Preserving the Identity of Digital Prints

ABSTRACT

The objective of this paper is to present a variety of aspects relating to digital print: light-fastness of inks, the relationship of ink on paper and alternative methods of presenting print, and research on print in a digital format. The paper refers to an exhibition Digital Print, Traditional Print, which was presented at the recent Computers and Art and Design Education conference (CADE) in Glasgow (2001). The paper also draws on issues raised at a conference relating to the conservation of inkjet prints at the Institute of Physics London (2001), and work undertaken on the impact of inkjet ink on archival artist's printmaking papers at the Centre For Fine Print Research (CFPR) is also described. The last section of the paper presents alternative methods for the dissemination of research, in particular electronic resources. Examples are shown of recently produced CD-ROMS, including the Impact Proceedings 1999 and Tate Gallery Archive, which records the print collection by process. The paper concludes by suggesting that there should be some form of 'best practice' for artists when making and selling work.

1. DIGITAL PRINT TRADITIONAL PRINT

Firstly, I have an admission - that I do not like the surface quality of an inkjet print, where colour is rendered uniformly and the substrate is very flat. The relationship of image on screen to two-dimensional print is often disappointing, the colour unbalanced, the commercial paper surface unsympathetic to the image, and the ink on paper dull and lifeless. The inkjet print is equivalent to listening to an
opera in the foyer with the doors closed. Therefore at the recent conference, Computers and Art and Design Education, my objective in an exhibition that I curated, entitled Digital Print Traditional Print, was to show how the photographic digital print could be taken beyond the conventional inkjet. The discourse between digital and traditional technologies has facilitated the development of a new, sophisticated and creative field. In the last twenty years digital technology has made a significant contribution to methods of art production and print theory. Most of the prints in the exhibition used photomechanical methods of printing - that is the traditional method of printing a photographic image but using press and paper. However, inkjet prints were included. The exhibition showed prints including, for example: Elizabeth Turrell's print on enamel, Michael McGraw's work that combines digital and photolitho, Sarah Bodman's bookworks, Claire Redwood's print on old evening bags and army packs, Frank Tinsley's helio relief, Paul Thirkell's collotypes and Andrew Atkinson's use of flexo intaglio print processes to achieve a wide tonal range with an exceptionally rich black. The objective to the exhibition was to show that whilst the conceptual framework has always remained a priority, the artist's interest in combining captured images and an autographic expression through mainly traditional print was integral to the methodology. Inkjet printing, although changing and developing, still restricts choice. A printmaker, however, is empowered by the variety of substrates, inks, processes and the ability to manipulate the image to produce two- and three-dimensional artifacts.


There are of course exceptions to the rule such as the sculptural works by Cecilia Mandrille: she inkjet prints onto cotton, which she then sews to create a family of sleeping doll-like figures. Also, Steve Hoskins' inkjet kites, which are printed onto Japanese tissue. These artists have thought about how to overcome the problems of inkjet by using novel substrates and furthermore creating three-dimensional artifacts.
2. THE PHYSICS OF PRINTS

From a practical perspective, the problem with digital prints is that, currently, not enough is known about the chemical substance of the inkjet print. They fade. However, we have lived for a lifetime with the knowledge and experience that photographs, drawings, paintings and prints fade, pigments crack and peel and paper discolours. So why are we concerned with the fugitive nature of digital prints? We are guaranteed by ink manufacturers that some inks have, according to accelerated light tests, a life expectancy of 99 years. However, a growing area for concern among artists and conservators and collectors is whether these claims are true. Whilst many artists have used fugitive materials in their work, and have guaranteed conservators regular employment, there are many extra problems related to the upkeep and longevity of a digital print. These include access to the composition of paper and inks and, furthermore methods of display and storage. An inkjet print can happily fade in a drawer in the dark(!) and methods for testing the fugitive nature of ink on paper are flawed. At a conference last year in London, on Preservation and Conservation Issues Related to Digital Printing the effects of ink on paper, humidity, UV testing, the blue wool scale and archival paper were discussed.

I was interested in attending the conference at the IOP because, like many printmakers, I was concerned about the long-term implication of inkjet technology. Initial research conducted into paper and ink at the Centre For Fine Print Research has revealed what we felt to be a lack of thorough testing by ink manufacturers prior to the launch of a product, arguably problematic methodologies for testing the light-fastness of inks. From our experience some tests have shown that combinations of certain inks and paper react so dramatically that they can fade in a darkroom overnight. I was surprised as to the range of attending delegates, comprising museum conservators, paper producers, ink manufacturers and digital hardware producers, but very few artists. The two-day event was loosely divided into three areas: an overview of printer, paper and ink technology; methodologies for testing inks and papers; and issues surrounding the curation and conservation of digital prints.

Michael Chamberlain of PIRA UK discussed commercial papers for digital printers, ranging from glossy coated, matt coated, satin and embossed papers to films.
Coating materials such as gelatine, PVA, silica or modified clays are used to increase the surface porosity and optimise the inkjet droplet. These coatings are necessary to obtain a certain surface that will retain the ink, and are balanced to control the spread of ink without causing the image to look chalky.

One of the presentations particular to our field and pertinent to the research at the CFPR was made by Richard Shearwood-Porter of St Cuthberts Paper Mill, who are producers of the Somerset paper range. He presented research into the development of photo-enhanced handmade papers and their new second-generation range. Richard was the first speaker to consider the requirements of the user, who wanted 'good colour separation, good colour lift, tone proportional to ink volume, true black and a high level of definition'. The company wanted to retain the proven archivability of the papers and have therefore used a carbonate buffer as protection from acidic conditions. The company has also started researching into their own range of pigment-based inks that, according to Richard, would give a better colour gamut with less shifting or fading.

Martin Jurgens of Queens University, Ontario, Canada, gave an interesting presentation on methods of identifying non-impact printing, which is important for archiving. Andrew Robb from the Library of Congress Conservation Division, Washington, USA, presented his observations into the effect of humidity on printed matter. His conclusion suggested perhaps why my freshly printed inkjet tests might have faded in a darkroom overnight. The combination of humid conditions, the moisture content of the paper kept in an (relatively) airtight environment might speed up the degeneration of the images by 'stewing in its own juices'.

3. INKJET TESTS ON ARCHIVAL PAPERS

Current developments in inkjet have led to the development of dedicated photo-enhanced and textured papers. Printer companies have often developed a paper that is designed to be used only on their printers and using their inks, inferring that the quality of the image might be impaired if other generic media are used. These papers are designed for high volume print reproduction or for the home user. The longevity of the paper and the ink, for these users, is not so much of a priority. However, as previously noted, a growing area for concern among artists, conservators and collectors is the light-fastness of digital prints and the relationship
of ink on paper. An alternative approach was undertaken by testing ink on a range of coated and non-coated archival artist's papers. The Encad Novajet 63E 600DPI printer was used to undertake a series of tests onto a variety of artist's archival papers to consider the subjective quality of ink on paper. A range of artist's archival papers were investigated in terms of, quite literally, how the ink mixed with the paper. The objective was to emulate methods by which an artist might generate an image and their expectations as to the quality of the final printed image. A piece of artwork was scanned, which comprised collaged squares of different textures and colours. The test page also included a grey scale, a colour scale, and text. The printed image was calibrated to match as closely to the original as possible. However it was impossible to obtain the richness of some of the colours and give an accurate indication of texture.

Fig. 5. Test page, showing artwork, line work, greyscale and colour scale.

Once a suitable colour balance was achieved, these colour combinations were used for the whole print run. A colour set produced by Lyson was used. The papers trialed ranged from lightweight Japanese tissues to heavyweight etching papers. There was also a variation in the base colour of the paper, which ranged from a bright white to an antique cream. A series of criteria were used to judge the effect of ink on paper:

- colour clarity - muddying of colour
- brightness, saturation, text - feathering at the edges, density
- paper - surface quality, chalky, dull, puddling or colour drag.

The results, if quantified not by accuracy of colour rendition, brightness or luminosity, revealed a broad range of subjective qualities. Some samples revealed a fairly accurate and clean rendition of the CMYK and therefore had little subjective quality. Others, where the colour may have been absorbed into the surface, showed a rich and dense quality with a very short tonal range but a high subjective
appeal. Other samples, where the colour was on a Japanese paper for instance, showed an effect unobtainable in any other manner.

4. PRINT ON CD

Discourse on the originality of printmaking can be considered as no longer relevant. The Internet has greatly contributed to notions of originality since the 1970s when photomechanical prints were banned or annexed. The issue now is access and dissemination. Many artists have access to the web, and use electronic resources and digital files. Often the electronic image is so far removed from the original, via scanning, email, the web, but has the potential to reach so many recipients. Artists often talk about surface and the tactility of print. Obviously there is a difference between the original and the image of a print, but does it matter? Is there enough information to convey the essence of the image? Through tacit understanding of print process, an artist can interpret a woodcut surface as opposed to an etched surface. With references to exhibitions and gallery archives, do we need to travel to a place to look at a print, or is the print on the web a satisfactory alternative? Catalogues are a useful reminder of a favourite exhibition, which could be considered as a portable reminder. Why not print exhibitions on CD or on the Internet, where the viewer could survey the image at such close quarters, which in a real life situation would have the viewer arrested? Dissemination of printmaking research has become a major component of print practice. In order to inform other academics worldwide, electronic resources have the potential to show papers, exhibitions, movies, demonstrations and prints. Such methods of dissemination of print through electronic resources are becoming more practical and usual at the CFPR. These include the Collotype Database (Lane, Atkinson, Thirkell) the Impact Conference Proceedings (Parraman, Brewer), the Tate Gallery Print Archive (Parraman) and the Helio Master Class (Parraman and Anderton). A recently completed CD-ROM is the 1999 Impact Proceedings (2001). The objective of the project was to disseminate a variety of information through an electronic resource. With funding from the AHRB, I was able to devise a methodology, which comprised: postscript text and image; a clear, readable and printable format; word search capability; compatibility with a variety of computers; publishability on the Internet. The Impact conference was a very useful, albeit large, guinea pig. The conference contained many aspects that would make a resource necessary, where illustrated papers, demonstrations and print exhibitions
were combined to produce a full colour, word-searchable .pdf document. The documents are saved as a PDF or Portable Document File, which captures the exact look and content of the original, complete with fonts and images. They can be distributed by e-mail, accessed on the Internet or saved on CD for other users to view across platforms.

On a smaller scale, the *Helio Master Class* (2001) was produced. This resource was viewed as part memento of the seminar for the delegates and part 'how-to' manual, which included an article by Richard Anderton, process notes by Eric Vontillius (GraphicStudio) and a series of stills from the master class session demonstrating the Helio process. The information was burnt onto CD and a copy of the event sent to each of the delegates. This format might also be considered as the first of a series of process based resources. The common objective to all these resources is to disseminate information, enabling information to be accessed and presented in a user-friendly, ordered, no-frills system. Perhaps the no-frills approach could be considered as dull, but from the perspective of academic practice, the emphasis is on clarity, precision and structure. I expect that paper based information will not be displaced as books still remain the most archivally sound method of storing information. However access, retrieval and storage of information is much easier when stored electronically and is a useful alternative.

A third electronic resource, a collaborative project underway at Tate Britain, is the production of a database that records the 20th century modern print collection by process. The database is searchable by keyword, for example etching; and more specific techniques such as drypoint, aquatint and spit bite. Colours are also recorded. Also included is an observations section, which highlights interesting aspects of the print in more detail. The database can be cross-referenced to the Tate collection archive, as it uses the same catalogue referencing system. The Tate are also halfway through a major undertaking to digitally record the entire collection, works on paper, sculpture and paintings to be accessed via the Internet.

I made the decision to work through the collection chronologically rather than alphabetically. I started at the beginning of the 20th century, working by decade, and now that I am working through the 60s and there are many more prints, cataloguing by the year. There are some seminal portfolios in the collection that have quietly contributed to the technological development of print. For example,
the rather undervalued Schools Prints, where a grained plastic was employed, on
which the artist drew or painted and then used as the photopositive to
photographically transfer the image onto litho plate. Also the work of Chris Prater
of the Kelpra Studio who, in collaboration with artists such as Richard Hamilton and
Eduardo Paolozzi, and through the development of 4 colour separations in the print
by Peter Blake, turned the notion of what constituted an original print upside down.
The database works on three levels: firstly to enable visitors to the collection to be
more informed about print, secondly to equip print historians with a better
understanding of print, and thirdly, the most important from my perspective, to
place print history in a different context, one that is not solely connected to art
historical models.

5. THE BLADE RUNNER PRINCIPLE

These resources show aspects of print in the margins, which are edition-less, and
enable multi access. As Walter Benjamin suggested, the revolution in reproduction
placed the printed image in new areas, which could not have been foreseen by the
artist. At galleries one can take away pocket size reproductions of favourite images.
However, how often does one look at these prints once they are in scrapbooks or
on bookshelves? Isn't a reproduction on paper an outmoded method of recording
visual information where the colour is often disappointing and the texture and
surface are flattened? How could one bypass the security guard in an exhibition
and get a really close look? Even better, what if we could get so close that we could
look at the structure of the print or look at it on a micro scale? Or perhaps look at
the grains of the aquatint in an etching or the impact of ink on paper? In the film
Blade Runner, Deckard, played by Harrison Ford, was able to identify a 'replicant'
by 'enhancing' a photograph many times so that he could distinguish a tattoo mark
on the neck of a woman sitting in a bath, which Deckard could not have found just
by looking at the photograph. By voice command he was able to zoom in on a tiny
area of the image, and print the evidence without, seemingly, any loss of quality.
Perhaps this futuristic concept is now achievable through the use of digital scanners
and cameras. Huge files containing detailed images can be compressed, stored and
accessed. Details that appear to be blurred under normal resolution can be
magnified many times to reveal micro lines and nuances.
Through the use of high resolution scanning and microphotography a better understanding of the paper surface and the impact of ink on paper can be obtained. Therefore a viewer could zoom through layers of images that would bring them nearer and nearer to the surface structure of the print. A database could be devised so that an image could comprise a series of layers, which by the action of clicking will bring the viewer closer until they reach microscopic detail. The intention would be that the viewer could almost turn the paper over in their hands. Indeed this type of approach is being used to support the prints by process project at Tate Britain in the form of a process glossary.

Therefore if the viewer wanted to learn more about aquatint, for example, they could go to the glossary database and look at magnified images of the process. The images are taken using a microscope attached to a camera. Swatches of each process are recorded at 5 and 10 times magnification. The objective to the project is to produce close-ups and cross sections of all the techniques, so that the viewer can look at how the ink and plate impact on the paper.
CONCLUSION

Printmaking could be considered as having evolved slowly, as being on the margins, as an applied art. However, print has undergone a quiet revolution in how it has embraced new technologies, new materials and innovative methodologies. The collection at Tate Britain for example reveals an interesting overview of how artists have combined idea and image. Since the late 19th century fine artists have used photomechanical print methods, because of the fine quality of the printed image and to reflect the notions of a new approach to photography. This was exemplified by Alfred Stieglitz's use of photogravure and gum bichromate printing to obtain the best possible quality reproduction for his Camera Work publication (1903-1917). The magazine provided a forum for the work of the Photo-Secessionists. Printed onto Japanese tissue, the combination of composition, process and paper made the results highly expressive and evocative.

During a question and answer plenary session at the Institute of Physics, concerns were raised by archivists as to a best practice for information dissemination regarding the chemical composition of inks and papers. Problems were also highlighted in the conservation of prints that were not solely related to digital printing but to many print processes. Etching and litho inks can also fade or suffer from colour shift. With the introduction of so many hybrid processes, mixed media printmaking and non-impact printing printmakers need to be more rigorous by using the best materials and documenting how the prints are made.

Presenting works via electronic methods also presents the artist with a similar problem. Archiving information and keeping up with continual developments in digital technologies also require a best practice for regularly updating works. A series of best practice working guidelines would be necessary for printmakers and archivists if current generation prints are to last our lifetime.
NOTES


2. A thin photopolymer film that acts as a barrier for sandblasting images onto wood.

3. A 19th century photomechanical process, researched and developed by Paul Thirkell, 2000, The Integration of digital media imaging techniques with 19th century continuous tone process, Bristol, University of the West of England.

4. Flexo or polymer plate: an industrial print process that has traditionally been used for printing onto corrugated or cardboard packaging. The plate comprises a photopolymer emulsion on a thin, flexible steel or plastic backing.


8. Many thanks to David Sully for his expert guidance in the production of the etching plates.