



University
of Glasgow

Currall, J.E.P. and Moss, M.S. and Stuart, S.A.J. (2008) Authenticity: a red herring? *Journal of Applied Logic* 6(4):pp. 534-544.

<http://eprints.gla.ac.uk/4658/>

30th October 2008

Authenticity: a red herring?

J. E. P. Currall, M. S. Moss and S. A. J. Stuart

Humanities Advanced Technology and Information Institute, 11 University Gardens, University of Glasgow, Glasgow G12 8QQ, United Kingdom

Abstract

Authenticity is a difficult and taxing notion in both the digital and the analogue world. It is a retrospective and by implication dynamic notion, a reaction to whether or not we are dealing with the genuine article, that an object is what it purports to be at a moment in time and its content can be validated using available technology. It is not an end in itself like a fresh herring, but a red herring which, because of the pungent smell of the smokehouse, can put the hounds off the scent. Moreover it is not an absolute: an object that might appear perfectly authentic from one perspective may be considered to lack sufficient tokens of authenticity in another, and may later from both viewpoints be considered invalid.

Content change may be captured in technologies, but does it necessarily follow that the intellectual content remains the same? Revolutions in technology may change the ‘container’ (for example a card catalogue becomes a database), but how do such migrations affect content and the procedures and practices that surround it? Is entering entities in a database the same as filling in cards? Distribution channels have always influenced structure and form without necessarily changing intellectual content or associated practice. In addressing such issues we warn against the ever present danger of a collapse into technological determinism with an accompanying utopian optimism [12].

We propose that discussion of identity needs to shift away from discussion of technologies for preserving information towards characterisation of the persistent intellectual content. In the migration to the digital we are especially concerned with four separate but related issues of identity from this perspective:

- *functionally identical replicas*
- *superficially identical replicas*
- *similar objects*
- *earlier/later versions*

We conclude that identity is not a technical issue: notions of identity, like authenticity, are dynamic and have to deal with the non-transitive relations in stages of

documents and objects. We are convinced that only by adopting such a stance can any progress be made in the sterile debate about digital preservation which logically must be downstream from the resolution of notions of authenticity that themselves are reactive to issues of intellectual content and available technology that following Aristotle we characterise as *techné*.

Key words:

PACS:

1 Introduction

Information objects serve a variety of purposes: as vehicles of communication, to seal agreements or contracts, for entertainment, persuasion, education and as repositories of artistic or intellectual endeavour. As a result they can be expected to have different characteristics. Any meaningful discussion of such objects therefore requires agreement as to which type of object is being considered so that the notion of identity can be thoroughly explored. The notion of identity in this context is important in relation to the sameness of such objects in time or place and also across the panoply of relationships that such objects can have to one another. This paper, like most other information objects, has a range of relationships to other papers, quoting from some, referring to others, agreeing with one, disagreeing with another and finally building on an earlier paper in which we first discussed the subject [1].

In trying to shed light on this area, we must consider why identity is important in an intellectual sense. Then we need to separate this quest for identity from a simplistic consideration of the (mainly technical) means by which we can determine objectively whether or not two information objects are the same. We soon discover that this task is by no means straightforward, with notions of version, rendition and performance all nuancing identity.¹ However, none of these notions are new in the digital world; our starting point must be to consider how identity is understood in the analogue world and then consider how migration to a digital world alters the way that we deal with the identity of information objects.

¹ Between us we produced no fewer than 19 versions of this paper before we arrived at the version that you are reading.

2 Content

The notion of content that we consider an object, text or event to contain or convey is neither singular nor immutable; at least, this is the conception following a writer such as Barthes [3]. The polysemy, or plurality of meaning, advocated by Barthes is a conception with which we have some sympathy, but which must be balanced by an exploration of the intention of the author or creator which may or may not have implications in any future retrospective discussion of authenticity. We can agree, for example that ‘The Haywain’ was painted by Constable, but we do not need to know what his intentions were in creating the work in order to appreciate the painting; whereas if we are beneficiaries we are very keen to learn what Aunt Gertrude intended when she left us her bantam cocks. On the other hand a third party reading Aunt Gertrude’s will may have no interest in such intentionality and only be interested in the fact that by committing her soul to God with the protection of the Blessed Virgin Mary and all the saints, she had Catholic tendencies.

As these trivial examples suggest, ‘content’ can refer to the meaning that something expresses, or to its information content, or to the constituents of an individual’s experience at any given moment: for example, marvelling at ‘The Haywain’ or being left bantam cocks. In the latter case the content is singular and fixed, but it is also private, subjective and, interestingly, immune from error through misidentification [34,10]. I cannot be wrong about who it is who is having the experience or, for that matter, what I believe to be the content of that experience, and what I believe to be the content of my experience is of little public concern unless my content is such that I am moved to act on it in a bizarre or threatening manner. It is with content as meaning and content as information that we are concerned in the context of objects that are external though, of course, they cannot but relate to the individual’s experience for things have content in virtue of their having a value of some sort for the experiencer or reader; ‘The Haywain’ would have no value if no one had ever seen it.

In his analysis of meaning or content Frege [13] distinguishes between the two ways in which an expression can have significance. The first is its sense, the way in which the term or text refers to the object; also known as its ‘mode of presentation’, which is to say, the thought that it expresses. The second is its reference, that is, the identifier, proper name or term used to refer to the object. So, if we take, for example, *Mona Lisa*, we have a term that refers, picks out, or identifies a particular work of art, but we also know that its a whole lot more than that. We might know, for example, that it refers to a painting by Leonardo Da Vinci, that it was painted during the period now known as the Italian renaissance, that it has the alternative title: “La Gioconda (La Joconde)”, or even that it has the title “Portrait of Lisa Gherardini, wife of

Francesco del Giocondo”, where it hangs in the Musée du Louvre in Paris, and so on. The name, the text or term, has many ways in which it refers to the object and not just that it means *Mona Lisa* and nothing more. It is in Frege’s groundbreaking work that we can begin to see Barthes’ polysemy take shape. As we have suggested, we do not need to know any of this reference detail to appreciate the painting; a simple catalogue reference can suffice.

On the River Clyde ‘Ship No. 534 at the John Brown yard’ is just as an evocative reference as the Cunard liner’s name *Queen Mary*. Such semantic reference conveys many more embedded concepts of identity than any amount of technical detail, the size and weight of the ‘Mona Lisa’ or the *Queen Mary*. In much the same way the technical, as opposed to semantic, attributes of digital objects may provide clues to provenance and any changes that may have occurred, but little else. However, we would not wish to reject the latter in favour of the former; they both represent essential characteristics in defining the identity of the objects to which they refer. Setting the technical and the semantic up in a binary opposition of this kind can be what forms the greatest obstacle to resolving the debates within the digital environment; one way out of this morass would be to reconsider them within an Aristotelian framework of *techné*, *prāxis*, and *epistēmê*, where each is employed alongside the other in an attempt to discover truth.

Aristotle [2] describes *techné* as the disposition by which something is brought about using true-reasoning from the appropriate principles which have been acquired through experience. *Techné* is an art or technical skill: “the productive state that is truly reasoned, while its contrary non-art [*atechnia*] is a productive state that is falsely reasoned” [2, 1140a1-23]. Thus, all activity, whether science or humanity is, ideally, both rational and productive. *Prāxis*, on the other hand, is to do with purposive conduct, and most particularly with the exercise of *phronesis* or practical wisdom and the search for truth (virtue) and falsity (vice) in relation to correct desire and, thus, (moral) action. Both *techné* and *prāxis* can be distinguished from *epistēmê* which refers to the theoretical underpinning of scientific enquiry where “the object of scientific knowledge is of necessity” [2, 113918-36], that is, (controversially for our age and reason) there are no conditions under which it could be otherwise. Aristotle’s favoured examples are taken from geometry, but there are many and they also include medical and general science. So, if *epistēmê* directs itself towards the discovery of truth, *techné* to its production, and *prāxis* to its employment, we can begin to see a way in which the technical and semantic should function together to be truth-preserving, if not truth-determining. In this way we can begin to see how Heidegger and Foucault’s use of *techné* as *alêtheuein*, or truth-framing, takes shape.

If we are to make progress we need, perhaps, to start looking in the direction of such mechanisms for what we could call ‘intellectual’ identity. What differences

are ‘significant’ in an intellectual sense as opposed to a purely technical sense? This takes us nearer Heidegger and Foucault’s use of the word technology or *techné* to mean a mode of *alêtheuein*, by ‘enframing’; ‘It reveals whatever does not bring itself forth and does not yet lie here before us, whatever can look and turn out now one way and now another’ [20]. Foucault argues that every technology implies a domain of knowledge and truth, and as a result technology and power become inseparable. For McLuhan the medium itself becomes the message. We may not wish to go so far, but we will explore the complex relationship between technology and *epistêmê* in the digital world avoiding the binary opposition between the technical and the semantic where, as we have suggested, much of the difficulty lies. Kuhn coined the concept of a ‘paradigm shift’, much cited in the context of the information revolution [21], but ‘only rarely does Kuhn recognise the crucial role a new piece of apparatus may play as the *prelude*’ to such an event [18, pg. 46].

Such an approach refuses to privilege the technical because it is easy and ‘objective’ and appears to avoid difficult questions, but instead embraces the semantic and intellectual as well. In both the analogue and digital worlds, different technologies can reveal different information from the same carrier.² In a digital environment, if we take a technical only view, it becomes very difficult to deal with the migration of digital objects to different systems and technologies in any reliable way, except to make ever more unsupportable assertions about technical processes, such as increasing the complexity of passwords, adoption of digital signatures, checksums, and so forth [16, pg. 50] [39, pg. 24] and leads to the approach of Gladney who states that ‘Where information is cryptographically packaged together with its own provenance assertion, and this evidence shows itself to be intact, a consumer can be confident that the information is authentic’ [15]. Let us take an example of where this might fail - if a Microsoft Word file has been read into Open Office and saved as an OpenXML file, is it the same abstract object? There are a number of issues even in this rather trivial example:

- there may be features of the layout that are not faithfully migrated and which are an important part of the intellectual identity of the object; for example in George Herbert’s poem ‘Easter Wings’ of 1633,³ layout is arguably as important as the words used, or in the case of the Mona Lisa the size, shape and texture are critical and can hardly be replicated on a biscuit tin let alone on screen.

² Many of us, as children, will have experimented with ‘hidden writing’ using, for instance, onion juice. More topically, developments in DNA profiling (DNA LCN or DNA low copy number) allow evidence to be extracted from materials which previously were not thought to have sufficient cells for this. [14]

³ A representation of this poem may be found at: <http://www.luminarium.org/sevenlit/herbert/wings.htm>

- there may be behaviours coded in macros that, under the translation, work quite differently (or not at all), in the same way as brush strokes or the texture of parchment vanish or are transformed in digital renditions.
- the file may not be completely self contained in either environment and rely on system settings that do not form part of the transformation or an explicit part of the file in either case. The conversion process is analogous to tearing a physical object from its intended setting, for example the removal of the ‘Elgin Marbles’ from the Parthenon.

3 Binding and its Importance

In the analogue, the identity of any documentary object and its place in a collection is warranted by attributes that can be characterised as bindings that will vary depending on the ‘value’ which is attributed to it by the responsible individual or organisation. Such bindings are the subject of ‘diplomatics’,

...the study of the *Wesen* [being] and *Werden* [becoming] of documentation, the analysis of genesis, inner constitution and transmission of documents, and of their relationship with the facts represented in them and with their creators. [9, pg. 7]⁴

From a diplomatic perspective, the ‘form of a document is of course both physical [technical] and intellectual’ [9, pg. 15]. Originally confined to juridical documents with necessarily unambiguous form and structure, ‘diplomatics’ has come to have a much wider application which still implies a set of all embracing rules. For this reason we prefer to use the less prescriptive term ‘binding’. In the analogue, bindings were obvious manifestations: the letters from a lover bound together with a garter, a bundle of receipts neatly docketed and tied with lawyer’s tape, a label attached to a museum exhibit, an album of photographs or a royal charter with the great seal attached by silken cord. All these disparate examples embody intentions and implicit or explicit rules and relationships that can be described as ‘grammar’ in much the same way as the syntax employed in the resource description framework (RDF) is described. The process of attaching a royal seal or a label to a museum object is explicit and surrounded by formal process, whereas tying a lover’s letter in a bundle to define their physical relationship may be equally dignified but is implicit. If the seal or label becomes detached or the garter is not retied then the value derived from the binding is lost.

⁴ Duranti is quoting Giorgio Cencetti, “La Preparazione dell’Archivista” in *Antologia di Scritti Archivistici*, ed. Romualdo Giuffrida (Roma: Ministero per i beni culturali e ambientali. Pubblicazioni degli Archivi di Stato, 1985), p. 285.

The grammar of binding in the analogue is complex and represents centuries of accumulated experience and technologies. A letter has a form and process that dates back hundreds of years, which like all other information objects is always viewed in the present through the lens of available technology: the quill pen, the camera, the typewriter, the PC and so on [24]. We were taught at school or in the Brownies how a letter should be laid out, with at the top the addresses of the sender and recipient along with the date, appropriate salutation (Dear Sir, My Love and so on), valediction (I remain your Lordship's humble servant, yours sincerely and so on), and the name and office, where appropriate, of the writer. If you are of our sort of generation, you learned to do this with a pen, even a dip pen, and ink on a piece of paper and woe betide you if you made splodges. From at least the seventeenth century there were guidebooks not just about the physical activity of writing itself and the layout of letters, but also about the appropriate style of language and vocabulary to be used in different contexts. [26]

Letters were finally authenticated with the sender's signature - a signature which can take a variety of forms depending on the nature of the contents, and is extremely difficult to forge. Where a letter was written out by a scribe, the author would conventionally endorse a signature with the initials mp - that stands for the Latin tag '*manu propria*' - signed in his own hand. If the writer did not sign it then the scribe would write pp (standing for the Latin tag *per procurationem* - through the agency of) before his/her signature. If the author could not write then a mark was made that was attested by the scribe. Where a letter or document required greater validation, signatures could be supported by seals or by witnesses. Letters were often closed with the wax seal of the sender or the sender's office providing further validation and security that after the introduction of postal services was supported externally by franking to indicate the place and time of despatch. The evolution of pre-gummed envelopes in the mid-nineteenth century obviated the need for sealing. To provide even stronger binding, important documents that have a legal function (a will or a contract or a land transaction for example) can be registered externally with an individual or organisation with juridical authority, such as a notary or the courts themselves, in which case they were expected to respect particular forms that became the focus of 'diplomatic' study. Such registration was often made explicit in the text of the document or through endorsements such as notorial marks or an indication that duty had been paid for registration.

4 Migration to the Digital

With the migration to the digital, several things have happened that combine to disturb this relationship which depended on an equilibrium between

content and context built up in the analogue over thousands of years, recognising the ‘profound significance of communicative stability’⁵. This context is culturally specific, reflecting different epistemologies and circumstances. We will suggest that this disruption may have significant consequences for social interactions. Financial information systems were amongst the earliest to be migrated, a process that predated the introduction of electronic computers. One consequence was that instead of transactions being registered in a hierarchy of records, that built for example the balance sheet and profit and loss account incrementally, they were registered as individual entities that could be linked to others through complex references that the software could interpret to generate different aggregations for different reporting purposes. Although they were still bound into a collection - essential for audit purposes, the collection itself lacked the formal and familiar hierarchical structures of the analogue and just subsisted in a database of individual transactions, in other words the ‘functional equivalence’ of the analogue [8, pg. 80]. It is simple to attribute this lack of structure to technical convenience, but a more convincing explanation may be that the system built on the ideas of Luca Pacioli (1445-1517) lacked his overall theoretical constructs that extended far beyond accounting to embrace the relationship of ‘proportion’ to religion, medicine, law, architecture, grammar, printing, sculpture, music and all the liberal arts. Remarkably the terms that Pacioli conceived in his *Divina Proportione* are still used by the film industry to this day. [38, pg. 60]

When word processing became commonplace with the introduction of the personal computer in the 1980s, other types of documentation, particularly correspondence ceased to observe the form and structure of the analogue, and their relationships often ceased to be made explicit within their form. It was assumed incorrectly that the headers and footers of an e-mail provided externally in the manner of a letterhead would be sufficient identification, even though as most of us know in the analogue many letters are written on the notepaper of other people or organisations. We have all scribbled notes on hotel letterheads and used quite legitimately other people’s e-mail accounts or used our business accounts for private transactions. As a result the roles of senders and recipients became confused to any other than the parties to a transaction and even to them might not be immediately obvious. In the analogue, ‘Hi Michael’ implies a degree of informality that does not appear to be the case of, for example, e-mail where perfect strangers often adopt this form of salutation. It would be naïve to suggest that such a change is entirely a reflection of the migration to the digital. Styles of writing reflect social behaviour and are dynamic. The use of the valediction ‘I remain your obedient servant’ had become archaic long before the introduction of the PC. What the migration to the digital appears to have done is to accelerate the process. The

⁵ As emphasised by David Levy ‘The ability to keep talk fixed, to guarantee its repeatability, has become an essential cornerstone of human social organisations’ [23]

recent emergence of social networks, exposed to search engines with global reach, like financial systems, raze epistemic hierarchies, and in turn reverse McLuhan's [25, pg. 46] claim that 'it is the accumulation of group pressures and irritations that prompt invention and innovation as counter-irritants'. Innovation now appears to be exaptive, rather than an outcome of interactions within epistemic communities, suggesting a disjunction. Companies like Amazon.com say to us "Here it is, do with it as you please, but we will watch you and give you extensions and other products that we judge match your expectations". It is here that technodeterminism is clearly at work.

The flattening of epistemic hierarchies is not just a consequence of the interactions within social networks, but of the way in which information is both aggregated and discovered. Digital objects that are not captured as part of a formal process of audit (pretty much anything other than records of financial transactions or those required to satisfy regulation) have come to be only loosely bound, if at all, into a collection even in an organisational context. They are often held in so-called 'files' on PCs or in individuals' email boxes with no indication as to how they might relate to other documents to form a collection. Together they can be described as a collection, but this would be a very contingent use of the term that would cover the web pages that I happen to have open at any one time in a browser. Alarminglly this state of affairs can apply to important documents, such as the emails of the Prime Minister, [27] as well as to those of private individuals. Digital objects in effect become stand alone objects in an intellectual as well as a technical sense, randomly stored by process and technology. When information is posted to social networks, this has even more profound implications for the notion of a bounded collection and the bindings that attach the information to an individual. The collection that is Facebook is much more porous and fluid than an analogue equivalent with very loose binding processes. It can easily be taken out of context or attributed through comment and links to other perhaps inappropriate contexts.

Taken together all these changes in practice consequent of an unthinking migration to the digital raise fundamental questions about the nature of individual identity in the digital world where virtual devils and angels abound in an almost medieval cosmology. This of necessity has important consequences when we seek to reference, authenticate or validate information in the digital environment. This 'digital marination' troubles Tara Brabazon [5, pg. 14], 'Google has flattened expertise, creating confusion between finding information and possessing the literacy to evaluate and judge information ... My fear is not of wiki or Google. My concern is that in the confusion between finding information and building knowledge, we lose not only the analogue objects and artefacts, but analogue ways of thinking ... We have lost the capacity to value the particular, the unique, the ephemeral and the transitory'. In other words individual identity not just of objects, but the users of objects, themselves, are being submerged in an undifferentiated morass.

5 The Abstract Object and the Stored Bit Pattern

If we consider a digital ‘object’, what we are generally interested in is the picture, the document, the song, the film, and so on, all of which we can call abiding verities. We only become interested in the actual bit pattern when there are questions around whether or not the item is what was seen or heard before, deposited, exchanged between parties, and so on - in other words doubts about authenticity. In many circumstances we are trying to get technology to provide an answer to a question that is not philosophically a technological question, at least not in the strict sense of the word [31, pg. 70]. The reason that we do this is because dates and times on files, number of bytes, and other data that is generated ‘on the fly’ are very easy to find out and compare and provide what appear to be straight-forward, unequivocal ‘black and white’ answers to what are complex issues that have troubled jurists at least since the sixteenth century when the Donations of Constantine were discovered to be a forgery [33, chapter IV]. We make the assumption that if the bits are the same then the identity is the same and that all changes to the bits constitute changes of substance. Neither of these assumptions is wholly reliable, in exactly the same way that the shape and form of a physical document is not an entirely reliable guide to either veracity or forgery.

We argued in our earlier article, ‘Digital Identity Matters’, [1] that when the same bit pattern is sent through the rendering mechanisms on two computers, there are many ways in which the perceived result may be different - thus making the first assumption unreliable. As a relatively trivial but common example of the second case, some copying processes change the date and time on a file (information that is stored in the file itself), and by so doing change the bit pattern stored. Many software environments treat date and time stamps (date created, date last modified, date accessed and date printed) in a far from robust way, making reliance on the stored bit pattern as a surrogate for identity problematic. However, this does not mean they do not have reference. We can observe the same phenomena in legal documents in the physical world where the date and time is often the termination or filing of a process rather than the date of its origination. For example, a will may be drawn up and witnessed long before death and only registered with the appropriate authorities sometime after death.

Does changing the file name of a digital object, without making any changes to the ‘intellectual’ content change its identity? This question is deceptive. In the analogue world changing the title of an object can have profound consequences. Suppose the portrait of the Mona Lisa was in fact that of Thelma Arbuthnot or using a digital analogy an arbitrary allocation such as WPM\$5467, or that Shakespeare’s play Hamlet was really called ‘Rosencrantz and Guildenstern are dead’. This takes us into the deep waters of the relationship of naming

conventions to objects in the analogue which have been explored by Barthes [4] and Sontag [37] amongst others in relation to images, and which we will develop in the digital context.

6 Rendition

In ‘Digital Identity Matters’ [1, pg. 367] we indicated that the language of types and tokens is common within the discourse of aesthetics [40] and it is from this domain that we developed our discussion.

“The type / token distinction has been utilised in order to distinguish art forms with ‘unique’ objects, for example, sculpture and painting, from those where there is no single unique object, for example, a play or a piece of music that will have a multiplicity of performances. When we speak of Raoul Dufy’s Trouville we refer to his 1907 composition using oil on canvas and not to any of the many reproductions of the work. It is unique, even if it does change over time due to deterioration of the paint or restoration, the type from which the tokens or reproductions are derived. But the situation is not always this straightforward. To begin with, types and tokens are slippery characters that are not forever fixed as either type or token; thus a token can become a type, and we might say of Nina Simone’s rendition of Feeling Good that it is the definitive version and that any other rendition is a token of that type. Secondly, we are not always dealing with physically unique objects, Schubert’s Unfinished Symphony is not a physical object, though we may want to argue that the original score is a physical manifestation of it; and finally, we can see that the usual mental / physical divisions that we use to categorise ‘objects’ are not always clearly appropriate when we talk of performances or a digital image of something, perhaps, Lara Croft, in virtual space.”⁶

The experience that we have of any digital object is not a direct sensory experience of the object itself, but a performance choreographed by a combination of hardware and software, fine-tuned by the settings on the computer in question and the idiosyncrasies of computer, monitor and so forth. That being the case, what each of us experiences in relation to a particular bit pattern will probably be different, but does that mean that the experience of one of us is ‘authentic’ whilst the others are being subjected to an inferior imitation? If this were the case, it would make the sharing of digital objects very problematic indeed and the presentation of any digital object as evidence in court impossible. Manifestly, people share digital objects frequently and, for

⁶ a description of this computer game character can be found at http://en.wikipedia.org/wiki/Lara_Croft

much of the time, do not suffer from this problem, even though the email that is sent by one of us to the others is ‘experienced’ differently in the different computing environments that we all use. Clearly what is important to us is the ‘content’ of the digital object, be that an email, a draft of this paper, a music track or a digital photograph.

In the analogue paper world, we developed ‘filters’ of varying sophistication, depending on the context, to determine what was important in relation to authenticity and what was not. The fact that we are able to accept a difference in the ‘performance’ of digital objects on different systems suggests that we have begun to develop ‘filters’ for digital information objects. A major problem is that, for most of us, the grammar of these filters is not well developed and this produces an opportunity for fraudsters who exploit the fact that, in the on-line world, they can draw together elements from the web sites of financial institutions and combine them with material of their own to produce digital ‘performances’ that appear to be authentic requests for security information, but are in fact ‘phishing’ scams, a topic that we will return to later.⁷ Such filtering is beyond the boundary of ‘diplomatic’ and needs to be considered within the framework of the interpretation of the ‘bindings’ that together enable ‘truth enframing’.

A further issue is that many performances in the digital world are based on dynamic assembly of information in response to the individual request. The Wikipedia article referred to in the previous paragraph will probably be different from that which is available to us at the time of writing by the time that this article appears in print. It will probably be different again if you look at it in another three months time. A more dynamic example of this scenario exists when a Google search is carried out, where the results returned change from minute to minute and so an instruction to ‘carry out a Google⁸ search for the words “digital performance” and then follow the link in the third item returned’ is meaningless as there is little fixity in the object that is the result of the search. This example, if repeated across searches via search engines, databases and on-line forms, requires us to separate the identity of the query from the identity of the result returned; the former may have a fixity, whilst the latter may be unique to each search.

⁷ for a more detailed description of phishing, see for instance the Wikipedia article at <http://www.wikipedia.com/phishing/>

⁸ <http://www.google.com/>

7 Divergence of Versions

One of the important advantages of digital representation over analogue is the ease with which objects can be changed. However, it also presents a considerable challenge to the notion of identity that we use to determine and re-identify an object over time and through change, particularly if we try to apply analogue epistemology to the digital [16, pp. 49 & 98-9]. This isn't necessarily an issue of a plurality of meanings that we have already referred to, though it is true that some changes can produce devastating alterations in meaning: for example, the omission of 'not' in Terence's phrase "Nothing is said that has not been said before.", or the mistranscription of 'l' in 'life' to an 'f' in "Nothing in life is promised except death.", which would surely give rise to a population shift in Scotland. Perhaps we should ask if any and every change that an object undergoes represents an identity change and, if so, how do we effectively link together chains of modification and amendment into a meta-level identity which permits the relationships to be characterised in a such a way that we can trace a document's progress as being D at time 1 (D at T^1) and D at time n (D at T^n)? If we remain for a moment in the analogue world and consider the changes that exist between the early and later versions of *The Waste Land*⁹, it would be hard to identify them as the same object, unless under some less than rigorous, adaptive notion of identity.¹⁰ Perhaps a notion of an intransitive relation, of the kind suggested by Russell [32], in which x stands in relation R to y , y stands in relation R to z , but the relation xRz is excluded, that is, $(xRy \ \& \ yRz) \rightarrow \neg xRz$ might do, though it is very strong and a weaker version, where the relation xRz is not explicitly excluded and $(xRy \ \& \ yRz) \rightarrow \neg xRz$ is not implied, is more likely to be useful in this and the class of similar problems we are likely to encounter.

The notions of identity, equivalence, transitivity and intransitivity are all important in a digital context because bit patterns may be rendered in any number of ways without it being clear that the same bit pattern persists, or that it is a different pattern of bits that is now being made to appear as a previous but quite distinct pattern once did. Their representation by itself is insufficient to establish their identity or discernibility. Once again we find ourselves concerned with how the identity conditions for one object with another can fail to be met at the level of the bit pattern, whilst remaining to be met at the level of representation or appearance. [1]

⁹ A rendition of this poem may be found at: <http://www.bartleby.com/201/1.html>

¹⁰ One of the tragedies of the digital representation and facility for change is the loss of a substantial record of amendments and revisions of the sort we have, for example, in Pound's work with Eliot all the way through the writing of *The Waste Land*.

With a domain of bit patterns D , which can be mapped using the action of the technology b , onto a range of representations R , we get the statement: $b : D \rightarrow R$. If we now define equivalence as $x \sim x'$ iff $b(x) = b(x')$, then $x' \approx x$, where $x, x' \in D$ must also be equivalent and thus both symmetric and transitive.

However, when bit pattern x is acted upon to produce bx , we have y and not x . We can express this as $x \rightarrow bx = y$, and having gone through this transformation we now find that to regain x by b^{-1} would be impossible since b^{-1} no longer exists. There is no way to go back to the previous state of x from where we are now. The relationship is asymmetrical and intransitive, and it would be clearly false to say of y that it is equivalent to x , for there are no conditions under which we could effect y in any way so as to produce x , but also, under our definition of equivalence, x and y would have to be members of the same domain, and they are not.

There is no inverse of b . If there were some function c which maps R to D such that $c(b(x)) \sim x$, it would *not* imply that $c(b(x)) = x$. This leaves us with a very curious state of affairs because c is not an inverse of b ; it cannot take us back to the bit pattern x . Which is to say that, as long as the set of equivalent bit patterns has more than one member, the inverse function of b will not be unique; the best you can do is find a function c which maps R to D to give you something that is equivalent to the original x , though not – except by some extraordinary chance – identical to it.

If we introduce the set (domain) of stylesheets (S), we can begin to see the complexity of the situation a little more clearly. If $b : D, S \rightarrow R$,¹¹ then $b(x, s_1) \rightarrow r_1 \in R$, $b(x, s_2) \rightarrow r_2 \in R$, and so on. Which, even if it did entail that $x \sim x'$ iff $b(x, s_1) = b(x', s_1)$ would not necessarily entail that $x \sim x'$ is $b(x, s_2) = b(x', s_2)$.

This state of affairs is not simply of academic interest. If digital objects lack fixity in addition to being easily tampered with, how can they be used as transactional evidence and what becomes of the bindings and associate filters familiar in the analogue world?

8 Technical Transformations

Technical processes are applied to digital bit patterns to transform them into different ones. Our interest is in (i) those that operate at a technical level on the bit patterns and are agnostic about what sort of object it is, and (ii) those

¹¹ This would more often be written as $b : D \otimes S \rightarrow R$.

that work on the intellectual content of the object. So, there are two sorts of transformations to consider:

- one-way, non-reversible transformations that produce a pseudo-identity which is related in a defined way to the original bit pattern;
- two-way, reversible transformations that produce an object that, following the reverse transformation, restore the original bit pattern.

8.1 One-way transformations

These are used to produce a ‘simplified’ object that can be used for some purposes in place of the original. An example of a technical transformation is a checksum or a hash. These can be used as a mechanism to detect technical difference between bit patterns, and have the advantage of being very quick to compute and use, but they are surrogates for one or more aspects of identity and can be used to verify technical identity without engaging with the intellectual identity of the object. An example is that law enforcement agencies and employers can use lists of hashes of known child pornography objects to screen systems rapidly in order to determine whether or not such objects are present. This does not involve a human agent being required to view such material at the screening stage. The hash provides a surrogate for the identity of the file. An example of an ‘intellectual’ transformation is a transformation of a media file that results in some loss of information by reducing the resolution of an image or the sampling rate of a sound file. In both cases the result is identifiably the same picture or song, but the non-reversible transformation has resulted in the discard of some of the information content. Migration of digital files from one format to another frequently involves this type of transformation and is likely to be a feature of migration strategies used as part of digital preservation activities [16, pp. 91-5] [30].

8.2 Two-way transformations

One important use of these is to produce a different object to hide the identity of the original from people and/or systems. This type of transformation is usually referred to as encryption and is widely used by governments, individuals and in commerce. What is the relationship between the original bit pattern, the intellectual identity and the encrypted one? Clearly the encrypted identity is not sufficient for recovery of the unencrypted one in that an additional key is required for recovery, and organisations and individuals often find out to their cost that without the key, they do not effectively have the intellectual objects.

Ideally digital preservation transformations would be of this type, but new formats are rarely simply supersets of existing ones, rather they are better considered as more or less closely overlapping sets. Manually checking that no corruption or data loss had occurred would be impossible and, as we have seen, cross checking automatically with the original could also not be guaranteed.

9 Composites

In the discussion of Divergence of Versions and Transformations above, we deal with one area where the identity of an information object can be problematic but which, as we have seen, presents similar difficulties in both the analogue and digital domains, except that in the latter it may leave little or no trace. We now turn to an issue that presents increasing difficulties in the digital world, as tools are produced that facilitate it and technological developments blur the distinctions: composite objects. At its simplest this involves combining two existing texts to make a larger one, but the flexibility and creative possibility offered by digital representation extends this into a wide variety of fields and in particular written texts (the boundedness of which can be very fluid through hyperlinks), composite images (easily modified with such tools as Photoshop¹² and Gimp¹³) and digital objects where one intellectual object is hidden within another.

Combining sources of information in a variety of ways such as through referencing and footnotes has long made the boundary of an information object slightly blurred. In an earlier paper we pointed out that:

“hypertext is an obvious way in which the bounds of digital objects become eroded, however it is not a concept that originated in the digital world. Wittgenstein’s *Tractatus Logico Philosophicus*, written in the trenches and first published in 1922, uses a nesting of levels of argument that provide a linking pattern that can be traced by the reader.” [6]

The hypertext world of the Web facilitates links and the seamless inclusion of intellectual entities from one source into another. The resulting composite has an identity of its own. The possibility of making one information object very similar to another by replicating most of one object with a few ‘minor’ changes allows those intent on fraud or deception all the scope they desire. We regularly receive e-mails from individuals or organisations attempting to obtain our bank security details via phishing attacks – using ‘composite’ web pages composed of material from a variety of sites including the ‘real’ bank web

¹² <http://www.adobe.com/products/photoshop/index.html>

¹³ <http://www.gimp.org>

site – that are intended to convince bank customers to divulge their security details. Most of the links and images on such composite web pages point to the real bank site and only a small number of page elements are actually provided by the fraudsters in order to harvest personal details. Increasingly such phishing expeditions appear to be authentic, but the content is not valid in much the same way as a forged charter produced in a medieval monastery is not authentic.

An important issue here is the intention to deceive. The artist Alison Jackson produces fake composite photographs of well known people in order to raise questions about whether or not the public perception of such figures has any basis in reality:¹⁴

“Hardly anyone knew Diana. Yet on her death the world mourned. They did not mourn the woman, but her photographic image. We all think we know David Beckham; thousands of fans have seen him in flesh on the pitch, but millions of us only know him through his image. The same goes for all celebrities, whether it’s Madonna, Prince William, or Tony Blair. The result is that the photograph becomes more real than the actual person or event. In my work I use celebrity look-alikes to create images which pose fundamental questions about where the truth ends and the lies begin. The line between what is real and what is fantasy has never been more blurred. My photographs seek to explore the gap between the two and, if only for a second, bring it sharply into focus.” [19]

In doing so she claims that she does not set out to deceive. On the other hand, in his article on detecting fake digital photographs, Hany Farid describes the impact of digital tampering and the development of mathematical and computational algorithms to expose digital fakes, a task that becomes necessary when there is an explicit intention to deceive or fabricate. [11]¹⁵ These are compelling examples of what we are getting at in the discussion of relationship between the intellectual and technical that we described as *techné*. A technical analysis would draw no distinction between Jackson’s rationale for her work and that of a fraudster.

We can develop this line of thought further. The question as to whether or not a manufactured image depicting child sexual abuse or, perhaps slightly less emotively, consensual pornography which depicts something that has never happened are equivalent to images (doctored or otherwise) of abuse or pornography that have taken place raises interesting intentional and legal issues. The

¹⁴ For an overview of Jackson’s work, see <http://www.guardian.co.uk/weekend/story/0,,1075094,00.html>

¹⁵ A range of examples of images doctored for a variety of purposes may be found at Farid’s web site at: <http://www.cs.dartmouth.edu/farid/research/digitaltampering/>

approach to this is not the same in all jurisdictions, a complicating factor that applies more generally to much of this discussion and by its very nature is dynamic.¹⁶ In such circumstances it is important to distinguish between ‘real’ (undoctored) and manufactured images and the extent to which such processes have taken place would perhaps have to rely largely on the technical attributes of the digital objects themselves rather than intellectual identity. The techniques discussed by Farid[11] are important in this situation, but a doctored image is not the same as a completely ‘fictitious’ one, since in the first case the person exists but in the second they may not; just like the difference between Jackson’s intention and fraud, this can only be distinguished intellectually and not mechanistically.

Computing systems can create a view that is dynamically based on a search of a database which may produce, for the user, an ‘object’ that has never been viewed before and will never be viewed again. We see a particular instantiation of this experience in the inclusion of ‘personalised’ advertisements as part of the page when a user visits a web site. These advertisements are selected as a result of earlier pages visited and cookies left in the browser. Pages viewed will be different for different users, because although the main content is the same, the advertisements are not. The LOCKSS (‘Lots of Copies Keep Stuff Safe’) system, developed at Stanford University¹⁷ to capture and archive e-journals, has to distinguish journal content from ephemeral material such as advertisements, site navigation and branding. This is achieved by constructing technical filters known as ‘plug-ins’ that have to be programmed to identify the ‘intellectual content’ of the journal for preservation purposes. Initially such filters must be defined manually, based on the specific requirements of e-journal archiving and the features of the particular e-journal publisher’s web site.

A further twist in this discussion of composite information objects is the capability to encode one intellectual entity in another as in the case of steganography where, for example, credit card details can be encoded within a digital photograph (or other type of content) that is only detectable with a decod-

¹⁶ The 1996 US Child Pornography Prevention Act (CPPA) extended the existing federal criminal laws against child pornography to include certain types of “virtual porn”. In 2002, hearing *Ashcroft v. Free Speech Coalition*, the United States Supreme Court found that portions of the CPPA, being overly broad and restrictive, violated First Amendment rights. The Court ruled that images containing an actual minor or portions of a minor are not protected, while computer-generated images depicting a fictitious minor are constitutionally protected. In the UK however, under the Protection of Children Act 1978, as amended by the Criminal Justice and Public Order Act 1994, a pseudo-photograph of a child is defined as an image, whether made by computer graphics or otherwise. Possession or creation of such an image is, therefore, illegal.

¹⁷ <http://www.lockss.org/>

ing programme. This illustrates the idea that an information object is viewed through the ‘lens of available technology’. A digital object viewed with simple tools (or settings) may be perceived to have a different information content than the same object viewed with a more sophisticated set of tools in the same ways as the DNA LCN example. This means that the same digital object may have different meaning for different people or at different times.

10 Where does this lead us?

Just like the pungent smell of a red herring, technology is beguiling to those who have a liking for the chimera of wood smoke rather than what in the first place made the wood, or the fish, and their respective aetiologies. We have argued that it is not simply that technology should not dictate the approach taken to the solution of identity but that it cannot. Technology *per se* does not entail even the possibility of truth-framing which we deem necessary for the determination of, those very problematic notions of, authenticity and validation – notions that must be fit for a particular purpose and determined by the user. Persistent identifiers, for example, are persistent only in their mode of social use and cannot be adopted as a technological solution, even if one were advisable.

As David Levy [2000] says:

In one current view, objects are at least in part socially constructed; they are bounded and stabilised through social interaction (Smith 1996[36]). Literary works (e.g., Hamlet) are a clear example of this. Although we cannot really say what works are, we have nonetheless created a cultural mechanism (copyright and the courts) to help us decide where the boundaries between works lie. Here there can be no question of ultimate, natural answers—only social answers based on law and politics.[22]

Whilst few writers make a strong assertion that identity is purely a technical issue, some do by either omission or implication or, as in the case of Negroponte[29], both.¹⁸ Much discussion around the use of both digital signatures and persistent identities sounds rather techno-deterministic[12].¹⁹ In

¹⁸ In *Being Digital* Negroponte talks a great deal about technology but does not discuss the identity of the objects except in describing bits as ‘The DNA of Information’, which is to adopt a very techno-representational perspective.

¹⁹ Contrast, for example, *Sign here! : handwriting in the age of the new media* [28], with the Wikipedia entry on digital signature at: http://en.wikipedia.org/wiki/Digital_signature, the report commissioned by the Nation Library of Australia at: <http://www.nla.gov.au/nla/staffpaper/2001/dack.html>, or the report on the DCC Workshop on Persistent Identifiers available at:

summarising discussions on Authenticity in a Digital Environment in 2000 at the Council on Library and Information Resources, Abby Smith used this description in relation to using Public Key Infrastructures as the answer:

To devise technical solutions to what is essentially a social challenge is to engender an “arms race” among hackers and their police.[35]

Although a brand is applied using a technology, such as a hot brand iron, the mark itself is nothing more than a social construct. Even if biometrics as a brand are collected, these only support a socially agreed identifier, a personal name. The inevitable consequence of the adoption of an arbitrary reference, one not concerned with the preservation of the intellectual content, will be an under-application of *prāxis* and potentially a failure in binding.

If, as we claim, technology does not provide the answer to identity problems, then we need to look at how these cultural mechanisms or social practices provide us with a way forward. One way of doing this is to look backward at the analogue world with which we are all rather more familiar, at the practices that have built up around the storage of information just as pigment marks on paper have developed over several hundred years. In this matter we are preceded by almost a millennium in the science of diplomatics that was developed in response to the widespread forging of documents in the Middle Ages.²⁰

Authenticity in the paper world is about much more than the technology that represents the document, it is about the structure, form, content and context of the document. In the digital world it is the same, but we have yet to establish many of the social practices and conventions that are required to deal with the distinct lack of fixity in such a world. Records management has much to teach us in relation to verifiable reference through file plans that are external to the document, retention periods and file registries. These are all social practices that organisations have simply abandoned in the digital world as unnecessary, but roles and responsibilities for particular actions and practices are an important part of establishing a digital order where there is verifiable identity and Duranti [9] is right to say that we have much to learn, in this respect, from the past.

As we have seen, there can be no guarantee that the intellectual content will be maintained if we rely entirely on technological referents without any consideration of the sense of the text and its reference in their particular contexts. For this reason we must learn from known practice and procedure in the analogue world with its well-defined rules that make binding an explicit consequence.

<http://www.ariadne.ac.uk/issue44/dcc-pi-rpt/> .

²⁰ A very good account of the history of diplomatics can be found in the Encyclopaedia Britannica Online article by, the very well-regarded, Peter Herde[17].

Such an approach directly addresses the notion that identity of the object, no matter what the object's format, is dynamic with changes that can be mapped in the form of intransitive relations at every stage of its persistence and relationships, which may or may not be intransitive.²¹

To pervert John Donne 'no document is an island'²² or as Day puts it 'information is not neutral and not without expression; information is produced by a relation of bodies in and as space' [7]. Content must not be dismissed in favour of technology since technology can never resolve the semantics of dynamic relationships.. The intellectual contents of documents can change over time without there being any necessary change in the technology used to render them. For example, the definition of the term 'bill of rights' in a stable print culture has changed repeatedly since it was coined in the late eighteenth century. There can be changes of technology which do not necessitate corresponding changes of content, for example, from writing to printing or from analogue to digital photography. However since it is content that is our fundamental concern, we must not concentrate on technology-driven solutions at the expense of the only thing about which questions of truth and validity are apt. Printing and the Internet make it possible to provide greater access to knowledge, but they do nothing to resolve the fundamental questions that depend on intellectual endeavour. Johann Gutenberg may have contributed to the great religious upheaval of the sixteenth century known as the Reformation, but he did not cause it; no more did Tim Berners-Lee cause globalisation.

Acknowledgement

The authors are very grateful for the input of Dr. Norman Gray in helping to shape their sometimes rather vague ideas, although the blame for any remaining lack of clarity rests solely with the authors themselves.

References

- [1] A. Allison, J. Currall, M. Moss, and S. Stuart. Digital identity matters. *Journal of the American Society for Information Science and Technology*, 56(4):364-372, 2005.

²¹ We can observe this clearly in a family photograph album where the identity of the subjects remain stable but their reference changes, mothers become grandmothers and daughters become aunts or even great aunts and so on.

²² John Donne - from *Devotions upon emergent occasions* (1623).

- [2] Aristotle. *The ethics of Aristotle: the Nicomachean Ethics*. Harmondsworth: Penguin Books, 1955. Thomson, J.A.K. (trans.).
- [3] R. Barthes. *S-Z*. Jonathan Cape, 1975. Miller R. (trans.).
- [4] R. Barthes. *Rhetoric of the Image*, chapter 'The responsibility of forms'. Blackwell, Oxford, 1986.
- [5] T. Brabazon. Boomers in thrall to a wiki universe. THES, 16 November 2007.
- [6] J. Currall, M. Moss, and S. Stuart. Privileging information is inevitable. *Archives and Manuscripts*, 34(1):98–123, May 2006.
- [7] R. E. Day. *Organized Worlds: Explorations in Technology and Organization with Robert Cooper*, chapter Diagrammatic Bodies. Routledge, London and New York, 1998. Available at: <http://ella.slis.indiana.edu/%7Eroday/cooper.htm>.
- [8] H. Dekeyser. *Sign here! : handwriting in the age of the new media*, chapter Authenticity in Bits and Bytes, pages 76–90. Amsterdam, Netherlands: Amsterdam University Press, 2006.
- [9] L Duranti. Diplomatics: New uses for an old science. *Archivaria*, 28:7–27, 1989.
- [10] G. Evans. *The Varieties of Reference*. Clarendon Press, Oxford, 1982.
- [11] H. Farid. Digital doctoring: how to tell the real from the fake. *Significance*, 3(4):162–166, December 2006. Available at: <http://www.blackwell-synergy.com/doi/abs/10.1111/j.1740-9713.2006.00197.x>.
- [12] P. Flichy. *The Internet Imaginaire*. MIT Press, Cambridge, Mass., 2007. Liz Carrey-Libbrecht. (trans.).
- [13] G. Frege. *On Sense and Meaning (Über Sinn und Bedeutung)*. Basil Blackwell, Oxford, 1952. Translations from the Philosophical Writings of Gottlob Frege, first published in *Zeitschrift für Philosophie und philosophische Kritik*, vol. 100 (1892), pp. 25-50.
- [14] FSS. DNA Low Copy Number (DNA LCN). Technical report, UK Forensic Science Service, November 2002. Available at <http://www.forensic.gov.uk/forensic.t/inside/FOI/class/documents/Lcn.pdf>.
- [15] H. N. Gladney. *Preserving Digital Information*. Saratago, California : Springer, 2007.
- [16] R. Harvey. *Preserving Digital Materials*. K G Saur, München, 2005.
- [17] P Herde. Diplomatics, 2008.
- [18] D. Ihde. *Instrumental Realism: The Interface between Philosophy of Science and Philosophy of Technology*, chapter III. Philosophy of Technology. The Indiana Series in the Philosophy of Technology. Indiana University Press, Bloomington, 1991. Available at: http://www.compilerpress.atfreeweb.com/Anno_Ihde_Instrumental_Realism_III_1991.htm.

- [19] A. Jackson. *Private*. Michael Joseph, November 2003.
- [20] D. F. Krell, editor. *Martin Heidegger: Basic Writings*, chapter ‘The Question Concerning Technology’. Harper and Row, New York, 1977. William Lovitt, (trans).
- [21] T. S. Kuhn. *The Structure of Scientific Revolutions*. University of Chicago Press, Chicago, 1962.
- [22] D Levy. *Where’s Waldo? Reflections on Copies and Authenticity in a Digital Environment*. CLIR Reports. Council on Library and Information Resources, Washington DC, 2000.
- [23] D. Levy. *Digital Library Use: social practice in design and evaluation*, chapter Documents and Libraries: A Sociotechnical Perspective. Cambridge, Mass : The MIT Press, 2003.
- [24] D. McKitterick. *Print, Manuscript and the Search for Order, 1450-1830*. Cambridge University Press, Cambridge, 2003.
- [25] M McLuhan. *Understanding Media: The Extensions of Man*. McGraw-Hill, New York, 1964.
- [26] L. C. Mitchell and S. Green, editors. *Studies in the Cultural History of Letter Writing*. Spring 2007. special issue of the Huntington Library Quarterly.
- [27] M. Moss. The Hutton Inquiry, the President of Nigeria and what the Butler hoped to see? *English Historical Review*, CXX(487):577–592, 2006.
- [28] S. Neef, J. van Dijck, and E. Ketelaar (eds). *Sign here! : handwriting in the age of the new media*. Amsterdam, Netherlands: Amsterdam University Press, 2006.
- [29] N. Negroponte. *Being Digital*. Coronet Books, new ed edition, 1996.
- [30] NSF/DELOS. Invest to save. Report and Recommendations, NSF/DELOS Working Group on Digital Archiving and Preservation, 2003. Available at <http://eprints.erpanet.org/48/>.
- [31] M. J. S. Owen. *Sign here! : handwriting in the age of the new media*, chapter Authenticity and objectivity in scientific communication: implications of digital media, pages 60–75. Amsterdam, Netherlands: Amsterdam University Press, 2006.
- [32] B. Russell. *Principles of Mathematics*. Cambridge University Press, Cambridge, 1903.
- [33] P. Schaff. *History of the Christian Church*, volume IV. T. & T. Clark, Edinburgh, 1910 edition.
- [34] S. Shoemaker. Persons and their pasts. *American Philosophical Quarterly*, 7:269–85, 1970.

- [35] A Smith. *Authenticity in Perspective*. CLIR Reports. Council on Library and Information Resources, Washington DC, 2000.
- [36] B. C. Smith. *On the Origin of Objects*. MIT Press, Boston, 1996.
- [37] S. Sontag. *On Photography*. Penguin, London, 1979.
- [38] R. Thomson. *The Grammar of the Shot*. Focal Press, Oxford, 1998.
- [39] UNESCO. Guidelines for the preservation of digital heritage. Technical report, UNESCO, 2003. Available at <http://unesdoc.unesco.org/images/0013/001300/130071e.pdf>.
- [40] R. Wollheim. *Art and its Objects*. Cambridge University Press, Cambridge, 2nd edition, 1980.