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The (In)Difference engine: explaining the disappearance of diversity in the design of the personal computer

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The (In)Difference Engine: Explaining the Disappearance of Diversity in the Design of the Personal Computer

Paul Atkinson, 2000

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Abstract

At the time of writing there is a clear perception of all office computers as being more or less identical. Discussion with users entails repetitive rhetoric as they describe a landscape of boring beige boxes. The office PC is indeed a 'clone' - an identical, characterless copy of a bland original.

Through the exploration of an archive of computer manufacturer's catalogues, this article shows how previous, innovative forms of the computer informed by cultural references as diverse as science fiction, accepted gender roles and the discourse of status as displayed through objects, have been systematically replaced by the adoption of a 'universal' design informed only by the nondescript, self-referential world of office equipment.

The acceptance of this lack of innovation in the design of such a truly global, mass-produced, multi-purpose technological artefact has had an enormous effect on the conception, perception and consumption of the computer, and possibly of information technology itself. The very anonymity of the PC has created an attitude of indifference at odds with its potential.

Keywords: computers, consumption, gender politics, product design, science fiction, social construction of technology

In 1833 Charles Babbage displayed his calculating machine, the Difference Engine, to an amazed public. One witness wrote 'visitors gazed at the working of the beautiful instrument with a sort of expression, and dare I say the same sort of feeling, that some savages are said to have shown on first seeing a looking glass or hearing a gun'.[1] That the same sense of wonder and awe no longer accompanies the computer is understandable, but that it should routinely be regarded as uninspiring requires further explanation.

Taking the signified of the signifier 'computer' to be the personal computer as it presently appears in the office and home - a beige rectangular box

containing a processing unit, a beige box form monitor, a separate beige keyboard and beige mouse - one encounters a rhetoric of repetition and ennui. Users are heard over and again to state 'They all look the same', 'They're so boring to look at', 'They're just grey boxes.'[2] In *The Aesthetics of Computing* David Gelernter refers to computers as 'graceless, lumpy objects.... an electronic Model T, an awkward shape that is cheap to build and enshrines permanently the first thing that came to mind. And they all look the same, their sheer sameness ought to make us suspicious.'[3] Despite being the subject of strong corporate competition, marketing drives and advertising campaigns, the computer remains an anonymous form, identified only with itself, not its producer. The computer industry confirms its own sterility by adopting the term 'clone' to describe multitudinous, identical, characterless copies of a bland original.[4]

Why is such anonymity acceptable? One argument, put forward by the computer historian Robert Cringely is that 'The operating system is the identity of the computer, the personality of the computer. Because we use the operating system.... the underlying computer becomes less important. What's the name on it? IBM, Compaq, Dell, Gateway, Acorn - who cares?'.[5] I believe this to be oversimplistic. The sterility of design in such a large area of production has far more complex origins.

This article is concerned with the design development of the office computer and not the home computer. This is an important distinction, as the two have distinctly different histories. The office computer, having roots in the military and large international corporations, has been subject to a series of defining precedents and the continuity of pre-existing work practices which affected its design and acceptance[6]. The home computer, resulting as it did from the activities of individual hobbyists and small garage-based companies, was by way of contrast a completely new, self-referential technological product[7]. It was not until the appearance of the spreadsheet application VisiCalc in 1979, written for the Apple II computer, that these two strands of history really began to interact, and the office and home computer became to all intents and purposes the same object. Because of this distinction between the two, peripheral objects such as the joysticks associated with extending the standardised computer for use as a games machine in the home are excluded from this discussion. Also excluded is the laptop computer and later developments such as personal digital assistants (PDAs). These, due to their portable nature, cannot be described purely in terms of being an office computer, and in any case are objects that carry a host of unique hierarchical, status and role-setting meanings.

The pictorial and textual evidence used in this paper has been gathered from the National Archive for the History of Computing at the University of Manchester[8], in particular, their Trade Catalogue and Machine Literature Collection, which consists of an extensive range of manufacturers brochures targeted at business users, from the late 1940s to the early 1980s. Taking a sample of over 250 brochures selected for depicting the widest possible variety of computers, the images therein were sorted into groups of computers sharing similar arrangements of component parts, disregarding the

date of the computer's design. This provided a framework of 21 distinct forms of the office computer which had appeared on a number of occasions (one off or unique designs were not included in this count). This gathering of heterogeneous examples revealed the sheer diversity of computer designs over the last 50 years. It is a history of variety that seems to have been largely forgotten.

By organising the constituent computers within each of these groups into a chronological order, a tentative measure of the earliest and latest appearance of each of these forms could be made. (Tentative in so far as no random sample, no matter how large, from an archive - which in itself does not claim to be comprehensive) can positively identify the exact earliest or latest appearance of any particular form of computer. The scope of this subject area - the sheer volume of manufacturers and products produced - means that any findings from this type of archival research have to remain indicative rather than conclusive). The diachronic analysis of this material exposed the rapid diversification of the office computer or computer interface from a single initial form as a console controlling a remote mainframe **[1]**, into an object which could appear in forms as diverse as office desks, integrated workstations, advanced typewriters, and even extended telephones, before more rapidly converging into a single, accepted shape as a series of beige boxes - referred to in this paper as the 'Universal Desktop Office Computer'. This, to date, would seem to mark an endpoint of the development of the office computer, as for the last 14 years there has been little or no discernible change in its basic design **[2-3].**[9]

The detailed exploration of this development as a complex, interwoven story determined by a multiplicity of factors is the subject of a previous article[10]. Here, I wish to explore the bearing of styling influences and cultural references on the design of the computer, arguing that it is these changing influences and references which have contributed to the level of innovation in previous designs, and to the indifference with which we treat the computer today.

Cultural references and office equipment design

Firstly, I wish to explore the role of stylistic influences on the design of the computer in the workplace. While the brochures under consideration show staged office sets, their use in analysing the form of the computers remains valid as those forms are accurately displayed (even taking into account that any image of an object can be said to elevate the form over the function).

Clearly, some computer terminals reflected aspects of the 1970s space-race in their appearance and usage at a time when the computer room connoted 'mission control', and parts of terminals 'docked' together like rockets into space stations. The events of July 1969, when the world's attention focused on the first moon walks, meant the conquering of space became a fundamental part of the zeitgeist - yet it was not only the reality of space-age

technology which was reflected in the design of the computer, but the fabricated world of science fiction. The designer George Sowden wrote:

> The first generation of computers wasn't really designed at all.... [T]hey had no particular identity of their own, partly because the jobs they were supposed to be doing still had to be invented.[11]

Designers had no historical semiotic reference with which to associate electronic computing, and the imagery of exciting, futuristic technology found in science fiction must have seemed an obvious parallel to the fledgling machinery **[4].** The consoles appearing with the first computers, with angled surfaces, straight edges and vertical backboards covered in control switches and indicator lights bear more than a passing resemblance to those envisioned by science fiction artists. In *Design* magazine, James Woudhuysen wrote :

> There was a time when console units were only a science-fiction illustrator's standby. If a spaceship interior in *Amazing Stories* or a Dan Dare strip in *Eagle* looked too bleak, an experienced illustrator would deck it out with vast arrays of glowing lights and dials and seat an intent-looking operator by them. Futurists tended to see Earth-bound business being conducted from winking, omnipotent consoles too. The console became a cipher for the technological prowess of the corporation to come.[12]

It would appear that there was some truth in the saying apparently used by NASA managers in their bids for project funding when they proclaimed 'There's no bucks without Buck Rogers'.

The console is presented in many other places as the epitome of futuristic technology. As an example, an article in the August 1978 issue of *Wireless World* presented 'the 'consumerole', an information console that could be in use in the home or at work by the end of the century' and made a credible attempt at the 'windows' type display common today. The consoles predicted by science-fiction illustrators and futurologists were imagined as the integration of discrete components into one high-tech object, a design solution which appeared in many consoles, workstations and terminals actually produced by manufacturers. Mario Bellini's 1966 TCV250 for Olivetti **[5]** was described in an exhibition catalogue as 'a floating landscape' using a continuous surface to unify separate components. According to the author, 'The terminal also has a science fiction aspect and conveys much of the experimental mood of the 1960s'.[13]

This trend towards integration of components seen in computer consoles has to be seen in context as part of a general design trend. Bernard Busch, discussing the design of the 1970s cited enormous changes in technology as an underlying influence: One response to these changes was the increasing number of technological design utopias dreamed up in the seventies, drafts for a world in which what had once been science fiction would become reality.[14] The accompanying images show integrated workplaces - typewriters, phones and intercoms moulded into one desk, suggesting that integration would be seen across all office furniture, not only computers. In fact, the

integration of various technologies into unified forms was predicted for the home as well as the office. Examples such as Joe Columbo's integrated living spaces may have arisen in part from the freedom designers explored in the plastic possibilities of new materials, or the desire for portraying hygiene by removing sharp lines in expansive, white surfaces. Whatever the reasons, architecture and interior design, furniture and product design all probed the integration of components as a metaphor for advanced technology.

By the end of the 1970s, it appears that the limitations and inflexibility of integration had been realised, and an alternative approach of modularization became prevalent. Domestic consumer products such as lounge furniture, storage units and hi-fi systems allowed the arrangement of the component parts of living space and technology to be built to order. This sort of 'plug and use' approach to technology, explored at least a decade earlier by the architectural group 'Archigram' in their designs for a 'plug-in city', saw the integrated console replaced by a more flexible alternative - the 'multifunction workstation'. An example of this design solution appeared in *Design* in January 1980 **[6]**.[15]

A telephone, display screen and computer keyboard are fitted into the desk surface heralding the electronic working practices to come, yet the paper trays and pencil tidy show the designer's acknowledgement that a paperless office for the executive was not just around the corner. Although designs such as this may have been informed by the realization that what was then called 'teleputing' - the convergence of information and computing technologies - would need to occur to meet future business needs; the speed with which such pieces of furniture would date and become technologically obsolete was recognised fairly quickly after. Two years later Roger Green disparagingly wrote 'Such devices appear, from time to time, at computer exhibitions, looking as likely candidates for office use as a cinema organ'.[16]

It is not only the physical design of computers that bore the influence of science fiction - the names and model numbers also reflect futuristic pretensions. Companies such as 'Nexos', 'Xenotron', 'Raytheon', 'Tektronix', Nixdorf' and 'Xerox' are names that recall planets from far-flung galaxies, exotically dangerous isotopes, or incomprehensible alien technologies. (For some reason there is a long-standing tradition of advanced futuristic technology being associated with words having, or suggesting ancient Greek roots - Stanley Kubrick's *2001* was, after all, *A Space Odyssey*). Control Data's 1974 'Cyberdata' series invoked the far future in the same way that series numbers from various manufacturers - HP 3000, Mael 4000, BTI 5000, and Kienzle 6000 - suggested millennial dates in a future history beyond human comprehension. The product which some see as the first ever personal computer, the 'Altair', was named after the planetary star system visited in the 1956 science fiction film *Forbidden Planet*. In discussing the shape of early personal computers Phil Palton wrote:

> Designers approached the first personal computers with the science fiction models of Buck Rogers and 2001 fixed firmly in their minds. Those images -

> visions of what a computer would look like if it existed - inspired the shape the machine took when it finally became a reality.[17]

In fact, certain designers of computer consoles had closer links with science fiction than might be imagined. Phil Palton cited Rob Gemmel (one of the organisers of Apple's 'Snow White' design policy) as having worked beforehand for Lucasfilms, the creator of *Star Wars*, and mentioned one computer hacker referring to a particular computer as 'Darth Vader's lunchbox'.[18] Along similar lines, Roger Wilkes, the designer of custom consoles for the banking industry in the city of London had previously been involved in the design of control consoles for the TV series *Dr Who* and *Blake's Seven*. An article about his work stated 'Few people will believe that the props in a children's science fiction programme had a fundamental influence on the working environment of banking in the 1980s'.[19]

All of this is not to try and suggest that science fiction was the only source of styling influence employed by designers of early computers, only that it was a significant factor in the design of *some* of the computers. The concept of the computer as office furniture had been present all along to some extent, particularly in products from larger companies already associated with 'serious' business machinery. An Olivetti prototype of 1964 by Sottsass, and the IBM System/32 of 1975 **[7],** for example, appear as pieces of hybrid technology, computers looking indistinguishable from large office photocopiers. The exploitation of science fiction in trying to give a physical manifestation to the excitement to be found in the new technology of early office computers may have actually alienated certain people as little in the way of familiarity with previous office equipment could be seen - a barrier perhaps to their acceptance. In these terms the styling of the 'Universal Desktop Office Computer' as an extension of familiar office technology would seem to make sense. In fact, the dominance today of this approach to computer design is more than likely due to the most influential of all office computers in terms of its styling as an advanced typewriter -the IBM PC **[8]**.

Launched late in 1981, its design is nothing if not 'safe'. Phil Palton, in *Connoisseur* wrote:

> It is in the tradition of Eliot Noyes-designed typewriters or the mainstream modern architecture of I. M. Pei or Edward Larabee Barnes. The noncommittal 'cream and pebble gray of the IBM PC line is reassuring and adaptable and matches other IBM products.... there are no tricks or gimmicks in the design.[20]

The IBM PC presented personal computing as little more than an electronic filing cabinet, and it was just about as exciting in its styling. Rather than suggesting a new, stimulating concept of work altogether, it recalled the staid and dusty world of ledgers and manila envelopes. In doing so it found a receptive audience. Rather than connoting radical change, it offered an improved method of carrying on familiar work practices.[21] The IBM PC was even less radical than their own previous computers. It's 'noncommittal' colour scheme went against 1970s designs when the company known as 'The Big

Blue' used the colours of its corporate identity for its computers - a colour used by other companies including Harris, Case, CMC and Livingston. Others of the period were bright red, including IBM's 'System/3' and NCR's Document Processors. ICL's computers throughout the 1970s and early 1980s appeared in bright orange. Others in yellow, green and brown show the diversity of colour associated with computers at a time when they were of special significance within the workplace, an unusual object meant to stand out from its surroundings. Colour preferences though, like styling influences, are subject to fashion. In *Design* magazine in 1979 James Woudhuysen reported on Hanover's Technology Fair and commented:

> The colour schemes are that all-too-familiar 'seventies ice-lolly orange and freezing light blue. The exceptions are the East Europeans, who go for a garish yellow, and those more progressive Western companies who have followed ITT's lead and opted for an off-white and milk chocolate brown combination - quiet, unpretentious, and successful whatever the size of the gadget.[22]

However he raised the dangers for design from the overuse of the 'office equipment' approach when he observed that as the major investment in the 1980s was likely to be information products, the design of all other products would be influenced by them, whether or not they contained microchips. There is an interesting distinction that has arisen here in the colours of technologically similar artefacts targeted for use in the home as opposed to an office environment. Throughout the 1970s, for example, almost all hi-fi equipment was finished in a silver colour before converting in the 1980s to a black finish which has become synonymous with the television, video recorder and other domestic entertainment and communication products today. In the office, however, the serious greys and beiges that had always been present to some extent slowly became dominant. As early as 1985, statements were being made about the prevalence of the bland colour scheme as designers tried and failed to change the status quo of computer colour:

> The team liked the 'Star Wars' look and felt the white colour could not be bettered. 'Everyone else does grey and beige; nobody wanted an also ran.'[23]

> The OPD is finished in ICL's traditional two-tone coffee and cream livery - a significant departure from the single-colour designs proposed by Moggridge.[24]

> The colour is not black nor dark grey (which Conran wanted with pale green hinge details) but khaki and beige.[25]

The colour scheme adopted by the IBM PC had a massive influence on later personal computers, just as IBM's 'safe' design approach directed the styling of the whole computer market. It is here that can be found the source of the 'clone' computer. In order to reduce development times and costs the architecture, hardware design and operating system of the IBM PC were left open to use off-the-shelf, non-IBM components. This lack of design control meant competitors could easily produce compatible machines with a fraction of IBM's overheads. First time buyers felt safe buying from a company that

was not likely to go out of business, and their rapid sales lead meant 'it became necessary for IBM's competitors, save Apple, to market PC-compatible machines'[26]. It has also been observed that as a general rule, the dominance of a small number of large companies in any given industry leads to more stability, but less innovation.

Apple, as evidenced by the futuristic wedge shape of the Apple II, originally embraced the science-fiction mentality wholeheartedly. Like many other small companies, Apple was bred of the San Francisco school of anarchic young computer hackers. Their most famous moment, though, marks the point of change. The 1984 Apple Macintosh was heralded by an advert directed by *Bladerunner*'s Ridley Scott, portraying IBM as 'Big Brother' being smashed by the alternative freedom offered by owning an Apple computer. Industry, however, was not impressed[27]. The Macintosh ethos was 'one person, one computer', and the literature targeted families and people working from home showing a friendly computer 'with the quiet look of a kitchen appliance'[28]. Although Apple were quick to realise its failures, a more powerful version aimed at business users could not alter this perception. *In The Cult of Information*, Roszak recounts Steve Jobs' realization that the future of the microcomputer lay not in the home, but in the office and the school - a realization that represented 'a dramatic change of course in the career of the micro computer'[29] Since the first Macintosh, Apple have produced computers which, although beautifully styled and detailed, owe more to the format of the IBM PC than their own past success.

The influence of science fiction in the styling of early computers encouraged the open exploration of radically different forms. New technology promised a great deal - it could do anything, and so could look like anything. Computers in this respect held enormous possibilities, and were recognised as agents of potentially great change. The destiny of mankind was seen to be in the hands of a machine,[30] and they were venerated by some as an alternative religion. Michael Shallis' book *The Silicon Idol* puts forward the view that just as religion accepts that God made man in his own image, society holds technology up as an idol and sees in it a reflection of itself. The technological view holds 'progress' as natural, and as Barthes explained in his essay *Myth Today*, this is exactly how myths operate. Ferranti's naming of its earliest computers after the mythological beings 'Pegasus', 'Mercury', 'Orion' and 'Argos' reflects the way they contained measures of hope and promise as well as fear and uncertainty. The positive aspects of this mindset towards the computer as a construct of fantasy contrasts sharply with the negative associations of today's office computer. A world of bland, repetitive clones, featureless designs with no imagination, presents the workplace as a place of boredom, containing no promise except the promise of more of the same.

The influence of gender politics on the design of office equipment

In the second part of this article, I wish to explore the role of status and gender politics of the workplace in influencing the design of the office computer. Again, there is a marked difference between the consumption of essentially the same technology in the context of domestic and working environments, which has affected the status and particularly the gendering of computers in both localities in the past.[31] In a 1986 paper, two computer historians analysed computer magazine adverts to assess how they reflect the perception and popular understanding of the computer by the public. They found that:

> The campaign strategy of presenting novelty within the context of the familiar means that advertising involving the office uses accepted stereotypes and reinforces conventional views of occupational and sexual roles.[32]

The same phenomenon is clearly seen to occur from the earliest computer manufacturer's brochures. This section examines those catalogues as the representations they are, as the images they contain are in no way documentary evidence of the context in which computing technology has been consumed in the office. Despite this, brochures, like adverts, present a constructed view reflecting the prevailing attitudes of the time in which they were produced, and for this reason they remain a valid subject for analysis.

Significantly, early computers appropriated the semiology of the office desk and typewriter, and the prominent use of these forms framed their operation as a feminine activity. Women were first employed in offices specifically to operate typewriters.[33] In *From the Word Processor to the Micro* Juliet Webster wrote ‘the processing of text was, of course, ‘women’s work’’[34], and in *Inventing Women: Science, Technology and Gender* Gill Kirkup noted that women operated and programmed computers ‘at a time when those activities were considered mundane... tedious and repetitive’[35] (mundane to the extent that one could do one’s knitting while operating Ferranti’s 1952 ‘Manchester Electronic Computer’ **[9]**). Webster’s belief is that this relationship between typewriter and computer defined women’s skills as non-technical and consequently undervalued; technical competence being seen as central to the ‘sexual and class politics of technological work’ as it conferred ‘potential or actual power’.[36]

Throughout the 1970s, the computer continued to appear as little more than a futuristic typewriter, and the images appear similar to the typing pools of the Edwardian office. Consequently, the association with female operatives remains evident. One 1977 brochure stated: ‘Consider the data preparation area of a computer project. This is almost certainly staffed by young, and frequently inexperienced girls.’[37] This is an image that reoccurs - the operator, always female, reduced in significance by identical repetition - a cog in the machine, under schoolroom supervision, slavishly inputting data.

Brochures which do show images of women working alone at computers are more often than not accompanied with text selling the ease of use of the computer; not as a benefit to the operator, but to the management. ‘The

operator requires minimal training'[38] and 'if she can type your letters, she can control our computer'[39] are typical quotes from brochures spanning a decade.

This innate sexism is apparent in computer literature throughout the 1970s and early 1980s. Men are portrayed as executives, managers, scientists or engineers, while women are portrayed as operators and assistants. The subordination of women in the context of the computer and the office is reinforced wherever males and females are shown together **[10]**. Women are portrayed sitting at the computer, carrying out the work while men stand - handing work to the woman, or looking over her shoulder, keeping her under watch. This is in spite of Webster's assertion that in fact women, in relation to office technologies, 'possess much greater competence than their male colleagues and superiors'. Males, she believes, distanced themselves from these technologies 'lest they be seen to be performing a 'low-grade' function'.[40]

Where men are shown using computers on their own, the accompanying text has, as one might expect, a different bias. Here the benefits of the computer are sold explicitly in terms such as 'effective', 'versatile', 'adaptable', 'performance' and 'business efficiency'. Moreover, the uses of control of one kind or another are made clear, whether it is 'production control', 'budget control', 'record control' or 'forecasting'. Images of men working alone on computers do not occur as frequently as images of women working alone, suggesting that although used for control, it was still, somehow, seen as less than 'executive' for men to be seen with an object operated by typing. An article in *Design* magazine in 1981 discussed a new piece of equipment designed specifically for executive use **[11]**. The MT-02 would, through its design 'express sophisticated engineering'[41], and contained advanced electronics which meant the keyboard 'talked' to the monitor via an infra-red transmitter. The styling of the casing, using straight lines, sharp corners and attention to detailing was intended to place the terminal in the same visual category as a finely engineered watch or camera - a very deliberate association with masculine aspects of technology. The author stated:

> Ergonomically optimised for long periods of key bashing by specialist operators, computer terminals aren't usually suited to use by company executives. What's more, rather than building up a desirable space-age corporate commander image, most of them look likely to lower a manager's status to that of the lowly VDU worker with managerial pretensions.[42]

It may be this attitude which is attempting to be countered in the images in manufacturers literature, as whenever a man has a computer on his desk, there are other objects present - most notably telephone, paper, and a pen **[12]**. Males in these images appear to retain their importance, and perhaps their masculinity, by showing that they still need to write. They still *need* the desktop, where females require only the computer.

Around 1975 computer processors became small enough to create true, self-contained computers. Initially, the high cost of such technology restricted the use of such computers to specialist applications in engineering or scientific

research before they appeared for management use at the end of the 1970s. By 1981, desktop processors became known as ‘personal computers’, and were shown being used by female secretaries for the fast growing application of word processing. While the images of computers in use in the context of the office do not cease after the 1970s, there are changes in their representation as status symbols that are indicative of wider social changes. The depiction of women as fulfilling menial roles in the office, and males in positions of authority in manufacturer’s brochures becomes less clear after 1980, and by the mid to late 1980s men and women are shown using the computer together as equal members of a team.

The office computer as a status symbol requires some further definition at this point. For an object to work as a status symbol in a traditionally accepted sense there has to be a recognised economic value which works to give it a symbolic value.[43] However, the economic value of the office computer does not represent a personal investment of any kind, merely an investment by the company, and the computer remains diluted as a status symbol. There is also a distinction that has to be made between the perception of objects as status symbols and role-setting objects. Francis Duffy in *The Changing Workplace* noted that objects seen as status symbols by some are seen by others as necessary to fulfil their expected role in a suitable manner. Depending on the position of the observer, what may appear to be a symbol of an act of exclusion can also be seen as merely an indicator of expected behaviour.

The anthropological theories of emulation described in detail by Mary Douglas and Baron Isherwood (1978) and Daniel Miller (1986) rely on reciprocal differentiation - in which there is a constant move to a new position by a superordinate group, providing a new target to be achieved by a subordinate group. In this context the office computer is problematic. The computer’s ability to function as a role-setting or status symbol has effectively been removed - not only by the elimination of gendering and sexual stereotyping, but also by the fact that any machine can run any software. Today, a male or female using a computer in an office could be either a secretary using a word-processing package or a financial director using accounting software. It is impossible to distinguish between the two using the indicator of the computer, as it now appears as natural in the office as the office desk. This issue has been resolved by many managers in removing the computer to be operated by a secretary. In doing so, the manager regains a superordinate position by reclaiming the real estate of the desktop to display managerial authority - an example of status being achieved through the absence of a previous status symbol.

It would appear computers have long been, and still are used for both work production and managerial control. Unlike today, however, computers used for these different functions, particularly from the mid 1970s to the mid 1980s, were designed and marketed in clearly different ways. Computers meant for data input, or text production stressed the keyboard element of their design over that of the monitor, deliberately aligning themselves with the typewriter **[13]**. Where the function of computers used for ‘low-status’ operations was transparently obvious, designs aimed specifically at executives struggled to

find a stylistic paradigm. The activities of management and control were perhaps less tangible and lacked semantic reference - resulting in confused objects such as the computer as telephone or intercom **[14]**. Such a problematic situation engendered exploration, allowing room for failure as well as success.

Conclusion

It can be seen that both stylistic influences and the gendered consumption of technology have played an important role in the development of the computer. There appears to have been a constant tension or dialectic between the precedents of older machinery and the futuristic, or at least forward looking tendencies of the latest technology - a battle seemingly won by an understandable resistance to change. Despite the personal computer being the focus of constant consumption and replacement at a phenomenal rate, the technical nature of their obsolescence has displaced the stylistic obsolescence present in the vast majority of other consumer goods. This has resulted in a cycle of technologically improved products remaining visually static. A potentially ephemeral, fleeting object has become an enduring desktop embellishment.

Within the field of design history, the emotional relationships people are capable of forming with artefacts have been well documented.[44] They are relationships that are not normally seen as being in any way untoward. It may be the anonymity of information technology, the lack of personality in the personal computer, which led to the representation in popular culture of those involved with them as being socially inept.[45] The increasing intrusion of the PC into everyday life is, however, altering this perception. In an attempt to ‘reduce the anxieties of computer phobia’[46] society has long made ‘a series of cultural assumptions about computers and human bodies’[47]. They have a ‘memory’, catch a ‘virus’, and are ‘cloned’; indeed some even welcome with a smiling face. As we start to enjoy ‘surfing the net’ and ‘driving the information superhighway’, this affinity is being reciprocated. We ‘network’ with colleagues, ‘multi-task’ our workload and even refer to intellectual capacity as ‘bandwidth’.

It may be worth commenting at this point on the recent launch of the Apple iMac **[15]** - apparently a complete change in direction in computer design (the cover of the first iMac brochure stated ‘To everyone who thinks computers are too complicated, too costly or too beige’). A quick look inside this brochure confirms that this computer is clearly targeted at family use - presumably a response to the recent massive increase in the domestic use of Internet technology. While it is indeed possible that such a visually radical product may overcome the inertia and affect the design of other personal computers, this is not the first time that such tactics have been tried and, for various reasons, failed.[48] ‘New’ or suddenly affordable technologies such as flat screen monitors (themselves previously launched as long ago as 1972 by Control Data Corporation) may subtly change the PC’s appearance, but the precedent of the ‘Universal Desktop Office Computer’ has so far proved

difficult to overcome. Just as the different paths of the home and office computer collided with the appearance of the Apple II, we may here be witnessing a point of departure where the two technologies once again take disparate trajectories.

I would posit that unless a new paradigm is accepted as the underlying representation of computing, an alternative semiology found to describe its function(s); or a more innovative, less universal, more exciting influence than an electronic filing cabinet is used as a reference in the styling of the office computer, in a physical sense it will remain an anonymous form.

Notes

Images in published version

Fig. 1 ICT Type 1202 Electronic Computer, 1960
Fig. 2 Torch XXX, 1985
Fig. 3 Compaq Deskpro, 1999
Fig. 4 Sperry-Rand Univac 1107, 1961
Fig. 5 TCV 250 Terminal, 1966
Fig. 6 Modular Workstation, 1980
Fig. 7 IBM System/32, 1975
Fig. 8 IBM PC, 1981
Fig. 9 The Ferranti Manchester Electronic Computer, 1952
Fig. 10 NCR 8100, 1978
Fig. 11 QED MT-02, 1981
Fig. 12 West Hyde Developments Series 400 Data-Screen, 1973
Fig. 13 LogAbax LX 2500 minicomputer, 1977
Fig. 14 ICL OPD (One Per Desk), 1984
Fig. 15 Apple iMac, 1999

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[1] D. L. Moore, Ada, Countess of Lovelace, Byron's Illegitimate Daughter, John Murray, 1977, pg. 44.
[2] Paraphrased from interviews with various office staff during research on personalisation of the workspace in P. Atkinson, 'Work, Rest and Play', in Proceedings of the 3rd International Conference of the European Academy of Design, Design Cultures, Sheffield, March-April 1999, Vol. 1, pp 26-56.
[3] D. Gelernter, The Aesthetics of Computing, Weidenfeld & Nicholson, 1998, pg. 109.
[4] The term 'clone' in the context of computers referred originally to computers having operating system compatibility only. Although there is no reason for this technological congruence to carry over into visual congruence as it has, it may be understandable in marketing terms in increasing the chance of acceptance of a cheaper, possibly inferior product. Many corporations today, however, produce personal computers of at least the same quality as 'original' IBM products, yet the sterility of design continues.
[5] R. Cringely in The Money Programme, BBC, 23 March 1997.
[6] See, for example, J. Yates, 'The Structuring of Early Computer Use in Life Insurance', Journal of Design History, Vol. 12, No. 1, 1999, pp. 5-24, in which the argument is put forward that IBM's success in their early computers being accepted by insurance companies was due at least in part by the continuity they offered to their previous tabulating machinery.
[7] For a detailed exploration of the development of the home computer see L. Haddon, 'The Home Computer: the making of a consumer electronic', Science as Culture, Vol. 2, 1988, pp 7-51.
[8] The National Archive for the History of Computing was established in 1987 at the Centre for the History of Science, Technology and Medicine of the University of Manchester to preserve rapidly disappearing artefacts and documents relating to the development of the information age. The archive consists of various collections documenting in particular the history of computing in Britain, including Manchester University's association with the development of the first stored program computer and the complete archives of ICL and Ferranti Ltd.. The Trade Catalogue and Machine Literature Collection used as the focus for this research consists of approximately 5,000 brochures, mostly from British, European and American manufacturers and covering production from the late 1940s onwards.
[9] Although I do not claim that there is no detailed difference between any of the personal computers created by a range of companies between 1985 and today, the fact remains that the basic format and arrangement of components is the same. Small differences do exist between the current products of different companies, and even between one company's range of computers positioned at different price points, but these are so small as to be negligible, and in no way significant enough to act carry any kind of signifying function in terms of identity or status.
[10] P. Atkinson, 'Computer Memories: The History of Computer Form', History and Technology, Vol. 15, Nos. 1/2, 1998, pp. 1-32.

[11] G. Sowden, 'Are you thinking comfortably?',. Design, April 1983, pg. 48.
[12] J. Woudhuysen, 'Complex consoles are coming', Design, January 1980, pg. 34.
[13] C. Mc Carty, Mario Bellini-Designer: MoMA exhibition catalogue, MoMA New York, 1987 pg. 21.
[14] B. Busch in Erlhoff (Ed), Designed in Germany, Prestel-Verlay, 1990, pg. 147.
[15] J. Woudhuysen, Op. Cit. pg. 35.
[16] R. Green, 'File under Future', Design, May 1982, pg. 47.
[17] P. Palton, 'The Magic Box', Connoisseur, January 1986, pg. 55.
[18] Ibid., pp. 55,56.
[19] T. Ostler, 'Sci-Fi in the City', Design, March 1985, pg. 30.
[20] P. Palton, Op. Cit. pg. 56.
[21] An example of the social construction of technology as a driving force of design development - a process outlined most clearly in W. Bijker, T. Pinch & T.Hughes (Ed) The Social Structure of Technological Systems, MIT Press, 1985.
[22] J. Woudhuysen, 'Things to Come' Design, July 1979, pg. 42.
[23] S. Braidwood, 'Torch: a tin box company no longer', Design, November 1985, pg. 48.
[24] T. Bentley, 'Laid on the Line', Design, March 1985, pg. 34.
[25] A. Pipes, 'Designing the Terminal', Design, February 1985, pg. 54.
[26] R. Rosenberg, The social impact of computers, Academic Press, 1992, pg. 257.
[27] See S. Levy's Insanely Great, Penguin, 1994, and J. Scully's Odyssey: Pepsi to Apple, HarperCollins, 1988, for reports of the business world's reaction to the Apple Macintosh.
[28] P. Palton, Op. Cit. pg. 57.
[29] T. Roszak, The Cult of Information, Paladin, 1986, pg. 179.
[30] See D. Lyon, 'The roots of the information society idea' in Heap, et. al. (Ed) Information Technology and Society, Sage, 1995, pp. 54-73.
[31] See, for example, G. Kirkup, 'The Social Construction of Computers: Hammers or Harpsichords?' in Kirkup & Keller (Ed.) Inventing Women: Science, Technology and Gender, Open University Polity Press, 1992 and L. Haddon, 'Explaining ICT consumption: The case of the home computer' in R. Silverstone and E. Hirsch (Ed) Consuming Technologies: Media and Information in Domestic Spaces, Routledge, 1992 for accounts of the gendering of computing technology in the office (Kirkup) and the home (Haddon).
[32] Aspray & Beaver, 'Marketing the Monster: Advertising Computer Technology'. Annals of the History of Computing, Vol. 8, No. 2, 1986, pg. 138.
[33] V. Guiliano in Forester (Ed) The Information Technology Revolution, Oxford, 1985, pg. 299.
[34] J. Webster 'From the Word Processor to the Micro: Gender Issues in the Development of Information Technology in the Office' in Green, Owen & Pain (Ed) Gendered by Design?, Taylor & Francis, 1993, pg. 113.
[35] G. Kirkup, Op. Cit. pg. 269.
[36] J. Webster, Op. Cit. pg. 118.
[37] Kenrick and Jefferson 'Keyboard Training' brochure, 1977.
[38] Control Data CRT Display Terminal brochure, 1972.
[39] Lomac Adam computer brochure, 1976.
[40] J. Webster, Op. Cit. pg. 119.
[41] T. Lindsay, 'Small screen, big style', Design, May 1981, pp. 43.
[42] Ibid., pg. 43.
[43] See Part III of G. McCracken, Culture and Consumption, Indiana University Press, 1988, for an explanation of objects as markers of status and consequent superordinate/subordinate relations.
[44] See, for example, M. Csikszentmihalyi & E. Rochberg-Halton, The Meaning of Things, Cambridge University Press, 1981.
[45] D. Lupton 'The Embodied Computer/User' in Featherstone & Burrows (Ed.) Cyberspace/Cyberbodies/Cyberpunk, Sage, 1995, pg. 102.
[46] Ibid., pg. 106.
[47] Ibid., pg. 99.
[48] As mentioned in the introduction, a series of one-off or unique designs were found in the sample collected for this research, but all had disappeared without trace. A similar situation to the present one (at the hands of the same individual associated with the iMac) occurred in the 1980s when Steve Jobs launched the NeXt computer - a black, sinister cube - as a competitor to both Apple and IBM.