. For example, we may notice some of the invariant features of the constantly-changing arrays of light that arrive at the eyes which afford us information about the nature of surfaces in the world - their degree of softness, hardness, rigidity or plasticity, summed up in Robert Witkin's [19] term *contact-values,* referring to the *haptic* qualities of the scene. At another degree of abstraction, invariants which afford information about our spatial position relative to those surfaces may be noticed, information about degrees of nearness or farness, and angles of surface disposition, or *distal-values*. Some other invariants relate to the interplay of shape, tone, texture and colour at the level of pattern and rhythm divorced from three-dimensional form - a way of seeing that is revealed through what Witkin termed *proximal-values.*

(Of course in everyday life, our organic perceptual systems operate simultaneously, for example, seeing, touching, hearing, tasting and smelling. They confirm each other's information).

Witkin's set of values, the haptic, distal and proximal, may be adapted and incorporated in Nanay's taxonomy of attention, to form the basis of a pedagogical model for drawing, the activity best suited to nurturing a flexibility of vision, an *intelligence of seeing* [20], ultimately appliable not only to the widest range of art and design activities, but all other disciplines [21].

Attending to Drawing

Drawing exercises may be directed towards each mode of attention:

1 Distributed attention to objects, and focused on their properties

Awareness of the *proximal* values, the general pattern of the overall scene, with a focus on the *haptic* values – the variety of textural qualities in the objects, or contrasts in their size,

shape and colour. (Figure 1).

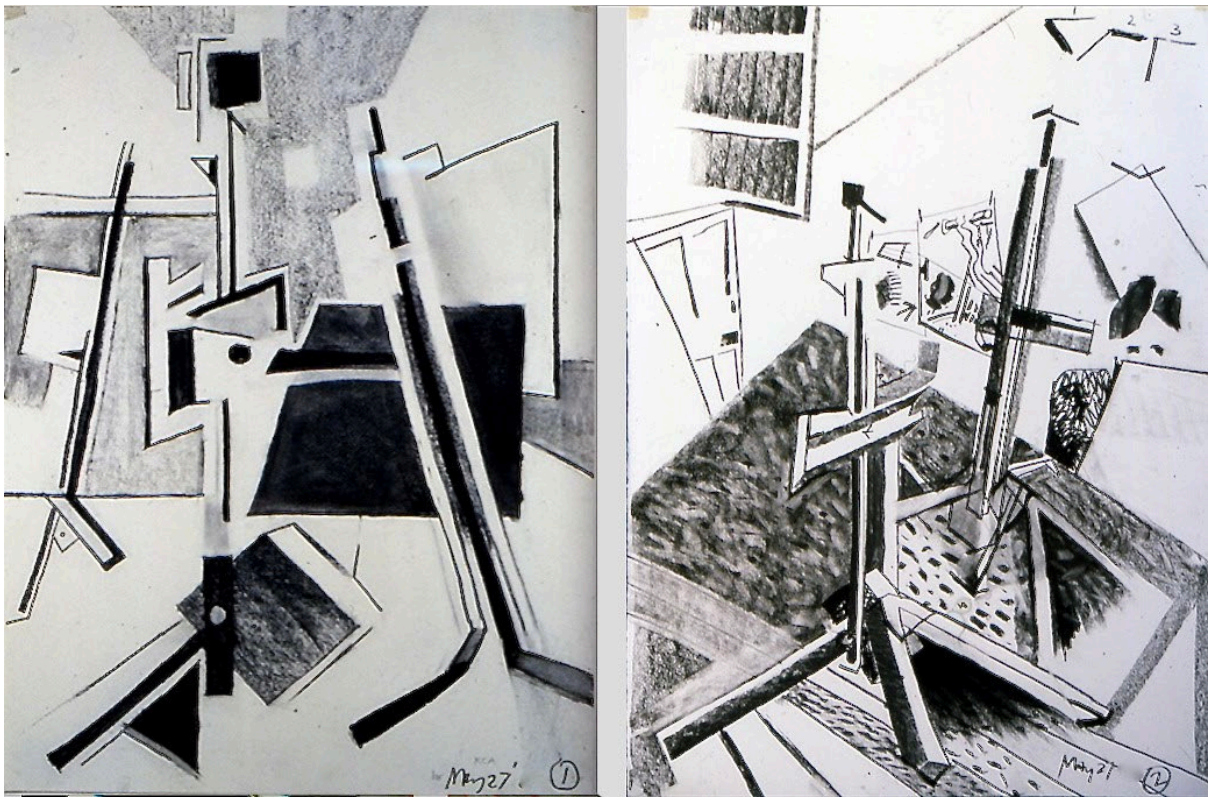

Figure 1 Howard Riley *Drawing studio, RCA, 1 and 2.* Charcoal on A2 paper.

2 Distributed attention to objects, and distributed across properties

Awareness of the *proximal* values of the scene, the overall pattern of 'positive' object shapes normally labelled with language and the 'negative spaces' between those objects. General awareness distributed across the distal and haptic values. (Figure 2).

Figure 2 Renata Ribeno *Figure in Negative Spaces* charcoal on A2 paper.

3 Focused attention to objects, and focused on properties

Concentration on an individual object within the scene, focused on its attributes: texture, colour, size, shape, edge qualities, (Figure 3).

Figure 3 Howard Riley *Bottle top.* Coloured pencils on A3 paper.

4 Focused attention to objects, and distributed across properties

Attending to the *distal* values, the cues for depth at edges of objects, construed as contrast boundaries between tones and textures; and aerial perspective, the gradation of density of tone between foreground and background, (Figure 4).

Figure 4 Robert Newell *Great Asby Scar 1.* Pencil & watercolour on paper, 49x79cms.

The four modes of attention discussed here inform a proposed drawing pedagogy, structured as a series of themes relevant to the nurturing of an intelligence of seeing, with potential to exercise those modes:

Theme: Seeing and believing

> Perception is a part-innate, part-acquired skill of transforming the raw material of vision into the 'finished product'; and every period has its conventional formulae and methods of interpretation for doing this. The ordinary mortal thinks most of the time in clichés – and sees most of the time in clichés. His (*sic*) visual schemata are prefabricated for him; he looks at the world through contact lenses without being aware of it. [22]

If students are to develop the capacities necessary to manipulate the balance between perceptual intrigue and conceptual intrigue [23] in artworks, useful as a criterion of quality, it is essential that drawing exercises are designed to encourage the understanding that

perception is capable of being ‘tuned’ to the different levels of attention, and also that it is culturally conditioned: *how we see the world is conditioned by what we believe*. This may be illustrated by showing the variety of ways cultures with differing belief-systems about space–time, for example, have devised geometric projection systems to represent the relationship in pictures. Once students are aware of their own ontological constructs, they become more flexible about recognizing the validity of those of others, and also more capable of inventing alternative constructs for representing time, objects and space.

Figure 5 explores the Aboriginal Australian convention of mapping the landscape from an imaginary high viewpoint, using contrasts of colour and texture. An example of attention focused upon the layout of landscape, and distributed across its properties. In this case, the cafes and other food outlets on a university campus are identified.

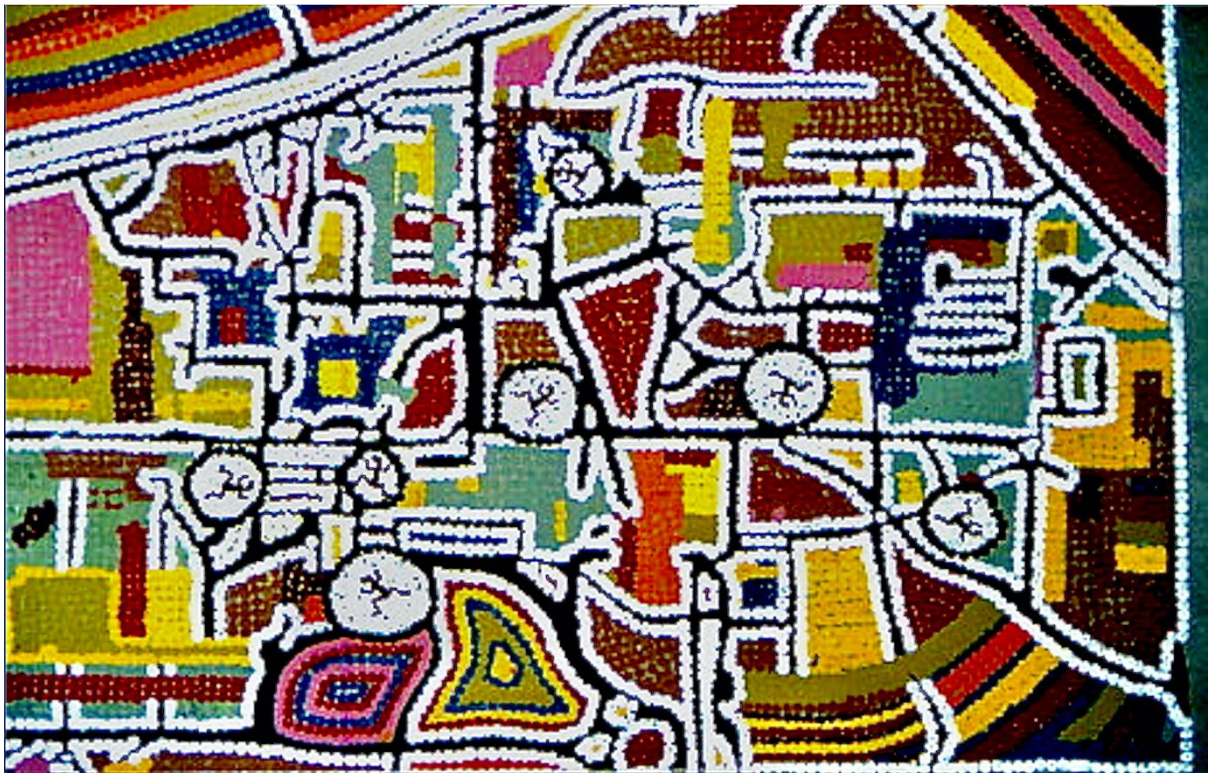

Figure 5 Samantha Geizekamp *Journey Through Space.* Gouache on A2 paper.

Theme: Functions of art

Students understand at an early stage that a mental concept, an idea for an artwork based upon some aspect of our experiences of the world, needs to be transformed into visible, tangible form in order to be shared.. Michael O’Toole’s [24] systemic-functional semiotic

model of the visual arts introduces the inter-relationship between the three functions of visual communication: the 'experiential' or 'representational' function, the content carried by the mental concept; the 'poetic' or 'compositional' function, referring to the practical processes of selection and combination of visual elements, materials and media in order to realise – make visible – the concept; and the 'interpersonal' function, relating to how those compositional choices both reflect the drawer's, and affect the viewers' attitude and mood towards the subject-matter represented. The three functions are summarized in Table 1:

EXPERIENTIAL FUNCTION	POETIC or COMPOSITIONAL FUNCTION	INTERPERSONAL FUNCTION
What is represented: Experiences of the world	The artist's selection and combination of visual elements	How the compositional choices position viewers in terms of mood and attitude towards the subject-matter represented

Table 1 *Three Functions of Visual Communication.*

For example, in Figures 6 and 7, although both represent foliage, the level of attention in 6 is focused upon the leaf, and focused on its attributes., particularly the textural. Figure 7 demonstrates attention distributed across the scene, and distributed across the scene's proximal properties. Each drawing invites the viewer to adopt different mood and attitude towards similar subject-matter: attention is directed from the macroscopic to the atmospheric.

Figure 6 Amanda Maria *Plantasia project* Charcoal and chalk on A2 paper.

Figure 7 William Reimnitz *Plantasia project* Charcoal on A1 paper.

Theme: Strategies of creative communication

Roman Jakobson [25] theorised the two poetic devices of metaphor and metonymy as characteristic realisations of the two fundamental processes of selection and combination through which the poetic, or compositional, function of communication operates. Metaphor refers to the description of one thing (the 'tenor') in terms of another (the 'vehicle'): in Figure 8 attention is focused upon the composite figure, particularly on the qualities of the snail's shell, inviting the viewer's attention to the negative connotations of the vehicle (the snail) as applied to the tenor (concept of 'progress').

Figure 8 Tom Alberts *Progress.* Oil on canvas, 100x80cms.

Metonymy refers to the process whereby one sign becomes contiguously associated with another: in Figure 9 the suspended construction invites viewers' attention, distributed across all the sheets, before being drawn to focus on the metonymic marks caused by the various sources of force applied to each sheet.

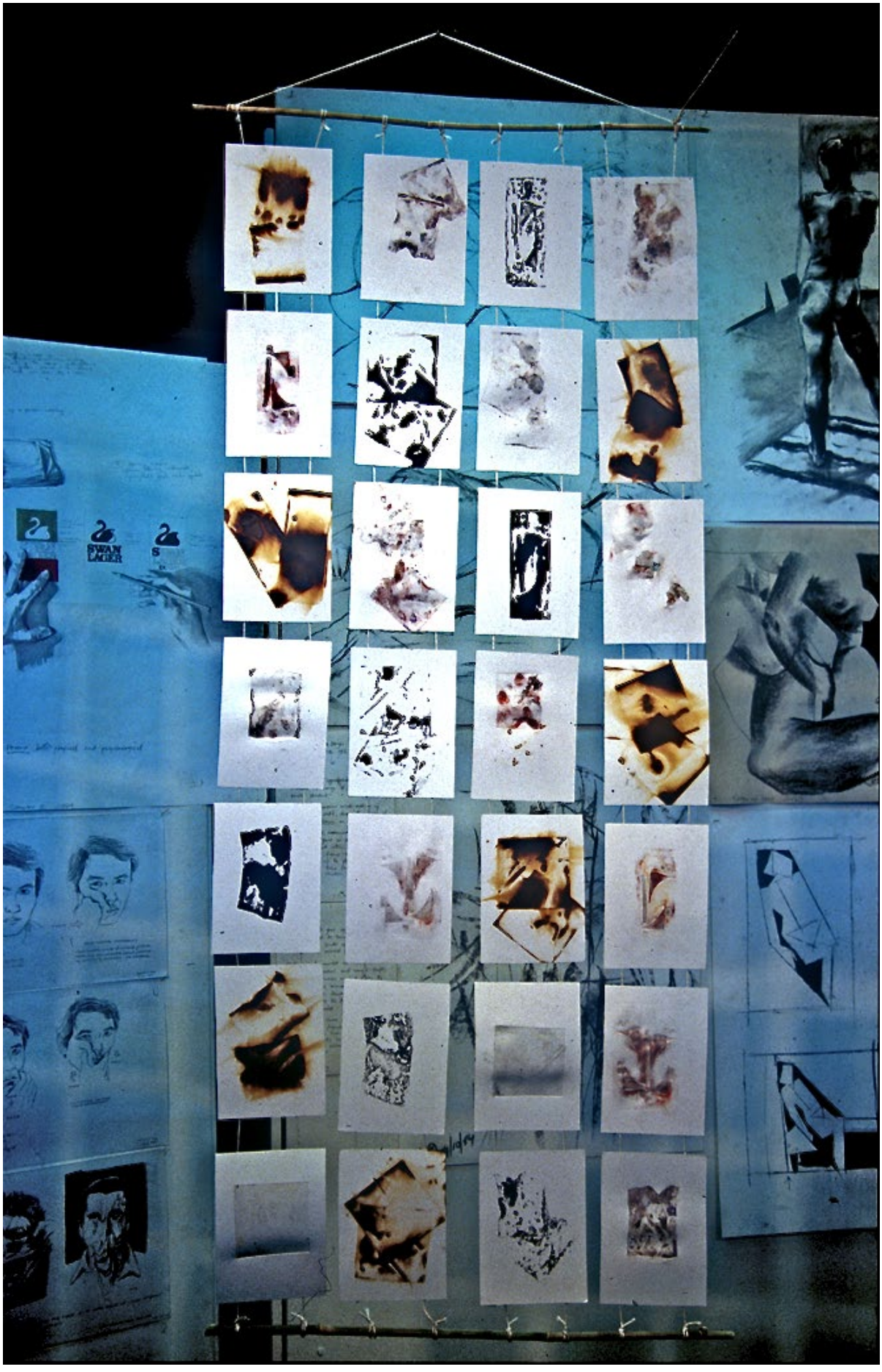
SWAN
LACHER

Figure 9 Ashley Hay *Metonyms of Force.* Sheets imprinted with indices of forces applied through various objects.

An understanding of the power of these 'poetic' devices as vehicles to make visual equivalences of conceptual ideas will surely empower students' practice. Other rhetorical tropes can also be employed to good effect, and so oxymoron, irony and pun may be introduced and applied in students' work.

Last word

A versatility of vision across the modes of attention, acquired through carefully structured drawing activities has an endurance; not only are we able to see the world differently, but in the words of Deanna Petherbridge, Professor of Drawing at the Royal College of Art, 1995-2001:

> Learning to draw…remains an activity of enormous importance and potency for education as a whole. Learning to observe, to investigate, to analyse, to compare, to critique, to select, to imagine, to play and to invent constitutes the veritable paradigm of functioning effectively in the world. [26]

Until politicians and managers/administrators at schools and HE levels are given a clear argument, outlining not just the longevity of drawing as a human activity, but its centrality to the nurturing of our intelligence of seeing - a concept of 'visualcy' as easily expanded and explained as literacy and numeracy, (but actually in evolutionary terms, the progenitor of those two privileged faculties), then the misperception of drawing as a time-and-space-consuming, 'performative pastime' will prevail. (Sorry, all you drawing-dancers engaged in the various performative activities in vogue at the moment - you're the joyful icing on the cake, but it's the cake that's crumbling in the curriculum.) It is time to reiterate the fundamental argument for drawing as the facilitator of all the visual cultures we see worldwide - both in terms of 'the transfiguration of the commonplace' (27) in generating ideas, and in terms of sharing, communicating them. And sad to say, the advocacy of famous artists and the reasonableness of academic articles don't seem to impinge upon the neoliberals, up on the entrepreneurial bandwagon. Academic journal articles have a voice, but what we need is a major politician to be the megaphone. We won't win it in the art schools while market values drive educational objectives.

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