Informative Tagging of Images: The Importance of Modality in Interpretation †

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ABSTRACT: The term "tagging" is widely used for the assigning of terms to information objects in user-driven websites, although a cursory examination of such websites suggests that the communicative functions undertaken by taggers are not always driven by concerns about inter-subjective informative communication. At the heart of the debate about social indexing are issues relating to meaning and interpretation. Even where the intention is to assign informative tags, there is an issue about the relationship between the modality of an information object and its subsequent interpretation in historical time. This paper tests a model of image modality using four test images, which are interpreted and tagged by a group of distance learner students at the Department of Information Studies, Aberystwyth University. The results are described, and the implications are discussed. Overall, this limited exercise suggests that the modality model might be of some use in categorizing images within an image IR system. The exercise also suggests that leaving annotation and tagging entirely to users could lead to information loss over time. Finally, the exercise suggests that developing a retrieval tool using genre and the intertextual nature of multimedia objects might lead to the construction of rich, knowledge based systems.

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1.0 Introduction

In the domain of image indexing and retrieval, writers generally acknowledge that establishing the meaning of images is a complex business (e.g., Brown and Hidderley 1995; Burke 1999; Enser and McGregor 1992, Enser 1995; Krause 1988; Shatford 1986; Shatford-Layne 1994; Svenonius 1994), and that the thorny question of meaning and interpretation of images can be usefully explored using the literature of art theory and visual semiotics. Shatford, Enser, and Burke in particular have referred to Panofsky's "levels of meaning" model as a way of thinking about the operation of meaning in images. In his essay "Iconography and Iconology" (1993 [1933]), Erwin Panofsky identified different types of meaning in art and constructed a framework of meaning, which he then applied to the interpretation of Renaissance art. The three levels of meaning Panofsky identified are:

- Primary or natural subject matter: which is subdivided into factual and expressional subject matter. This is the pre-iconographical level of art.
- Secondary or conventional subject matter: identifying the male figure in the painting with the knife as St Bartholomew (54). This level of subject mat-

ter depends on cultural knowledge and is called the iconographical level of art.
– Intrinsic meaning or content: This level of meaning depends of the viewer synthesising information gathered at the first two levels of meaning with additional information, which might include information about the artist and the socio-political cultural moment of production. A work of art might be interpreted as evidence of Leonardo's personality, or "of the civilization of the Italian High Renaissance, or a peculiar religious attitude" (55). It involves historical, psychological, or critical approaches to art. Achieving iconological interpretation depends on having "synthetic intuition" according to Panofsky, an attribute which might be more often to be found in the talented layman than the erudite scholar.

Panofsky's model has been used by information theorists interested in mapping the specificities of meaning in images (for example, Shatford, 1986, Enser 1995, Burke 1999). Shatford (1986) discussed at length the notion of "ofness" and "aboutness," an analytical distinction drawn from Panofsky's work. Her model identifies the pre-iconographic level as "generic Of"; the iconographic as "specific Of"; and the iconological as "About" (Shatford 1986, 43-45). Peter Enser's analytical categories (iconography refers to specifics; pre-iconongraphy refers to generics; iconology refers to abstract meaning) are based on Shatford's model, while Mary Burke constructed her own version of Panofsky's table of levels of meaning (1999). While information scientists tend to emphasise the subjective interpretational aspects of iconological content, Panofsky insisted that the more such interpretation is based on individual psychology and Weltanshauung, the more crucial it is that objective correctives be applied.

2.0 Images, Interpretation, and Semiotics

The underlying foundation of this paper is Hodge and Kress's approach to social semiotics (1988), which originates in a critique of conventional Saussurean semiotics. Social semiotics stresses the dialogic nature of communication and signifying practices and is interested in the nature of meaning within a socialised communication context. It is concerned with questions of structure and form within the context of production and reception, the function of signifying practices, and power relationships within signifying systems. This approach leads to a view of connotative meaning which stresses the importance of logonomic parameters in determining the range of connotation possible within specific cultural contexts. Hodge and Kress (1988, 4) define the logonomic system in the following terms:

> A logonomic system is a set of rules which specify who can claim to initiate (produce, communicate) or know (receive, understand) meanings about what topics under what circumstances and with what modalities (how, when, why.) Logonomic systems prescribe social semiotic behaviours at points of production and reception, so that we can distinguish between *production regimes* (rules constraining production) and *reception regimes* (rules constraining reception).

The terms "denotation" and "connotation" come to social semiotics from Louis Hjemslev by way of Roland Barthes. For Barthes, denotation or first level signification refers to the straightforward or common sense meaning of the sign, while the second level signification, or connotation, refers to cultural meanings attached to the sign. Connotations derive from specific social and cultural contexts. Where connotations are seen as being naturalised or normal, they are hegemonic and form conceptual maps for us to make sense of the world. In semiotic analysis, signs can be decoded at both denotatative and connotative levels; indeed, Stuart Hall argued in "Encoding/Decoding" that distinguishing between denotation and connotation is useful for analytical purposes, but in the real world, the sign always bears with it its associative meaning (2001 [1973], 171).

Another approach to categorizing signs comes from Charles Peirce who speculatively identified a large range of signs that humans use to communicate. The ones that are referred to most often in the subsequent literature of semiotics are the icon, the index, and the symbol (Chandler 2002, 37). The iconic sign is a sign which resembles the signified/object such as a portrait; the indexical sign is a sign which, in some way, is connected to the signified/object, such as a horse's hoofprints; and the symbolic sign is arbitrary and conventional, such as traffic lights, the meaning of which has to be learned. The distinctions between these types of signs are of some interest in the discussion of images and image retrieval. For many critical theorists, the sign, even an iconic sign which seems to foreground denotation, such as the photograph, is always ideological, where the term ideology refers to sets of ideas that are used in particular times, places, and culture to make sense of the world. Hall (2001

[1973]) argues that ideology is so much embedded in the sign that it appears "natural." But for Hall, it is at the level of associative signs, of connotations, that the struggle over meanings, "the class struggle in language" (Hall 2001, 73) can be seen. The sign, although bounded even at the connotative level, is more open to active transformations which exploit its potential to have multiple meanings, its polysemic nature. However, Hall argues that any society tends to impose its classifications of the social, cultural, and political which constitute a dominant cultural order.

Hodge and Kress (1988) are interested in modality, that is, relationships between the sign and the real world, as a way of categorising signs, partly because social semiotics is concerned with representations of the real. Signs are encoded and decoded within systems of codes and conventions operating at the level of particular societies. Codes and conventions are related to class and to status and are ideologically bound. Judgements of modality involve comparisons with models of the real world and models of the genre, that is, the codes and conventions making up genre, which means that modality operates at the level of the mimetic plane and the semiotic plane.

Within this framework, the term genre derives from Bakhtin's (1986 [1952-3]) notion of "speech genres," socially specified modes of speaking or writing which are recognized and used by particular cultures or groups, for example the university lecture or the letter of resignation. Genres are governed by expected codes and conventions, themselves historically contingent and open to modification and transformation (Rafferty 2010).

How we analyse and interpret modality is historically contingent so that films and photographs created in the early 20th century might well have been considered highly modal by contemporary audiences while now being considered to be highly artificial. Very often, identifying the representation as construction is only possible with time. Photographs are generally considered to have higher modality than writing, but it is worth remembering Hall's view that even the iconic, televisual image, seemingly highly modal, is always ideological and constructed. This view is similar to Sonesson's (1993) view of the photograph as indexical-icon or, in some cases, iconic-index, but it would seem that there is always a caveat regarding iconicity. Within visual communications, images can range from the highly modal, for example snapshots, to images with low modality, for example, abstract artworks. In addition, the sign might be tightly encoded so that the meaning of the sign resides in the sign itself, the "readerly" sign in Barthes' terms, or the sign might have to be constructed by the encoder in such a way as to allow the decoder space to interpret the sign, e.g., the "writerly" sign in Barthes' terms.

2.1. Image Retrieval and Web 2.0

The issue of image retrieval has in many ways become even more interesting in relation to Web 2.0 applications. User-based indexing and folksonomies have emerged as grass-roots approaches to the challenge of distributed indexing practice on the Web, but the theory and philosophy of user-based indexing has a longer history pre-dating the emergence of the Web as a global distributed information network. The notion of user-based indexing is to be found in Hanne Albrechtsen's 1997 IFLA paper on democratic classification and indexing in public libraries, and Hidderley and Rafferty's (1997, 2005) democratic indexing. There is a literature of user assigned indexing celebrating the freedom of tagging and heralding the organic development of folksonomies (e.g., Merholz 2004, Shirky 2005), but the need for post-hoc disciplining of some sort is hinted at throughout the literature, suggesting that there is a residing doubt amongst information professionals that self-organising systems can work without some element of control and some form of "representative authority" (Wright 2005). At the heart of the debate about social indexing are issues relating meaning and interpretation. The term "tagging" is widely used for the assigning of terms to information objects in user-driven websites, although a cursory examination of such websites suggests that the communicative functions undertaken by taggers are not always driven by concerns about inter-subjective informative communication (Rafferty and Hidderley 2007). Even where the intention is to assign informative tags, there is an issue about the relationship between the modality of an information object and its subsequent interpretation in historical time (Rafferty and Hidderley 2005).

The potential of collaborative indexing for museums, galleries and libraries has been recognised by a number of important cultural institutions including the Powerhouse Museum in Sydney, the Philadelphia Museum of Art, and the Indianapolis Museum of Art while the Smithsonian Photography Initiative project allows users to tag the historical photograph collection. These kinds of projects have begun to generate a research literature that investigates the effectiveness of collaborative indexing in relation to information re-

trieval, promotional activities, and educational and cultural knowledge. The Australian Powerhouse project has generated a blog, "Fresh + New(er)" (Chan 2008), which discusses issues around digital media and museums, while the National Library of Australia has undertaken a survey of user tagging approaches currently in use in major cultural institutions in New Zealand and Australia (Clayton, Morris, Venkatesha, and Whitton, 2008).

Research into "real world" collaborative tagging undertaken by the steve.museum between October 2006 and December 2008 is reported by Trant (2009). This project had a number of aims which were: to investigate whether tags used by viewers differed from those used by professionals; to investigate whether museum professionals find the user tags useful for searching art collections; to investigate whether user tags relate to conventional controlled vocabularies used by the institutions; and to explore whether the tagging interface influences the tags assigned (Trant 2009, 11). Trant discovered that there were differences in the tags assigned by professionals and users, and that museum professionals found the majority of user assigned tags useful. Trant writes of the issue of relating user tags to existing controlled vocabularies that "[r]elating tags to museum controlled-vocabularies proved problematic at best," while it was discovered that a small number of *supertaggers*, or power taggers (Springer et al 2008, 26) had more influence on the shape of the folksonomy than the tagging interface. It was not in the remit of this project to consider questions relating to genre and modality.

Another approach that museums have taken is to make part of their digitized collection available through Flickr's The Commons, an initiative which allows cultural heritage institutions to share photographs. The Library of Congress started its Flickr Commons project in January 2008 (Springer et al 2008). One of the stated aims of the project was to raise awareness of the library's activities, drawing attention to the Library's longstanding digitization programme. Power taggers were important in developing the folksonomy, while the Library was impressed by the work of the voluntary "history detectives" (25) who contributed historical information (Springer et al 2008, 26):

> It is particularly gratifying to see Flickr members provide all kinds of connections between the past and the present through discussions of personal histories including memories of farming practices, grandparents' lives, women's roles in World War II, and the changing landscape of local neighborhoods. As an example of the memories evoked by these images, see the reminiscences posted about the Sylvia Sweets Tea Room, especially the detailed and moving account from the restaurant owner's family.

There were only a relatively small number of mischievous tags assigned, which, it was speculated, might be related to Flickr's particular culture. This point is echoed by Chan (2008). The project enabled the Library staff to become familiar with the rhythms of Web 2.0 dialogue, allowing space for users to contribute before interjecting with the Library comment. There are now many institutions which use The Commons, including the Powerhouse Museum, the U.S. National Archives, the LSE Library, the Imperial War Museum Collection, the National Archives U.K., the Biblioteque de Toulouse, Bergen Public Library, and the National Library of Wales. The list goes on. Such interest suggests that collaborative social indexing is an activity that will become increasingly important to cultural heritage institutions, and that there is space for developing information retrieval tools that build on the power of tagging.

2.2. A Model of Image Modality

Earlier work carried out by Rafferty and Hidderley (2005) led to some tentative suggestions about the decoding and interpretation process, which are that:

- A non-textual information object of high modality decoded at the same historical moment, and within the same culture and logonomic system as the encoding moment, would be expected to evoke a limited range of denotational meanings. There may be a broader range of connotational level interpretations. Textual anchorage could help fix the intended encoded meaning, but decoding might evoke negotiated or oppositional interpretations. Interpretation within a different cultural and logonomic system would potentially evoke a broader range of connotational and denotational meanings.
- A non-textual information object of low modality decoded at the same historical moment and within the same cultural and logonomic system as the encoding moment will evoke a larger range of subjective interpretation than a high modality non-textual information object, and will be dependent on textual anchorage supplied by the producer to fix meaning. The range of interpretation will be de-

pendent on interpretations possible within the logonomic systems shared by encoder/decoder. Non-textual information objects can be self-consciously constructed as abstract or ambiguous by the producer to encourage "subjectivity" and a "readerly" or "userly" response.

– A non-textual information object of high modality decoded at a different historical moment might depend on the viewer having external historical and cultural knowledge to interpret and decode all the elements. The ideological, connotative aspects might also be interpreted in quite a different way than that which the encoder intended, although it might be possible for the viewer to identify the "preferred" meaning while still opposing it. A viewer decoding an information object at a later historical moment might well have access to a range of interpretations, contemporary and historical.
– A non-textual information object of low modality decoded at a later historical moment might, ironically, lead to a narrower range of connotative interpretations, as the avant garde becomes establishment over time. Principles governing the encoding of low modality information objects, particularly those belonging to specific cultural movements, might become more generally known, so that a greater amount of external anchoring information is known than was available at the moment of encoding.

A small-scale study has been carried out to test this model of modality and interpretation. In this study, four images were chosen from publicly available web sites to represent each of the four categories identified above. Distance learning and full-time postgraduate students from Aberystwyth's Department of Information Studies were invited to assign descriptive and/or associative tags to each image. The images were given to the respondents without any accompanying tags or other information.

There is necessarily a gap between visual signs and their interpretation in and through language. Content-based image retrieval may offer the facility to search visual signs using visual signs but currently context-based linguistic searching is still used by many image retrieval systems including Web based systems. The shift from a visual semiotic model to a linguistic semiotic model is not a straightforward one, as each sign system is made up of its own semiotic structure. Visual signs have both denotative and connotative values, and the translation from perception of this system to interpretation through language, the signs of which have their own denotative and connotative values, assumes some equality or similarity in the translation from one system to another. To actualize this study, we have to accept for the moment that this translation is possible, certainly Volosinov's view of language might allow us to argue that all meaning is articulated in and through language. In this study, terms which are descriptive and mainly common and proper nouns are assumed to constitute denotative tagging, while terms that are more associative, a category that might include abstract nouns, are assumed to constitute connotative tagging.

It was explained to the respondents that tags might describe specific things in the image, e.g., "oak tree," or might be terms assigned to describe the whole image, e.g., "1950s Italy," or might be associative rather than descriptive, e.g., "peaceful," or "Christmas." The associations might be quite personal. They were asked to assign tags based on immediate interpretation rather than from research. It was stressed that there could be no right or wrong answers in this exercise. In addition, students were asked to provide information about age, gender, and in the case of postgraduate students, the subject of their other degree(s). The study is necessarily limited by time and by response rates. It is a study of interpretation, but it must be acknowledged that the context of undertaking the exercise is artificial. The analysis of the responses will consider whether responses are primarily descriptive and denotative, or associative and connotative as defined in relation to this study.

3.0 The Test Images

The image which was chosen to represent the first category in the model, a non-textual information object of high modality decoded at the same moment as encoding, was a photograph of Barack Obama taken from the Flickr website (image can be found at: http://www.flickr.com/photos/fastlaine/3057356781/). The image is a photograph of a television screen which shows Obama speaking after his election. The broadcaster is NBC news. Behind Obama is the U.S. flag. Obama is wearing a red and silver tie, and there are two microphones in front of him. The image which was chosen to represent the third category in the model, a non-textual information object of high modality decoded at a later moment in time than the moment of encoding, was a black and white photograph of a group of people sitting in a charabanc parked in a country road taken from the Flickr website

(image can be found at: http://www.flickr.com/photos/fabulousminge/1848905384/). The creator of the Flickr record has annotated the image with the information that the photograph includes her maternal grandfather and grandmother and her mother, naming all the family members. The photograph, which forms a postcard, was taken in Jersey in 1925.

The other two images are photographs of abstract art images, and they represent category two, a non-textual information object of low modality decoded at the same moment as the moment of encoding, and category four, a non-textual information object of low modality decoded at a different time than the moment of encoding. The category two image is a modern artwork image taken from Flickr (image can be found at: http://www.flickr.com/photos/mrfitz/94388435/in/set-72157603892112260/). The creator of the record writes that this abstract was influenced by Mondrian, the pointillists, and Van Gogh. At the centre of the image is a blue rectangle slightly off-centre. The lines making up the rectangle are thick and discontinuous, not unlike the lines of the wheat in Van Gogh's "Wheatfield with Crows." The next rectangular shape painted around the central blue rectangle is orange, and, again, is made up of rough straight lines of oil paint. The next rectangular shape is red. The rest of the painting is made up of rough straight lines in orange, blue, and grey against a red background. The image used to represent category four was Piet Mondrian's "Composition with Yellow, Blue and Red" (1921) taken from a publicly available art website (image can be found at: http://www.ibiblio.org/wm/paint/auth/mondrian/ryb.jpg).

The images were chosen with specific purposes in mind. It was hoped that the Obama image would be so recent and so ideologically, culturally, and politically interesting that it would generate associative meanings as well as descriptive meanings. The image of the charabanc was included partly because of the term "charabanc" itself. This is a term that is rarely used nowadays except in self-consciously archaic cultural texts. Terms such as "charabanc" are very historically specific and while arguably capturing the "spirit of the times," because they represent vernacular language of particular historical moments, they tend to disappear from popular vocabulary and possibly never even enter the restricted language of academic use, yet these are terms which may well be the best ones to use to describe the contents of photographs, often taken by amateur photographers of everyday cultural practices, and film, both commercial mass market films and amateur home films. The point of interest was whether any of the respondents used this term to describe the image.

The Mondrian image was included because of the history of that specific artwork, which was used in the 1960s by Yves St Laurent to create a mini-dress that at the time was arguably one of the most iconic signifiers of 1960s modernity and chic. What was of interest here was whether any of this associated cultural history was intertextually recalled in the tags. Finally, the modern abstract was included because it was a self-conscious homage to Mondrian and to Van Gogh. The interest was whether any of the taggers interpreted the image in the way that the record creator did.

4.0 Responses to the Images

4.1 The Respondents

Of the thirty respondents, twenty-one were female and nine male. Of the twenty-one female respondents, four are over 50, four are in the 40-50 age range, seven are in the 30-40 age range and six are in the 18-30 age range. There were sixteen postgraduate students in this group. Two were in the over 50 group; one has a BSc Computer Science degree, and one has a B.Ed in Community Education. Three were in the 40-50 age group, and, of these, one has a Law degree, one has a Theology and History degree while the third has a BSc in Mechanical Engineering and an MSc in Process Safety and Loss Prevention.

Six of the graduates were in the 30-40 group and, of these, one has a BA in Psychology and Sociology and a BA in Humanities, one has a BA in Visual Communication, the third has a BA in English, the fourth has a BA in English and Theology. The other two graduate students in this group already have post graduate qualifications: one has a BA in History and PG Diploma in Human Resource Management, while the sixth student has a BA in American and Canadian History, an MA in Literature and Environment and a PhD in African History. Of the six students in the 18-30 group, five are graduates. One has a BA in Philosophy, Politics, and Economics, one has a BA in Music, one has a BA in History and Archaeology while another has a BA in History, Economy, and Culture. The fifth student has a BA in English.

Of the eight postgraduate male respondents, three were in the 40-50 age range, one was in the 30-40 group, and four were in the 18-30 group. In the 40-50 group, one has a BA in English Literature and History, one has a Law degree, while the third has a BSc

in Computer Science and Maths. In the 30-40 group, one student has a BSc in Business Administration. Of the four students in the 18-30 group, two have BA degrees in History, the third has a BA in Theology, while the fourth has a BA in Film and Media. Tables 1 and 2 show the ages and educational backgrounds of the respondents.

4.2 Tagging the Images

4.2.1. Image 1

There were a number of informational, descriptive tags attached to the first image. Seventeen of the thirty respondents used the term "president" or "president elect," three used the phrase "first black president," one used the tag "the new president," and two full time post-graduate students used the term "senator." Eighteen named the man in the image as Barack Obama. One used the tag "leader" and one used the tag "black leader." Eleven used a tag relating to the screenshot including "television," "news broadcast," "NBC," "TV news," and "NBC news image," while one used the tag "headshot." Three used the tag "election," and seven respondents used either "speech" or "speaking." One student used the tag "red tie." Nine used "America," "American," or "USA" as a tag.

Five respondents used a tag relating to Barack's colour including "black," "black-leader," and "mixed-

Female Respondents by age	Undergraduate	Graduate	First degrees
18-30	1	5	BA Philosophy, Politics, Economics BA Music BA History & Archaeology BA History, Economics, Culture BA English
30-40	1	6	BA Psychology & Sociology & BA Humanities BA Visual Communication BA English BA English & Theology BA History & PG Dip HRM BA American & Canadian Studies, MA Literature & Environment, PhD African History
40-50	1	3	LlB Law BA Theology & History BSc Mechanical Engineering & MSc Process Safety & Loss Prevention
Over 50	2	2	BSc Computer Science BA Community Education

Table 1. Age and educational backgrounds of the female respondents

Male Respondents by age	Undergraduate	Graduate	First degrees
18-30		4	BA History (x2) BA Theology BA Film and Media
30-40	1	1	BSc Business Administration
40-50		3	BA English & History LlB Law BSc Computer Science and Maths
Over 50			

Table 2. Age and educational backgrounds of the male respondents

race," in addition to the three who used "first black president" and the one who used "black leader" as a tag. In this study, the term "mixed-race" is included in the associative category because of the problematic nature of the term "race," both culturally and scientifically. The term "black" and the absent signifier "white" are also problematic. The term "black" is included in the descriptive category, with limited confidence however. It is included in this category because it is felt that this is how the respondents believed that they were responding – with a descriptive term. Such categorization is far from scientific, as is often the case with language, interpretation, ideology and semantics. These terms are good examples of the ideological nature of even those signs that seem at first glance "natural" or denotative.

There were also a number of associative or connotative tags, some of which relate to emotions that might be experienced by the viewer: two respondents used the tags "new era"/"new beginnings," one used the tag "momentous occasion," one used the tag "making history," while one used the tag "revolution?" with the question mark attached. One respondent intriguingly used the tag "Afghanistan." Four respondents in particular used a number of associative tags which included "confident," "united," "reflective," "historical importance," "triumph," "the winner!" "charisma," "hope," and "change." All four respondents are female students, three of whom are studying for the B. Econ undergraduate distance learning degree.

In total, fifty separate tags were used by respondents. Of these, thirty might be categorised as descriptive while twenty might be categorized as being associative, although the artificiality of the distinctions in real life show quite strongly in these tags. Table 3 shows the descriptive terms used to tag Image 1 while table 4 shows the associative terms used to tag Image 1:

Barack Obama (used 18 times)
President (used 17 times)
First black president (3)
The new president
Senator (2)
America/USA (9)
African/American (2)
Young
Handsome
Black
Leader
Black leader
Speech/speaking (7)
Election (3)
Public address
NBC News image (5)
TV news/news broadcast (4)
Press interview
Television/television image (3)
TV screenshot
Headshot
Year: 2009
US flag (3)
Red tie
Democrat
Male
Political
Public relations
Looking sideways
Current events

Table 3. Individual descriptive tags for Image 1

Revolution?
New beginnings
Historical importance
Success
The winner!
Triumph!
A new era
Afghanistan?
Confident
Mixed race
Race
United
Reflective
Momentous occasion
Patriotic
Making history
Hope
Change
Stars and Stripes
The orator

Table 4. Individual associative tags for Image 1

It was clear that the respondents were all aware of Barack Obama's identity and the circumstances in which the photograph was taken. More tags are descriptive rather than associative, although tags such as "leader" and indeed "president" bear with them clear ideological and cultural content. Interestingly, a number of respondents refer to the form of the image (television image) as well as the content. Of the thirty denotative terms used to describe Image 1 in this study, twenty-four might be categorised as terms

that fairly clearly point to iconographic aspects of the sign available through cultural knowledge, for example knowing that the man in the image is President Barack Obama. Three terms might be categorised as clearly pointing to pre-iconographic aspects of the sign and these are "red tie," "male," and "looking sideways."

We have already considered the problematic nature of the term "black," which, although it is categorised descriptive within this study, could be categorised as associative. The term "black" could be categorised as pre-iconographic or, perhaps more accurately, iconographic. This term is an example of how difficult it can be to distinguish clearly between terms that might be categorised as pre-iconographic and those that are iconographic. This might be a function of being contemporary with the image and the responses. The same is true of the terms "young" and "handsome," which are categorised as descriptive terms in this study but which might, under different analytical conditions, be categorised as associative. In this study, it is believed that the respondents meant these terms to be descriptive and so this is how they are categorised by the researcher. However, what is considered "young" and "handsome" may well be determined by logonomic parameters. In addition, these terms might be categorised as pre-iconographic or iconographic depending on how encultured our notions of beauty and age are. We are all encultured and operate within the logonomic parameters of our society and our time. It might be that distinctions between natural and cultural become clearer with historical distance: an argument perhaps for the archiving of tags.

A number of the connotative tags associated with this image seem to have mythologized Obama as a bearer of a better political future, even though the tagging was done very early into his presidency. The hope bound up in these tags illustrates the wider hope attached to this presidency, evidenced for example in Obama's receipt of the 2009 Nobel Peace Prize. These terms are historically contingent and the image might well be tagged in a different way if the exercise had been done in December 2009 following Obama's announcement of more US troops for Afghanistan.

4.2.2 Image 2

In the second image, the interest is primarily in how much of the historical information the respondents include in their tags. The image was retrieved by the researcher using the historically specific term "charabanc." In the tagging exercise, two out of the thirty used the term "charabanc" to tag the image. The interest here relates to whether historically contingent vocabulary is in danger of being lost over time. Seven respondents used the tags "bus," "old bus," "vintage bus," or "bus tours," and thirteen used tags relating to "car" including "classic car," "early automobile," and "vintage car." One respondent used the tag "early motor transport," one used the tags "convertible" and "people carrier," and one used the tag "the new jalopy." Eight respondents used the tag "outing," and two specified the outing as a "family outing" while one used the tag "Sunday outing." Three respondents used tags relating to the perceived social status of the figures in the image. One used the tag "workers," one used the tag "middle class," and the third used the tags "holidays" and "wealthy."

Five used tags that denote the form of the image, three using the tag "photograph," one using the tag "old photo," and one used the tag "black and white motor photo." One respondent focused on the stilted and artificial look of the people in the photograph using the terms "posed," which was also used by another respondent, "frown," and "insecure." This is of some interest in relation to the notion of the indexical-icon quality of even the most iconic of signs. Three respondents used the tag "sepia," and six used the tag "black and white." Ten respondents referred to the historical period, three placing the photograph in the 1930s, five placed the photograph in the 1920s, and one suggested "early 1900s" as a time tag. For one respondent, it would seem that the photograph evoked 1920s silent films as he used the phrases "Keystone cops" and "Laurel and Hardy."

There are fifty-three separate tags used by these respondents that might be categorised as predominantly denotative or descriptive, and twenty-three tags that in the context of this study might be categorised as connotative or associative. The majority of denotative tags are pre-iconographic. The distinctions between denotation and connotation, although useful for analytical purposes, are, as Hall suggested, largely artificial in the real world, making the categorisation of tags quite difficult and open to interpretation. In relation to Image 2, tags categorised as connotative or associative are tags that suggest that the respondent has interpreted rather than described aspects of the image. The tags "workers," "wealthy," "middle class," and "money for the first time" are all categorised as connotative because these concepts cannot be directly seen in the image. Terms relating to history or historical value are historically contingent and relate

to the respondent's diachronic relationship with the image and so, for the purposes of this study, are considered to be associative. The terms "adventure," "touring," and "on the road" have been suggested by the image rather than being terms describing elements in the image. It can be very difficult to determine which specific category terms might fit. We do not know that the people in the image are "family" or "friends," nor do we know that this is a holiday snap, although with our cultural knowledge it might be possible to deduce that the photograph is likely to be a holiday snap, in which case these terms might be categorised as denotative and iconographic.

There were a number of tags that denote similar content, but are slightly different, for example, "old motor car," "old vehicle," and "early automobile." This illustrates the difficulties of working with uncontrolled vocabularies. One might argue that the concepts are basically the same and should be treated as such, on the other hand, Shirky (2005) might argue that the concepts are slightly different and the difference in terminology points to the conceptual difference which should be recognised.

This image generated more individual tags than the Obama image, and, as expected, most of the tags are pre-iconographic because much of the specific cultural knowledge needed to generate iconographic tags for this historical image has been lost. One of the concerns about user based tagging is that while the practice might well ensure that current terminology is used in information systems, it might also lead to the loss of knowledge and historically specific terminology. The response to this image suggests that that while the respondents are all relatively accurate in recognising interesting denotative elements in the photograph, they are perhaps less knowledgeable about the terminology that might have been used at the time of encoding and possibly about the social status signified by denotative elements in the photograph. Using the term "new jalopy" as a tag is interesting given that the term "jalopy" is often used to refer to decrepit automobiles. Table 5 shows the descriptive terms used to tag Image 2 while Table 6 shows the associative terms used to tag Image 2.

Early automobile
Motor car (used 5 times)
Old motor car/old vehicle (4)
Charabanc (2)
Vintage car (2)
Vintage automobile
Convertible
People carrier
Classic car
The new jalopy
Bus (3)
Vintage bus
Old bus (2)
Bus tours
Transport (2)
Early motor transport
Vintage transportation
Public transport
Historical transportation
Mode of travel
Group outing/outing (8)
Group gathering
Group trip
Day trip
Trip
15 people
Passengers
Family outing
Sunday outing
Black and white (6)
Photograph (3)
Early photography
Old photo
Old
Sepia (3)
Black and white motor photo
1930s (3)
1920s (5)
1920s/1930s
Early 1900s
Tourist
Hats
Countryside (2)
In the countryside
Men
Women
Men and women
Road
Moustache
Frown
Packed
Bonnets
Good weather

Table 5. Individual descriptive tags for Image 2

Posed (2)
Historical value
History
Social awareness

Adventure
Touring
On the road
Formal outing by bus
Return journey
Workers
Middle classes
Wealthy
Money for the first time
Vintage
Real life
Serious figures
Togetherness
Family
Friends
Holiday
Insecure
Keystone cops
Laurel and Hardy

Table 6. Individual associative tags for Image 2

4.2.3 Image 3

In the third image, the interest is in how far the respondents share a view about this modern low modality image. Nine respondents used the tag "modern art" and nine used the term "art" in their tags. Seven used the term "painting," one used the term "picture," and one respondent used the term "abstract painting." Seven used the term "abstract." Beyond the basic denotative terms relating to the image as art, colours, and shapes in the images were tagged, with shape terms including "coloured boxes," "dashes," and "blocks," while nine taggers used the term "square." Thirteen tags that might be categorised as associative were used by the taggers. The terms "ethnic" and "multicultural" and "Moroccan spices" were used, as were the terms "chain link woven," "wickerwork," and "tapestry." It might be possible to suggest that there are some loosely related associations amongst these terms: the first sub-group are terms that perhaps point to the perceived cultural associations of the artwork (Moroccan, ethnic), while the other sub-group relates to the qualities of the image that resemble Middle Eastern cultural artefacts (tapestry, chain link woven referencing a carpet perhaps). Other tags include "dining room" and "meditative," "silly" and the highly subjective "Art I wouldn't buy." That two respondents used the term "rain" might suggest that they perceived the broad and straight brush strokes as signifying rain. None of the respondents used tags which suggest that they share the creator's view about this image being inspired by Mondrian, Van Gogh, and the pointillists, but three respondents used art genre tags to categorise the image as "impressionistic," "expressive," and "cubist."

Modern art (9)
Art (9)
Picture
Painting (7)
Abstract painting
Abstract (7)
Shape
Square (9)
Modern (4)
Impressionistic
Cubist
Expressive
Red (8)
Orange (4)
Blue (6)
Yellow (3)
White
Colour (3)
Collection of colours
Colourful (2)
Coloured boxes
Image (3)
Paint
Dashes (2)
Geometric Spiral
Blocks
Pattern (4)
Bright

Table 7. Individual descriptive tags for Image 3

Ethnic
Chain Link woven
Dining room
Meditative
Ground Zero
Silly
Art I wouldn't buy
Wickerwork
Multi-cultural
Rain
Blur
Kalaidoscopic
Tapestry

Table 8. Individual associative tags for Image 3

4.2.4 Image 4

The fourth image was an image of a Mondrian painting that has been used beyond its initial domain in the area of fashion. The interest in the interpretation of this image was whether the respondents tagged this image with terms relating to its broader cultural history, in other words, does a multimedia object of low modality, but with a rich cultural history lead to the assignment of a narrow group of connotative terms relating to its conventional history? Two respondents tagged this image with the tag "Mondrian," one used the tag "Mondrian-esque," while one used the tag "Rothkoesque," which is categorised as descriptive in this study. Ten used the tag "modern art," five used the tag "art," while the terms "artwork," "abstract art," and "art deco" were also used. A number of respondents used tags that relate to the forms in the image: five used the tag "grid," six used the term "square," nine used the tag "lines," and one used the term "linear," two used the term "blocks." There were three instances of the terms "vertical" and "horizontal" used, the term "geometric" was used three times, and "geometric shapes" was used once. Specific colours in the image were used by a number of respondents. Ten terms could be categorised as associative. One respondent used the term "Dutch." Two respondents used value laden terms although they are quite different: one tagged the image as "cold," and the other as "nice." The terms "brick" and "window" were used, suggested perhaps by the shapes in the image. Other connotative tags included "sunset," and "shopping centre," tags attached by the same tagger who used "dining room" to tag Image 3. One tagger used the terms "meaning" and "expression," terms that are abstract but suggestive of interpretation beyond the concrete. It is interesting that, despite this being a relatively rich cultural image with a broad history, none of the respondents included tags relating to its cultural history beyond the initial creation.

Mondrian (2)
Mondrian-esque
Rothkoesque
Mackintosh
image
Famous
Art (5)
Famous art
Modern art (10)
Abstact art
Artwork
Picture
Modern
Art Deco (2)
Clarice Clift
Tate Modern
Abstract (2)
Structured (2)
Minimalist
Design
Plan
Grid (5)
Boxes
Primary colours (3)
Lines (9)
Linear (2)
Straight lines
Squares (6)
Blocks (2)
Blocks of colour
Horizontal (3)
Vertical (3)
Geometric (3)
Geometric shapes
Rectangles
Irregular patterns
Optical illusion
Black (4)
Black lines
Black grid lines
Bold lines
Red (6)
Yellow (6)
White (6)
White background
Optical illusion

Table 9. Individual descriptive tags for Image 4

Bland
Dutch
Cold
Nice
Shopping centre
Sunset
Expression
Meaning
Brick
Window

Table 10. Individual associative tags for Image 4

5.0 Discussion

The research exercise is clearly extremely limited in both size and range, and the activity itself is an artificially created activity rather than tagging on a live site. These factors limit what can be deduced from the research activity. Any results are impressionistic, and the exercise itself is a small-scale activity, which, perhaps, generates some issues to consider and some further avenues to explore. In particular, although information about the age, gender, and educational backgrounds of the respondents was captured, the exercise as it was undertaken was not broad enough to unpack the similarities or differences amongst the various groups, however, this is an area of research that could be usefully undertaken given more time and resources.

The first object of the activity was to test whether the modality model has any merit and to consider whether it might be used as a basis for a categorisation approach to multimedia indexing. The Obama image was used as a test image for the first element in the modality model. The results suggest that a multimedia image of high modality decoded at the same time as encoding does evoke a fairly limited range of denotational tags. The range of connotational tags is still relatively narrow in relation to this image at this historical moment, but the inclusion of the tag "Afghanistan?" might suggest the existence of a spectrum of ideological worldviews within even this narrow group of respondents. The tags generated by this image clearly illustrated the complexities alluded to by Hall, of categorising signs with reference to distinctions between denotation and connotation and pre-iconography and iconography. They point to how embedded ideology is in human perception and subsequent categorisation.

The image of the 1920s charabanc was used to explore the third element of the model, which was the high modality multimedia object decoded at a different historical moment from the moment of encoding. Only two of the respondents used the term "charabanc," which was the term used by the record creator to describe the image and used by the researcher to search for the image. That the respondents did not use the term does not mean that they are not aware of it, but the small numbers of respondents who used the term might suggest that there is a possibility that historically specific knowledge, for example particular vernacular terminology, is in danger of being lost if conscious efforts are not made to preserve such knowledge. The respondents generally have a sense of the historical context of the image however, even though that knowledge might not be specific or, indeed, accurate. What was interesting is that a number of the respondents commented on the perceived class status of the group in the charabanc suggesting that they are able to decode the signification of the charabanc in its contemporary terms. This ability depends on the respondents' historical and cultural knowledge.

The image that was used to test the second element in the modality model was a generally unknown modern abstract. This image evoked responses that were primarily denotative and focused on the colours, shapes, and form of the image. Where connotative tags were used, the range was relatively wide, although the term "rain" was used by four of the respondents. This result is of some interest. There is nothing in the image to explicitly suggest rain; indeed, the brush strokes are in a range of colours not normally associated with natural hues of rain. The connotative association with rain is likely to come from the brush strokes, which are broad and linear. This result is of some interest in relation to the broader discourse of semiotics, in particular, Peircean semiotics. Peirce was interested in the process of semiosis through which meanings could be generated endlessly from signs, and, as explained earlier, Peircean sign functions include the index, the icon, and the symbol. A specific sign can operate as any or all of these functions at any given moment read from different perspectives by different readers, and the functions may be historically contingent. It can be difficult to distinguish between iconicity and indexicality. Hodge and Kress (1988, 27) explained that indexicality is a matter of judgement, so that icons are the class of signs which has the highest modality, in other words, icons have a higher reality status than either indexes or symbols, where reality refers to a relationship with the world. In relation to this exercise, the brush strokes which evoke "rain" for some of the respondents are operating at an indexical and symbolic level. The broad straight brush strokes representing rain is a culturally learned sign.

The digital copy of a Mondrian painting was used to explore the fourth element of the modality model, the low modality image decoded at a different historical moment from the moment of encoding. As expected, this image was recognised and "placed" by a number of respondents who had the appropriate cultural and historical knowledge. The speculation was that the image might evoke connotative associations relating to the subsequent cultural history of the image, but this proved not to be the case. Interestingly, one respondent tagged the image with the term

"Mackintosh." The analytical model used in this study would record this tag as a descriptive tag. It is iconographic in that it draws on cultural knowledge. The analytical model does not distinguish between accurate and inaccurate cultural knowledge, but in its inaccuracy, this tag becomes an interesting connotative tag. For the tagger, this image evokes Mackintosh. Such an evocation might suggest that incorporating some form of intertextual links in an image storage and retrieval system could enrich the system as a knowledge base.

The range of associative tags used in relation to the Obama image is particularly interesting and worthy of further exploration. The literature of social semiotics suggests that meaning in relation to documents is bounded by logonomic parameters operating at any given time so that at any particular moment there would be only a range or spectrum of interpretative meanings possible in a specific culture. Logonomic systems are not ontological but historical, so any fully developed theory of logonomic parameters and interpretation needs to address questions of diachronic transformations; however, the notion of the range or spectrum of meaning is potentially interesting in relation to the tagging of images. This exercise was too small to explore the issue in detail, but the inclusion of both positive and negative tags in response to a modern, high modality image suggests that the issue is worth exploring.

6.0 Concluding Remarks

Underpinning this paper is Hodge and Kress's (1988) approach to modality in signs and their view that modality judgements involve comparisons with models of the real world, and with models of the genre, in the context of this exercise, representational photographs and abstract artworks, so modality works on both mimetic and semiotic planes. What is considered to closely represent reality at one historical moment may for future generations seem conventionalised and artificial, while judgements about the representation of the real depend on the codes and conventions within which and through which the viewer reads and interprets the multimedia informational object. The operation of meaning in multimedia is a function of the content of the object and the codes and conventions relating to specific historical and societal moment at which reception occurs so that the meaning of information changes over time.

We have seen that within the communicative domain of visual communication, images range from those which are extremely high in modality to images which have self-consciously low modality, most images occupying a point within those two extremes along a continuum representing relationship with reality. The purpose and provenance of the image, if it can be identified, will be important in thinking about semiotic encoding and about whether the "preferred" reception position has been determined and controlled by the encoder, or whether the meaning(s) might be more fluid, ambiguous, and open to interpretation. This issue leads to questions about the interpretation and reception of signs. Does the meaning of an image depend on the meaning attached by its creator, and, if so, how can we know what that meaning is, or does the construction of meaning occur when the viewer interprets the image? Is the image the sole source of meaning or does the viewer (re-) create meaning in interpreting the image? These questions are of some interest in relation to the interpretation of multimedia images, as demonstrated in the research activity, perhaps particularly in relation to the abstract images.

Overall, this limited exercise suggests that the modality model might be of some use in categorising images within an image IR system. It confirms Hall's view about the artificiality of distinguishing between denotation and connotation. Often, one level of meaning melds into the next. The exercise also suggests that leaving the annotating and tagging solely to users could lead to the loss of historically contingent information over time unless conscious efforts are made to preserve it. Hidderley and Rafferty's "level of meanings" model used as a template for annotating images might well be useful in relation to structuring and controlling tags and might be used along with modal categorisation. The image based levels of meaning template is shown in Table 11.

The template is partly built on Panofsky's (1993, [1933]) approach to interpreting images and partly influenced by Barthesian (1973, [1957]) distinctions between denotation and connotation. Underpinning this model is a view that meaning is not ontological, and even in the case of the highly readerly text, resident in the signifying object, but rather that meanings are historically contingent and constructed by human interpreters of the signifying object.

Finally, the exercise suggests that developing a retrieval tool using genre and the intertextual nature of multimedia objects might lead to the construction of rich, knowledge based system. A pilot intertextual system for literature has already been developed (Vernitski, 2007). The purpose of Vernitski's fiction

Level & Category	*Description*	*Some examples*
1.1 Biographical	Information about the image as a document	Photographer/artist, date & time of creation, colour/B&W, Size, Title
1.2 Structural contents	Significant objects & their physical relationship within the picture	Object types, position of object, relative size (or importance) within the picture, e.g. car top right.
2.1 Overall content	Overall classification of the image	Type of image, "landscape," "portrait," ...
2.2 Object content	Classification of each object defined in 1.2	Precise name & details of each object (if known), e.g. Margaret Thatcher, Ford Orion...
3.1 Interpretation of whole image	Overall mood	Words or phrases to summarise the image, e.g. "happy," "shocking"
3.2 Interpretation of objects	Mood of individual objects (when relevant)	e.g. Margaret Thatcher triumphant, defeated.

Table 11. Levels of Meaning table

system is to produce a knowledge-based tool for literary scholars, but intertextuality, as Barthes (1981) and Kristeva (1986) theorize it, refers not only to scholarly quotations, but to the notion of text as mosaic. The responses provided in this exercise, although small scale, suggest that decoders operating within specific cultural and historical moments share an understanding of cultural genres which are contemporary with them and anterior to them, at least when those genres relate to the recent past. Developing a tagging template which incorporates intertextuality, the meaning spectrum, and generic categorisation within an historically sensitive IR system that recognises the importance of diachronic transformation might be the way to create a knowledge based resource for image storage and retrieval.

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Image URLS

Image 1 Barack Obama. Available http://www.flickr.com/photos/fastlaine/3057356781/

Image 2 Jersey charabanc. Available http://www.flickr.com/photos/fabulousminge/1848905384/

Image 3 Modern abstract artwork. Available http://www.flickr.com/photos/mrfitz/94388435/in/set-72157603892112260/

Image 4 Mondrian: Composition with yellow, blue, and red, 1921, Webmuseum, Paris. Available http://www.ibiblio.org/wm/paint/auth/mondrian/ryb.jpg