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Pictures in words: Indexing, folksonomy and representation of subject content in historic photographs

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A thesis submitted in fulfilment of the requirements
for the degree of
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7 November 2013

USE OF THESIS

The Use of Thesis statement is not included in this version of the thesis.

ABSTRACT

Subject access to images is a major issue for image collections. Research is needed to understand how indexing and tagging contribute to make the subjects of historic photographs accessible.

This thesis firstly investigates the evidence of cognitive dissonance between indexers and users in the way they attribute subjects to historic photographs, and, secondly, how indexers and users might work together to enhance subject description. It analyses how current indexing and social tagging represent the subject content of historic photographs. It also suggests a practical way indexers can work with taggers to deal with the classic problem of resource constraints and to enhance metadata to make photo collections more accessible. In an original application of the Shatford/Panofsky classification matrix within the applications domain of historic images, patterns of subject attribution are explored between taggers and professional indexers.

The study was conducted in two stages. The first stage (Studies A to D) investigated how professional indexers and taggers represent the subject content of historic photographs and revealed differences based on Shatford/Panofsky. The indexers (Study A) demonstrated a propensity for specific and generic subjects and almost complete avoidance of abstracts. In contrast, a pilot study with users (Study B) and with baseline taggers (Studies C and D) showed their propensity for generics and equal inclination to specifics and abstracts. The evidence supports the conclusion that indexers and users approach the subject content of historic photographs differently, demonstrating cognitive dissonance, a conflict between how they appear to think about and interpret images.

The second stage (Study E) demonstrated that an online training intervention affected tagging behaviour. The intervention resulted in increased tagging and fuller representation of all subject facets according to the Shatford/Panofsky classification matrix. The evidence showed that trained taggers tagged more generic and abstract facets than untrained taggers. Importantly, this suggests that training supports the

annotation of the higher levels of subject content and so potentially provides enhanced intellectual access.

The research demonstrated a practical way institutions can work with taggers to extend the representation of subject content in historic photographs. Improved subject description is critical for intellectual access and retrieval in the cultural heritage space. Through systematic application of the training method a richer corpus of descriptors might be created that enhances machine based information retrieval via automatic extraction.

DECLARATION

I certify that this thesis does not, to the best of my knowledge and belief: incorporate without acknowledgment any material previously submitted for a degree or diploma in any institution of higher education; contain any material previously published or written by another person except where due reference is made in the text; or contain any defamatory material.

Signature: _____

Date: 7 November 2013

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I thank the indexers, researchers, and many tagging participants who gave generously of their time in agreeing to participate in this study. I am grateful for their interest and enthusiasm for my project.

I am indebted to my colleague Vicky Wilson who spurred me to embark on this research.

I thank my previous professional colleagues in the JS Battye Library of West Australian History of the State Library of Western Australia. My work with them to catalogue and digitise the photographic collections served as part of my inspiration for this research. The many discussions and the issues we faced in working together to improve access to these collections were a constant incentive to my research and a reminder of its value.

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1. INTRODUCTION

1.1 Overview

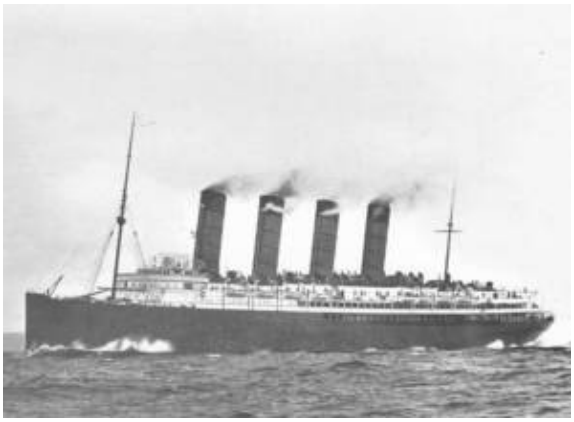


Figure 1.1 – A Steamship

This photograph[1] (Figure 1.1) shows an early twentieth century four-funnelled steamship. Without a caption or other metadata, there may be little more that can be said about the image.

Figure 1.2 – Lusitania passing Old Head of Kinsale

The photograph, in fact, is a detail of a larger photograph (Figure 1.2), originally taken in 1911, which identifies the ship as the Lusitania. The bibliographic record from the library that contributed the photograph to Trove (previously Picture Australia) provides three objective subjects: "Lusitania (Ship)"; "Steamboats"; and,

[1] Pocock, M. (2013), 'Lusitania (1907)', *Maritime Quest*, retrieved 25 September 2011 from http://www.maritimequest.com/liners/lusitania_page_3.htm.

"Passenger ships". Yet, this photograph is inscribed below the image: "IT WAS OFF HERE SHE WAS TORPEDOED WITH A LOSS OF 1446 LIVES. MAY 7. 1915. Most savage episode of the war." [2]

How does the inscription on the second photograph change our understanding of these images? How should the associations with the subsequent tragic story of the Lusitania, explicitly highlighted in the inscription, be addressed by an indexer in analysing the subject content of the photographs?[3]

Intellectual access to images is a major issue for libraries and for historic photographs, my particular professional area of interest, indexing is critical. As a practitioner and library manager overseeing cataloguing and digitisation projects of historic photographs with limited resources, I have been very involved with the challenges of practical indexing for many different user needs. I have observed indexing practices where the analysis of subject content consistently produced specific and generic subject headings but where the "bigger picture" was ignored.

My research has been motivated by questions about what professional indexers consider constitutes the subject content of an image, what subject concepts they choose to represent with subject headings, and how useful these will be to potential users. Do indexers' subjects match those of users? Do professional and institutional frameworks and training provide different points of reference that cause a gap between indexers' perceptions of subjects and those of users? During my earlier career as an art historian, I observed the gap that often exists between art historians' and users' subject descriptions, a gap that has motivated growing interest by art museum professionals in user-contributed subjects through tagging (Trant, 2009, p.

[2]State Library of Victoria (2013), *It was off here she was torpedoed with a loss of 1446 lives. May 7. 1915.* [bibliographic record], retrieved 25 September 2011 from http://search.slv.vic.gov.au/primo_library/libweb/action/dlDisplay.do?vid=MAIN&reset_config=true&docId=SLV_VOYAGER1754623.

[3] See Errol Morris' discussion of a similar Lusitania photograph from Maritime Quest and the comments posted in response. (Morris, E. (2007, July 10), *Liar, liar, pants on fire* [Web log post], retrieved 25 September 2011 from http://morris.blogs.nytimes.com/2007/07/10/pictures-are-supposed-to-be-worth-a-thousand-words/.)

5). Does a similar gap exist between library indexing of historic images and user subject descriptions?

Equally important, cost-effective indexing methods are essential because cataloguing is labour intensive and, with more detail becomes increasingly expensive (Calhoun, 2006; Hider, 2012). Estimates for cataloguing individual photographs range from twenty minutes (Lusenet & Klijn, 2004) to at least one hour (Arms, 1999, pp. 380-381, 390). A survey of UK museums and archives found the number of catalogue records created in a six-hour day ranged from 2 to 37 full records (Will, 2001).

Furthermore, the availability of images on the Internet increases the need for practical solutions to problems of intellectual access (for an overview see Enser, 2008) and has revived interest in the topic of relevance (reviewed by Saracevic, 2007a, 2007b). Metadata, or information resource description, is needed "to provide effective *access* to information resources" (Hider, 2012, p. 18). Trove,[4] which absorbed the National Library's first discovery service Picture Australia in 2012, has more than seventy national, state and local institutional contributors and over two million images. Subject description is critical for effective retrieval from such expansive collections. Research on web users has found evidence for online search failure rates ranging from 19% (Pu, 2008) to nearly 50% (Hembrooke et al., 2005), and for short search queries, averaging about two to four terms, for which current classification systems appear to perform poorly (Jansen, 2008; Markey, 2007a). Importantly, searchers working online lack the expert mediation that professionals can provide to assist their search for image content (Enser, 2008; Lehane, 2006). As well, the metadata provided to represent online images by cultural institutions has not been adequately supplied (Angel, 2012).

The key challenge of image access, expressing the content of an image, has been very widely discussed over the last twenty years (summarised in Enser, 2008). Specifically the optimum strategy for categorising images is still debated (Ransom & Rafferty, 2011; Rorissa & Iyer, 2008).

[4] Located at http://trove.nla.gov.au/picture?q.

A subject classification system is only useful if professional indexers choose concepts in the same way as users think, however, users find it difficult to expand their range of subject terms (Bates, 2003). This highlights the need to learn more about users and how different domain knowledge may affect subject identification.

Since its inception as a formal discipline in the nineteenth century, library and information science has focussed on developing metadata directories (catalogues) that represent the information contained in documents and facilitate efficient and effective access (Miksa, 1983) through topical relevance (Saracevic, 2007a, 2007b). While the concept of the "subject" is critical, subject indexing poses major difficulties and the lack of an indexing theory "has long been considered as a blind spot in the theory of classification and indexing" (Chowdhury, 2004, p. 86).

Despite its importance, the process involved in deciding on a subject is little understood and there is a surprising lack of research on how it should be done (Mai, 2005). This is particularly true for the appropriate range and type of image attributes to be indexed (Laine-Hernandez & Westman, 2006; Menard, 2007). Gorman (2002) argued that information professionals incorrectly assume that they understand users. The critical issue is that "meanings of concepts are created, maintained, or developed within discourse communities, a domain, a culture, or a society" (Brier, 2004, p. 637) and human indexing is problematic as "indexers and searchers do not participate in the same language games. Their work and social environments are different..." (ibid., pp. 652-3). The diversity of textual description is a key challenge for major on-line research collections when "each collection's data structure is typically tailored to a contributor's own needs" (ARTstor, 2004). Recent research has investigated the different interpretations of a document that are developed by different user groups or discourse communities and the way these may put different demands on how systems provide access to documents (Hjorland, 2002, 2004; Mai, 2004; Menard & Smithglass, 2012; Rorissa & Iyer, 2008; Yoon, 2009).

The openness of the image to multiple readings increases the complexity of indexing it. Several writers have suggested community input to indexing annotation as a possible solution, and there have been several museum-based projects that have attempted this (Chan, 2008; Jorgensen, 2004; Trant, 2006; Trant & Bearman, 2007;

van Vliet & Hekman, 2012; Wyman et al., 2006). Social tagging, also known as folksonomy, is the collaborative classification and/or "distributed indexing" by users. Commonly identified with the Flickr photo sharing service, social tagging offers another paradigm to traditional indexing. Various institutions participate on the Flickr Commons[5] where taggers are invited to tag and comment on the available images. Researchers have compared social tagging descriptors to existing index terms (Rorissa, 2010; van Vliet & Hekman, 2012) or to controlled indexing vocabularies (Jorgensen, 1995; Stvilia & Jorgensen, 2010). It has been suggested that hybrid classification, i.e. traditional indexing and tagging, will be the way forward (Aurnhammer et al., 2006; Menard, 2007; Menard & Smithglass, 2012) and such an approach has been piloted at the Powerhouse Museum in Sydney, Australia (Chan, 2008). However, there has not been a rigorous analysis of how traditional indexing or tagging choices represent the subject content of historic photographs, based on a framework developed specifically for visual images. This research attempts to address this omission in the research literature. While the research focus is historic photographs, my professional area of interest, it is expected that the results may be applicable to other types of photographs

From the early 1990s, intensive research has addressed automated or content-based image retrieval (CBIR), based on the data structure of digitised images. However, to what extent do cataloguing and indexing by automatic (algorithmic) methods need to be mediated by human intelligence? The CBIR paradigm was initially promoted as the solution to text-based image retrieval problems; but it only provides access to low level image attributes, such as colour, texture and shape, and cannot provide access to images at the higher semantic level required by human users. Current research advocates a hybrid approach to image retrieval, where CBIR complements text-based description, as the way forward (Enser, 2008). For historic photographs, the indexer or tagger is unlikely to be replaced any time soon by artificial intelligence in the reliable attribution of subjects to historic images.

[5] The Flickr institutional participants are listed at http://www.flickr.com/commons/institutions/.

1.2 Statement of the problem

There is little understanding of how professional indexers analyse and represent the subject content of historic photographs. Indexing is critical "to represent the contents of the analysed sources in a way that will be suitable for matching users' queries" (Chowdhury, 2004, p. 3), so it is important to understand how indexers' subject concept choices relate to those users are interested in. Users' descriptions provide insight to the subjects they are likely to use when searching. A better understanding of indexer and user subject choices can inform future indexing and user tagging and help improve the representation of the subject content of historic photographs in order to facilitate intellectual access.

1.3 Aims of the research and the research questions

How indexing represents the subject content of historic photographs is fundamental to making them accessible. Historically, access to collections was available only through onsite catalogues where indexing was often limited to concrete or specific subjects. The choice of subject concepts underpins the subsequent translation of the identified concepts into the controlled vocabulary and this critical first stage is the focus of the research. Users requiring interpretative access to image content had professional staff available to help. Today, these collections are online without the ready availability of professional assistance. Other approaches, such as social tagging, offer alternatives to institutionally mediated access.

This research investigates whether professional indexers and users have essentially different approaches to analysing the subject content of historic photographs. Using a combination of qualitative and quantitative methods, it firstly investigates whether there is evidence of "cognitive dissonance", a conflict between how indexers and users appear to think about and interpret images. Secondly it investigates whether social tagging might be used to improve subject description and what the implications of a training intervention might be on tagger behaviour.

The indexing of historic photographs is supplied mostly as a public good. In circumstances where institutions have only scarce resources available, it makes sense

to think about future approaches to creating metadata (Hider, 2012) and how indexers and taggers might collaborate.

The two principal research questions are:

> *PQ1 - What is the evidence of difference between indexers and users in the way they attribute subjects to historic photographs?*

> *PQ2 - How can indexers and users work together to enhance subject content representation of historic photographs?*

The principal research questions (PQ1 and PQ2) have four related sub-questions. It is important to understand how professional indexers and users currently describe the subject content of historic images and how their approaches differ before investigating possible solutions. The first "problem-oriented" questions are:

> *RQ1 - How well does current indexing practice represent the different levels of subject content found in historic photographs?*

The target group for this research is professional indexers. If professional indexers do not fully represent subject content, then this may have implications for recall and user searching of historic photographs.

> *RQ2 - How well do users' descriptions and current tagging represent different levels of subject content found in historic photographs?*

Do users represent subject content differently? The literature on user subject attribution with historic images is sparse. A better understanding of what users describe, and how their approach differs from professional indexers, is needed to evaluate whether they can play an important role in expanding the corpus of descriptors and assist with the problem of resource constraint with indexing.

The solutions-oriented questions are:

RQ3 - How does training affect user annotation for representing the subject content in historic photographs and the resulting folksonomies?

Training provided by professional indexers might support taggers in their interpretative development and the annotation of further concepts found in historic images. Improved representation of the subject content of historic photographs will likely improve recall and hence the user experience of information retrieval with historic images.

RQ4 - How should tagging be supported to achieve better representation of subject content found in historic photographs?

If the answer to RQ3 provides evidence of positive effects from indexer/tagger cooperation, it suggests how tagging might be supported with benefits to users. For example, by harnessing tagger efforts, cultural institutions might improve access to historic photographs within their existing resources.

1.4 Significance of the research

The research findings and conclusions will contribute to understanding of indexing and indexing theory and of human categorisation of visual information.

An awareness of the basis of current indexing will help institutions evaluate its appropriateness in meeting their users' needs and, hopefully, develop strategies to improve access to image subject content. The research findings can provide direction to institutions about areas where their goals, policy, and procedures for indexing should be clarified. The importance of alternate points of view and domain knowledge in providing access may encourage institutions to integrate user tagging with their indexing.

A better understanding of current indexing has implications for individual practice. The findings should be a catalyst for professional indexers to consider what factors influence their own indexing and how these may limit their effectiveness. It is hoped

this might encourage them to develop their knowledge and skills and sensitise them to other domain perspectives.

This research aspires to provide practical direction in the way institutions can work with users to enhance subject representation to meet their subject access needs more effectively. Such cooperation offers opportunities for taggers to directly contribute to indexing for the benefit of other users and assists institutions with limited resources to make collections more widely accessible.

Incorporating tagging in information retrieval systems also has important implications for systems design and the institutional management of user contributions. If taggers contribute data directly, then systems need suitable interfaces and functionality to allow collaboration. Institutions will have to develop appropriate policies and methods to manage and integrate indexing and tagging.

The research has implications for professional education and the role of indexers. Professional education in visual information and image interpretation might be needed. Working with taggers will require new skills and could transform the role of indexers.

1.5 Overview of the thesis

This research examines how individuals attribute subjects to historic photographs. Its aims are to gain insight about the interpretation of visual material, to develop indexing theory and guide professional practice, and to contribute to practical methods for making images accessible. Given the nature of the research focus and the questions, a mixed methods research design, employing quantitative and qualitative investigation, is considered the best approach.

Descriptive and inferential statistics are used to analyse and interpret categorical distributions and relationships between variables such as descriptors by subject level and facet. A qualitative analysis is also used to confirm or corroborate the quantitative results. The use of a mixed-method design provides triangulation of

results and reduces the weaknesses or biases that may arise from the use of any single approach.

1.6 Structure of the thesis

The research presentation is outlined below.

Chapter 2 provides a review of the literature relevant to the research. The analysis of the literature explores how two major approaches to indexing, the positivist and the interpretivist, serve to frame and situate the research. It will be argued that the positivist standpoint shapes current indexing practice while the interpretive approach more closely reflects users' perspectives, thus creating a gap between indexing and user needs.

Chapter 3 presents the research methodology and design. This chapter describes the research approaches and how the data are collected and analysed. The Shatford/Panofsky classification matrix is introduced as the intellectual framework for analysing subject levels and facets. Assumptions and limitations of the methodology are addressed.

Chapters 4 to 7 comprise the "problem-oriented" phase of the research:

Chapters 4 and 5 report the analysis and interpretation of the data collected in the study with professional indexers (Study A) and the pilot study with users (Study B). Particular attention is given to examining the indexing process and what factors influence the subjects indexers choose to index. Comparisons between indexers and users are made and analysed.

Chapter 6 presents a critical review of the research design of the tagging studies. Following the first study with online taggers (Study C), a change in recruiting participants was required and its impact on the research is evaluated.

Chapter 7 reports the analysis and interpretation of the data collected in the two baseline Studies C and D with taggers. The evidence of cognitive dissonance between professional indexers and taggers is examined.

Chapter 8 presents the "solutions-oriented" phase of the research (Study E). This chapter describes the online training intervention and evaluates its effect on subsequent tagging on the research website.

Chapter 9 describes the contribution to knowledge made by the research and places the key findings in the context of other work. A complete list of outcomes of the research is proposed and justified. The analysis includes how the outcomes were reached, why they are claimed to be valid, and any qualifications or limitations. The chapter includes reflections on the research. The implications for indexing, tagging and information retrieval systems and future research directions are outlined.

The appendices contain transcripts of interviews and photo analysis sessions, copies of the Flickr research website for each online study, and other related documentation.

1.7 Definition of terms

Access

Intellectual access to the content of images, provided through bibliographic records, indexing, and tagging is the aspect of access explored in this research. Physical access, that is direct access to the original photographic object or surrogate, including a digital reproduction, is outside of the scope of this research.

Discourse and domain

Discourse refers to the ways of talking and thinking about a certain topic within a community. It has come to refer to systems of knowledge and their associated practices (Foucault, 1972). More narrowly, discourse refers to particular systems of language, in actual use within its social and ideological contexts, with a characteristic terminology and underlying knowledge base, such as legal discourse, or the language of cultural studies.

Domains comprise disciplines or fields of knowledge. A domain may also be a discourse community.

Cognitive Dissonance

"Cognitive dissonance" is used in modern psychology to describe the condition of conflict arising from inconsistency in an individual's beliefs and actions. The term, as used in the context of this research, is intended to describe the conflict between how different individuals appear to think about and interpret images.

Folksonomy

Folksonomies are "sets of categories" derived from "tags that are used to characterize some resources" (Halpin et al., 2007). The term "folksonomy" was coined by Vander Wal (2005).

Historic photograph and Image

An historic photograph can be produced by any one of a variety of photographic processes. The *image* is the content of the photographic object. However, the literature relevant to this research rarely distinguishes between these two terms.

Similarly, when discussing paintings or other art works, the terms are used as equivalents to image. More generic phrases referring to images, such as visual representation or visual information, are also found in the literature. The various terms referring to pictorial representations of a person, scene or object will be used as appropriate or to reflect the authors' original language.

Image will be used to refer to the content of photographic objects and other pictures rather than to mental imagery.

Image analysis

Image analysis is used to describe the techniques to analyse the subject content of an historic photograph or image and to express these subjects in indexing terms (ISO, 1985). The equivalent term in text indexing is “document analysis”.

Indexing

Indexing, as defined by the International Organisation for Standardisation (ISO, 1985), is "the act of describing or identifying a document [including an image] in terms of its subject content". The description of the subject content involves the “identification of those concepts which are essential elements”. Each concept is then translated into an index term which is "the representation of a concept, preferably in the form of a noun or noun phrase" taken from "a controlled set of terms selected from natural language and used to represent, in summary form, the subjects of documents". The activities relating to the identification of concepts are the primary focus of this research.

Interpretivist

The interpretivist approach is interested in the “meanings and experiences of human being” and that people are “constantly involved in interpreting their ever-changing world” (Williamson & Johanson, 2013, p. 9). Interpretivism, sometimes referred to as naturalistic enquiry, encompasses a range of approaches which focus on meanings constructed by individuals and on qualitative data (ibid., p. 9ff.).

Ofness* and *Aboutness

Ofness is what a viewer can see and name in the image, whether objects or events.

Aboutness is the interpretation of the themes, narrative, iconography or symbolic meaning contained in an image.

Positivist and objectivist

The positivist approach takes an empiricist view of the nature of science and attempts to establish general laws (Williamson & Johanson, 2013, p. 9). It is based on "objectivist or realist ontology - the assumptions that social reality exists out there irrespective of the observer" (ibid., p. 120). Positivism applies scientific methods and quantitative data collection; "measurement" and "objectivity" are key tenets and common research designs are experimental and survey (ibid., p. 7).

Subject

The definition of *subject* is very difficult and variants in meaning and interpretation are found in the literature. *Concept*, *aboutness* and *ofness* are used with varying degrees of synonymy with subject. Various writers use other terms such as topic, theme, or topical content to refer to the subject. The terms are used interchangeably in the literature and will be used in appropriate contexts to refer to the subject.

Subjects of images include "things, places, activities, abstract shapes, decorations, stories, and events from literature, mythology, religion, or history. Philosophical, theoretical, symbolic, and allegorical themes and concepts may be subjects. Subjects...may be *narrative*...; they may be *non-narrative* [italics in original]…" (Visual Resources Association, 2004, p. 176).

Tagging

Tagging is "the process by which many users [contributors] add metadata in the form of keywords to shared content" (Golder & Huberman, 2006). Online social networks, for example the popular photo sharing and tagging service Flickr, "allow participants to annotate a particular *resource*, such as…an image" (Marlow et al., 2006a).

Warrant

Warrant is the "authority a classificationist invokes first to justify and subsequently to verify decisions" (Beghtol, 1986b, pp. 110-11). The classificationist uses warrant

to justify a subject concept. Literary warrant is the "topics around which literature has become established" (Beghtol, 1995).

2 LITERATURE REVIEW

2.1 Introduction

This research is about understanding differences between professional indexer and user subject analysis and description of subjects in historic photographs. The literature review is in three parts. The first part (section 2.2) focuses on the traditional Library and Information Science (LIS) approach to indexing. The review shows that this positivist approach affects the conceptualisation of the subject and what image content is indexed. The second part (section 2.3) discusses the challenge of interpretative indexing and how users "read" and search for images. Understanding user interpretation is essential if image indexing is to meet their needs. Finally, in the third part (section 2.4), the process of professional indexing is reviewed and evaluated.

2.2 The positivist approach

The positivist approach in LIS and the key literature in this area are mapped in Figure 2.1. The figure shows relationships between the major themes which are then explored in specific sections of the review.

Positivism is the governing LIS epistemology (Budd, 1995; Hjorland, 2005; Radford, 1992; Svenonius, 2004). It is based on the empiricist view of the nature of science and attempts to establish general laws. LIS traditionally has focussed on techniques, standards and rules for organising and representing documents, including images, in an information system.

The rules-based approach dates from Cutter's *Rules for a Dictionary catalog* (1904), which has shaped subsequent practice (Miksa, 1983). Cutter's injunction that to use the most specific heading is the "foremost rule in indexing" (p. 67) remains a foundation of modern indexing (Svenonius, 2000) and is still found in textbooks, for example, Lancaster (2003, p. 35). The approach developed for texts provides the basis for image indexing. It has resulted in a narrow notion of the image subject and indexing limited mostly to objective content.

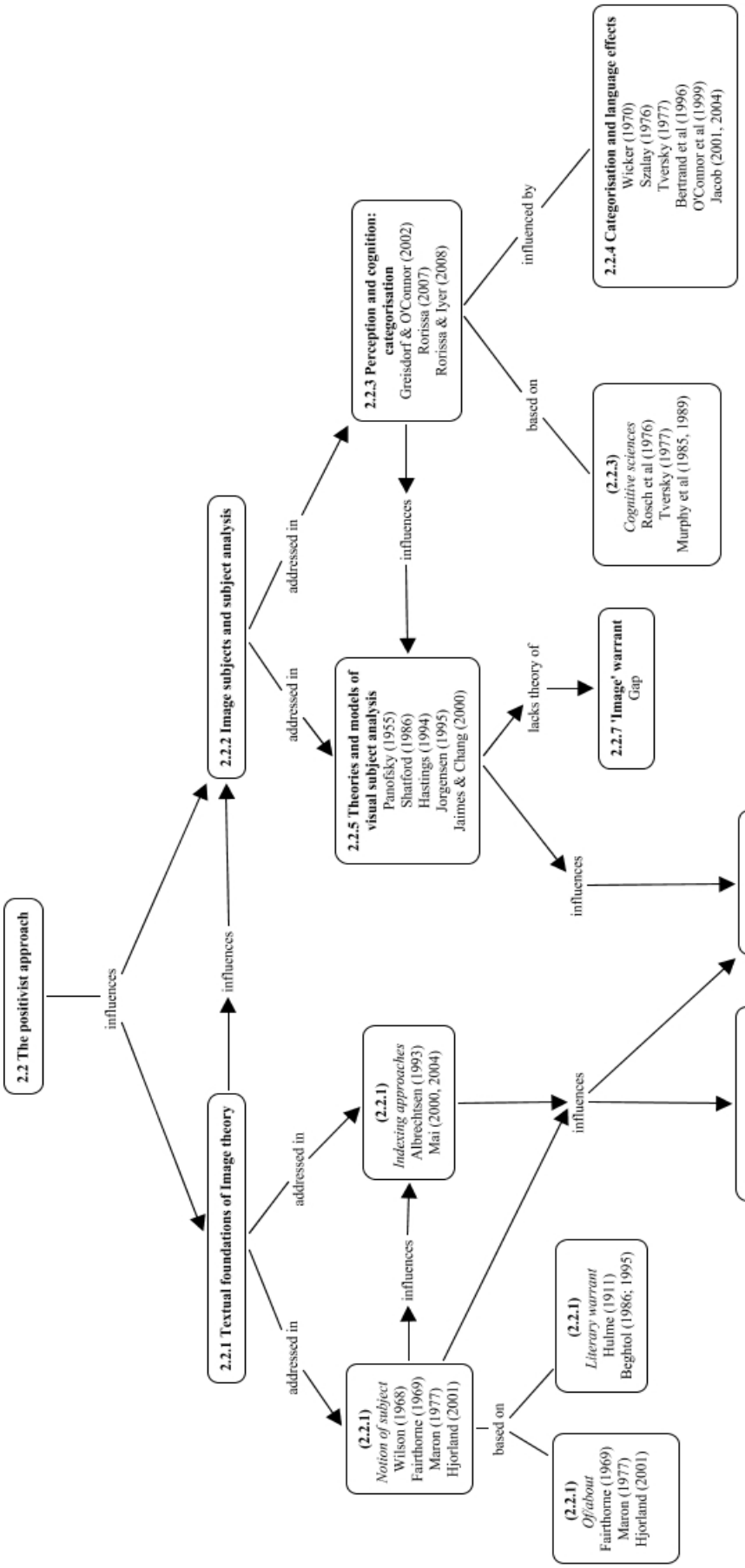


Figure 2.1- A mapping of the positivist literature

An alternative to indexing is computer-based image retrieval, referred to as *content-based image retrieval* (CBIR), which uses colour and shape features for automatic image retrieval from a database. While CBIR has been successful for facial recognition and various scientific applications, Trant (2004, p. 5) comments on its "failure" in museum and library applications and Hider (2012, p. 183) on its weakness in dealing with non-verbal information. The CBIR matching process on low level visual image attributes, such as colour, texture and shape, mean human cataloguing and browsing are still critical (Lesk, 1998). Bates (Bates, 1998, p.1186) has concluded that automated access doesn't meet all human needs, because information retrieval "involves language and cognitive processing". Sormunen (Mark Pejtersen et al., 1998) has stated that most of the identified needs of users he has studied include query attributes outside the image or that are too complex for current CBIR techniques. Forsyth (Forsyth, 1999, p.348) has concluded queries at semantic level encounter "deep and poorly understood problems in object recognition".Enser (2008), in an overview of visual image retrieval, reviewed CBIR and concluded that the consensus within LIS is that human intellect is still required for "high-level" indexing. The problem with the semantics of higher level retrieval is that understanding of how to program for analysis and recognition of objects in images falls far short of the task.

2.2.1 Textual foundations of image indexing

The concept of the subject has produced several competing viewpoints without yielding a clear understanding (Andersen, 2004, p. 128ff.). A major early theorist suggested the very definition of subject is intractable (Wilson, 1968). One response to these difficulties is the concept of *aboutness*.

Robert Fairthorne (1969), a prominent early LIS thinker, suggests two types of aboutness: the content of the parts or intrinsic to the item; and the reason or purpose for which a library has acquired, or a user requested, an item. The first type is document-centred and the second need or user-centred. The latter, according to Fairthorne, depends on the environment of use, the type of user and the user need; consequently an indexer cannot "index only matters of interest that are referred to in the document. For a document can be of interest for reasons that appear only when it

is judged against the background of its expected environment of use" (ibid., p. 77). Furthermore, a document is a "unit of discourse" and indexing must respond to discursive activities (ibid., p. 79).[6]

Maron (1977) distinguishes three types of aboutness: subjective, objective and retrieval aboutness. These respectively relate to the personal experience of the subject; its inherent subject; and the combined. Retrieval aboutness anticipates the request-oriented approach to indexing (Soergel, 1985). Maron suggests an index term should not merely be extracted from or summarise a document, but should be based on the probability that it will match a user search term. Maron does not explain how an indexer might know what concepts would satisfy users. He also appears to assume a "class" of library users whereas there are many different user communities.

Despite criticism that proponents have failed to properly clarify what aboutness means (Lancaster, 2003), the concept is an accepted part of LIS literature where subject and aboutness are usually treated as synonymous (Hjorland, 2001, p. 774). A standard information retrieval handbook suggests that the first step in indexing is deciding on the aboutness of an item (Chowdhury, 2004, p. 74).

In the absence of a clear subject theory, the LIS literature focuses on indexing approaches. Albrechtsen (1993) suggests there are three basic approaches: simplistic, content-oriented, and requirements-oriented. Simplistic indexing considers subjects to be objective entities[7] which can be extracted manually or automatically from the terminology of the text. Content-oriented indexing combines extraction with interpretation of implicit information to identify further subjects. Both of these approaches are document-oriented. The third approach, also known as request-, user- or cognitive-oriented indexing, asks "under what descriptors should this entity be found?" (Soergel, 1985, p. 230). The aim is to match indexer and information retrieval system terminology to user search terms.

[6] See further section 2.3.3, p. 37, on discourse communities.

[7] Discussions of indexing often tacitly assume a document centered approach is objective. The interpretive nature of any indexing is revealed by studies of inter-indexer inconsistency (briefly reviewed in Olson & Wolfram, 2008).

Mai (2000, pp. 288-289) refines Albrechtsen's model into a continuum of five indexing approaches: simplistic (automatic extraction); document-oriented; content-oriented; user-oriented; and requirement-oriented. In a further refinement Mai (2004) extends the user-oriented with a domain-centred approach based on the later work of Albrechtsen (1995) and Hjorland (2002). This attempts to understand the domain and users, and the indexer's role in analysis. It provides a "clear frame of reference for making decisions when indexing and it ensures that the indexing is consistent with the users' use of the information" (Mai, 2005).

Traditionalists would argue that LIS already incorporates the domain perspective. The concept of warrant, first coined by Hulme in 1911 (Svenonius, 2000, p. 135) and fundamental to text indexing, is the "authority a classificationist invokes first to justify and subsequently to verify decisions" (Beghtol, 1986b, pp. 110-111). Literary warrant is the "topics around which literature has become established" (Beghtol, 1995). Modern classification systems such as the Library of Congress Subject Headings are explicitly based on literary warrant (Olson, 2002, p. 143) but how well they reflect different domains is debatable.[8] Furthermore, library classification legitimates classification and a cataloguer considering the question "what is the nature of the pre-existing subjects (discursive formations[9]) to which a new book can be assigned?" can use it as grounds for designating classification numbers and subject headings (Radford & Radford, 2005, p. 70ff.). Sauperl (2004, pp. 61-62) provides evidence that cataloguers "consciously developed the cataloger's meaning" and are "more oriented toward their professional community than to authors or readers of the documents."

While there have been a variety of approaches suggested in the literature, indexing remains largely document-centered (Mai, 2005) and the meaning of documents that is developed essentially is its meaning within the LIS domain. This is a fundamental issue for information retrieval on the Internet. The development of metadata

[8] Similarly, online ontologies developed solely by experts will not represent domains as well as those developed with end- users' participation (Bachore, 2012).

[9] The ways in which material elements organised with respect to each other, for example books on shelves in classification order, are an example of Foucault's discursive formations (Foucault, 1972).

standards, while welcome, "can do nothing to improve the quality of the catalogues themselves and the need for careful, systematic description remains as great as ever" (Lusenet & Klijn, 2004, p. 26). Furthermore, these catalogues:

> contain documents produced by different paradigms, specialties, and subject areas, all of which have different language games even when they share a vocabulary…indexers and searchers do not participate in the same language games. Their work and social environments are different. (Brier, 2004, pp. 652-653)

How professional indexing meets user needs is still a critical matter for LIS to address.

2.2.2 Image subjects and subject analysis

The positivist LIS viewpoint developed for texts, underpins standards developed for cataloguing images (Betz, 1997). The Library of Congress *Thesaurus for graphic materials 1: subject terms (TGM 1)* (1995), a widely used tool for professional indexers, recommends indexers examine the image and any documentation to determine both the "concrete aspects (what the picture is 'of') and any apparent themes or authorial intents (what the picture is 'about')" but cautions against reading "into the images any subjective aspects which are open to interpretation by the viewer".

These instructions highlight several limitations. The document-oriented approach and concept of aboutness are translated into the concepts *of* and *about* but are no more clearly defined. There is no explicit method of visual interpretation.[10] Determining subjects by authorial intents assumes these are accessible, and exemplifies what literary criticism calls "intentional fallacy", that is the creator's intended meaning is the primary subject matter. *TGM 1* explicitly recommends an objective stance and avoiding subjective interpretation. An example, taken from *TGM 1*, to illustrate the recommended limit of interpretation is shown in Figure 2.2.

[10] A list of core competencies for visual resource management does not mention visual literacy, merely ability to identify image media and, in the cataloguing and classification section, knowledge of standards and vocabularies (Iyer, 2006).

Example: Dorothea Lange's photograph known as 'Migrant Mother,' which depicts a Dust Bowl migrant worker and her children, is 'of' **Mothers & children** and **Migrant laborers**. In this case, it would be overly subjective to assign terms for 'aboutness,' since the caption fails to tell us whether the photographer's focus was poverty, despair, hardship, survival, or other abstract concepts.

Figure 2.2 – 'Migrant Mother' by Dorothea Lange (Library of Congress, LC-USF34-9058-C, film negative)

The statement that it is "overly subjective" to assign interpretative terms is ironic. The Library of Congress website quotes the photographer's own description of the portrait as a "hungry and desperate mother"[11] and it is an iconic image of suffering and perseverance.[12]

Similar advice is offered by a standard Australian LIS thesaurus (State Library of New South Wales, 2000). The traditional approach is evident in standards for the description of art works which librarians have helped to develop (for example Baca & Harpring, 2000; Visual Resources Association, 2004).

All these standards provide rule-based advice and guidelines, but little insight into what a subject is or what to index.

[11] See http://www.loc.gov/rr/print/list/128_migm.html (retrieved 14 October 2012).

[12] See an excerpt from Robert Hariman and John Louis Ducaites (2007), 'No caption needed: iconic photographs, public culture and liberal democracy', retrieved 7 October 2012 http://www.press.uchicago.edu/Misc/Chicago/316062.html.

2.2.3 Perception and cognition: categorisation

A fundamental assumption of indexing is that viewers recognise and identify corresponding categories when looking at images. Various LIS researchers (Greisdorf & O'Connor, 2002; Jorgensen, 1995, 2007; Rorissa & Iyer, 2008) have looked to studies of visual perception and cognition to assist in understanding this categorisation.

Basic level theory provides a basis for understanding human categorisation and a theoretical foundation for image indexing (Rorissa, 2007; Rorissa & Iyer, 2008). According to the theory, categorisation of objects is hierarchical with three levels of abstraction and generality: superordinate (e.g. furniture), basic (e.g. chair) and subordinate (e.g. desk chair) (Rosch et al., 1976). People use categories which "represent an optimal level of abstraction" in structuring what they see (Tversky, 1977, p. 348). The basic level is learned first and, even among adults, remains the most common categorisation (Green, 2006). Viewers tend to use superordinate terms when looking at images of groups of objects and experiments suggest these identifications "access scene and relational information more readily than basic concepts do" (Murphy & Wisniewski, 1989, p. 583). Typically people list more attributes for superordinate than basic objects (Murphy & Brownell, 1985, p. 71). Atypical members of a category tend to be classified at the subordinate level (Jolicoeur, Gluck and Kosslyn, 1984, reported in Palmer, 1999), so viewers seeing a robin will call it a bird, but an ostrich will be called an ostrich, and are recognised more quickly (Murphy & Brownell, 1985, p. 81). The entry-level category which a person uses is influenced by experience, so an ornithologist immediately perceives robins as robins rather than generically as birds. Experiments by Rorissa and his colleagues (2007; 2008) show viewer consistency in categorising objective items and that indexing of these subjects is likely to match user perceptions. Basic level theory, however, does not explain why certain objects may be picked out by viewers or how people interpret images.

Schemata, cognitive structures which provide expectations about what should appear, may partially explain why viewers focus on or select the same content in images. Visual perception operates schematically and helps comprehension of

objects and scenes (Palmer, in Norman et al., 1975, chap. 11). Experiments also show perceptions can be influenced by a task (Anderson and Pichert reported in Solso, 1994; Sternberg & Ben-Zeev, 2001, p. 67ff.) or a cue, such as a label or title, which affect what is remembered and for how long (Solso, 1994, p. 253).

Basic level theory and schemata support the assumption there is a shared categorisation of concrete objects and suggest why viewers may pick out similar subjects. However, this research does not explain higher level image interpretation. Moreover, LIS use of basic level theory has been reductionist; it emphasises perception of objective elements rather than a holistic understanding of image meaning.

2.2.4 Categorisation and language effects

Evidence suggests people respond more to word than visual stimuli because the detail and concreteness of pictures "inhibits the search for associated descriptive terms" (Wicker, 1970, p. 437). Experiments by Szalay and Bryson (1976) show responses to words and their corresponding pictures will be more consistent for the latter. Similarly identifications match more for pictures representing a particular object or category than for more ambiguous images, and, interestingly, responses include qualities projected by the viewer, such as “secure” and “happiness” for the image of a house and implied objects such as a car when only a garage is shown. The researchers suggest familiarity, experience, and relevance influence responses. LIS researchers have found similar results (Collantes, 1995; Greisdorf & O'Connor, 2002; O'Connor & O'Connor, 1999; O'Connor et al., 1999).

Categorisation can also be influenced by whatever classification scheme is used (Tversky, 1977, p. 344). This has important implications for indexing as "identifying important concepts could be due to perceptual processing based on specific cues, as well as conceptual processing based on prior knowledge of the documentary language and domain to be indexed" (Bertrand et al, 1996, p. 419 cited in Anderson & Perez-Caballo, 2001a, p. 237). Indeed, LIS professionals see classification as a "scaffolding" which

> minimises the cognitive load on the individual by providing the technologies, knowledge, strategies, and/or procedures that augment human capabilities and support problem solving...by constraining problem spaces, limiting the range of possible solutions, and providing criteria for selecting the most likely alternative. (Jacob, 2001, p. 89)

The classification language can constrain indexers' choices of concepts. Practitioners and users need to learn the language structures of the institution and although Jacob asserts classification can support different communities of practice, Cooper (2002, p. 1224) suggests for the user "to successfully interact with the library, s/he must change their way of thinking about information from a personal to a cultural perspective... This creates a potential problem for the information searcher if s/he cannot make that cognitive leap". On the positive side, the indexing vocabulary can potentially support or develop users' searching.

The potential effects of readily identifying objects and of classification languages in constraining subject analysis highlight the challenges for fully representing image subject content.

2.2.5 Theories and models of visual subject analysis

A different approach to understanding image subject content derives from the discipline of art history and the formal analysis of Renaissance art works outlined in a seminal paper by Erwin Panofsky (1955).

Panofsky distinguishes three levels of subject matter or meaning: pre-iconographical description, iconographical analysis, and iconology. Pre-iconographical description relates to everyday objects and events and requires no specialist knowledge. Iconographical analysis deals with images, stories and allegories for which knowledge of specific themes or concepts is needed. Iconology requires interpretation of the "intrinsic meaning or content" and an insight into symbolical values and their varying use over time.

Shatford (1984; 1986; 1994) modifies Panofsky's approach to provide LIS with a theoretical basis for describing an image and classifying its subject matter (Table 2.1). Shatford bases three different subject levels on Panofsky's theory: the "specific

of", the "generic of" and the "about". She extends these by four facets: "who?" (objects and beings), "what?" (activities, events and emotions), "where?" (place) and "when?" (time). The resulting classification scheme provides an indexer with a structure for systematically identifying possible subjects.

Table 2.1 – Shatford/Panofsky subject classification matrix

	Iconography (S=Specifics)	**Pre-Iconography (G=Generics)**	**Iconology (A=Abstracts)**
Who?	Individually named person, group, thing **(S1)**	Kind of person or thing **(G1)**	Mythical or fictitious being **(A1)**
What?	Individually named event, action **(S2)**	Kind of event, action, condition **(G2)**	Emotion or abstraction **(A2)**
Where?	Individually named geographical location **(S3)**	Kind of place: geographical, architectural **(G3)**	Place symbolised **(A3)**
When?	Linear time: date or period **(S4)**	Cyclical time: season, time of day **(G4)**	Emotion, abstraction symbolised by time **(A4)**

As a minimum, Shatford proposes indexing images with subjects for "ofness", that is both the generic "of" (e.g. bridge; suspension bridge) and the specific "of" (e.g. Brooklyn Bridge). She suggests there are thresholds where indexing should cease, even if not constrained by resources. One is the threshold of detail, so no element which is an integral part of the whole should be named. For example, if a picture shows a woman, "woman" would be indexed but not the parts of her body. Another is the threshold of pertinence, so only meaningful and identifiable objects should be indexed. She also notes that while the aboutness of an image represents a subjective analysis of the image, subjectivity affects almost every aspect of picture indexing.

Critics question the practical ability to distinguish clearly between objective and subjective of and about aspects. Krause (1988) equates these respectively to "hard" indexing, concerned with description, and "soft" indexing, relating to meaning and personal reaction, but admits the distinction is difficult to maintain. Svenonius (1994) is sceptical concerning aboutness because of the difficulty in expressing the visual in words. Aboutness, or iconographic indexing, is further criticised for requiring more expertise and decision making than the other levels and for potentially obscuring or eliminating useful information or resulting in wrong interpretations (Leung et al., 1992). One response to these difficulties is advocacy for indexing to focus on primary or pre-iconographic subject matter as both simpler to

index and more accessible to the general user (Markey cited in Hogan et al., 1991; Keister, 1994). This overlooks the subjectivity in selecting what primary subjects are indexed.

More fundamentally, Panofsky's and Shatford's models are criticised for inadequately providing qualitative content and requiring specialist knowledge in searching (Burford et al., 2003). Critically, neither adequately addresses the question of "meaning for whom?" (Burke, 2001, p. 41).

Jorgensen (1995; 1998), inspired by a need to consider a broader range of attributes, investigated user descriptions. She identifies twelve classes and forty-seven image attributes grouped into three levels: perceptual, interpretative, and reactive (or affective). She proposes indexing, as a minimum, four classes: objects, people, colour and location. She suggests that as "Content/Story" and other abstract and affective attributes are typically described, that indexing might benefit from more subjective interpretations. Jorgensen (1996) trialled an indexing template describing the twelve categories with "naïve" users sorting items into the appropriate classes. The trial was not very successful, possibly because her class organisation is not systematic in relation to how users extract meaning (Burford et al., 2003, p. 130). Furthermore, her classes relating to subjects lack the clearer and more developed structure proposed by Shatford/Panofsky.[13]

Concurrently, Hastings (1994) studied eight art historians' interactions with a small database of digitised art images. She proposes a pyramid model with three faces: queries, access points, and computer manipulations. The model arranges queries in four levels: identification of "who?", "where?" and "when?"; of type "what are?"; of style, subject and "how?"; and for meaning, subject and "why?". These query levels are combined with proposed access points in an information retrieval system. Hastings' model has received less attention than it deserves. This undoubtedly is because her research was with art historians and coincided with Jorgensen's more influential work with a more general group of users, and because her subject level framework is less developed than that of Shatford/Panofsky.

[13] See section 2.2.5.1, p. 28, for comparison of the major models.

Jaimes and Chang (2000) have developed a conceptual indexing structure for visual and non-visual content. The indexing structure is useful for bringing together the syntactic, or perceptual, and the semantic, or conceptual, elements and relationships. The "semantics" comprise generic objects and scene, specific objects and scene, and abstract objects and scene. The classes can be seen as a sequential extraction of meaning at increasingly higher conceptual levels. While this model provides a more organised arrangement of classes than Jorgensen, the subject categorisation is not as developed or detailed as Shatford/Panofsky. Experiments to test this model with Jorgensen's indexing template (Jorgensen et al., 2001) suggest it can accommodate a range of attributes and, under experimental conditions, guide description of subject content. However, as the authors admit, the experiments were limited and the indexers were students or the researchers themselves.

2.2.5.1 Summary and comparison of major models

The three major frameworks are summarised in Table 2.2.

Table 2.2 - Image frameworks (after Laine-Hernandez & Westman, 2006)

<table>
<tr><th>Shatford / Panofsky (1986)</th><th colspan="2">Jorgensen (1995/1998)</th><th colspan="2">Jaimes & Chang (2000)</th></tr>
<tr><td rowspan="4"></td><td>Interpretative</td><td>Art historical information</td><td rowspan="4">Syntax</td><td>Type/technique</td></tr>
<tr><td rowspan="3">Perceptual</td><td>Colour, visual elements</td><td>Global distribution</td></tr>
<tr><td>Colour, visual elements</td><td>Local structure</td></tr>
<tr><td>Colour, visual elements, location</td><td>Global composition</td></tr>
<tr><td rowspan="2">Pre-iconography / generic of</td><td>Perceptual / interpretative</td><td>Objects, people</td><td rowspan="4">Semantics</td><td>Generic objects</td></tr>
<tr><td>Interpretative</td><td>Content / story</td><td>Generic scene</td></tr>
<tr><td>Iconography / specific of</td><td>Interpretative</td><td>Content / story</td><td>Specific objects</td></tr>
<tr><td>Iconology / about</td><td>Interpretative</td><td>Abstract, people-related and reactive attributes</td><td>Specific scene</td></tr>
<tr><td></td><td></td><td></td><td>Semantics</td><td>Abstract objects</td></tr>
<tr><td></td><td></td><td></td><td></td><td>Abstract scene</td></tr>
</table>

The models are similar in their hierarchical structure, although in Jorgensen's framework the levels and classes are less well differentiated, and in the increasing knowledge and expertise required as the analysis moves from simple recognition of objects through to abstract or symbolic meanings. The Shatford/Panofsky model differs from the others in that it focuses exclusively on subject content and does not address perceptual attributes, such as colour. None of the models provides direction

on interpretation or aboutness, nor accounts for the interaction between levels and contextual or different domain knowledge.

While all the models provide useful frameworks for understanding the range of subject attributes viewers may describe, the Shatford/Panofsky model is the most suitable for this research because it supplies the best analysis of image subject content. The Shatford/Panofsky model provides a more developed and detailed subject categorisation and enables subject descriptors to be classified by the subject levels of specifics, generics or abstracts, and then by the facets of "who?", "what?", "where?", and "when?". Neither of the two other models has such a clear and developed structure for understanding subjects.

Furthermore, while Jorgensen (1996) trialled an indexing template based on her model this trial was not very successful, Experiments to test the Jaimes and Chang model with Jorgensen's indexing template (Jorgensen et al., 2001) were more promising but unlike the Shatford/Panofsky model these models have had limited use. In contrast, the usefulness of the Shatford/Panofsky model as an explanatory and analytic tool for subjects was shown in pioneering user research (Armitage & Enser, 1997). More recently, the Shatford/Panofsky model has predominated in a variety of current research, from user studies (Conduit & Rafferty, 2007; Rorissa, 2008), to investigations of tagging behaviour (Chung & Yoon, 2009; Golbeck et al., 2011; Ransom & Rafferty, 2011). Thus, an advantage of using Shatford/Panofsky is that it allows findings from this research to be more easily compared to previous investigations.

After considering the available models, it is clear that the Shatford/Panofsky model provides the best tool for subject content. Its strengths and prior usage by other researchers make it a good choice for this research.

2.2.6 Image indexing approaches

Despite the various theories and models of visual subject analysis, current image indexing follows traditional textual approaches:[14] simplistic, document-oriented, and user-oriented (Enser, 2008; Matusiak, 2006).

The simplistic approach underlies retrieval systems using natural language automatically extracted from image captions and other associated text (Enser, 2008; Enser et al., 2006). Proponents suggest words associated with images are effective, but captions or annotations are often limited and sometimes problematic sources for content description (Craven, 2006). Results from search engines, which work on the text near the image, are extremely variable (Entlich, 2001); research comparing automatic to human indexing concludes it cannot match humans (Tsai et al., 2006).

Descriptive metadata for images are created following the traditional document-oriented approach (Matusiak, 2006, p. 284). Enser (2008, p. 533) states "whatever the level of sophistication attained by conceptual models, the manual indexing of images has remained a matter of trying to represent visually encoded semantic content in a verbal surrogate". The challenge is that images, unlike text documents, lack the words to describe themselves and, in the absence of captions or other text, LIS standards offer little help to indexers.

User needs research, to better understand the different meanings an image can have to different people, or even to the same individual, at different times or under different circumstances, has been a major theme of research since the 1980s (Enser, 2008, p. 534).[15] Current indexing practice, however, suggests that user needs may be subsidiary to other considerations:

> the intricate process of analyzing visual sources can hardly be broken down to a formula, but some of the general elements include: a close reading of the content; a comparison to like and unlike items; and an awareness of visual conventions and context (including the creator's purpose, the intended audience, and the technology used to produce the item). (Natanson, 2007, p.

[14] See section 2.2.1, p. 18.

[15] See further sections 2.3.4, p. 39, and 2.3.5, p.40.

106)

Despite injunctions to consider user needs, LIS has not developed useful tools for user-oriented image indexing. Another approach has been "user" indexing (discussed in section 2.3.6).

2.2.7 "Image warrant"

Indexers cannot draw on literary warrant to determine subjects when pictures lack text. The lack of a concept of "visual or image warrant" is a shortcoming (Svenonius, 2000, p. 138). However, the image or the interpretations of viewers[16] can supply warrant (Rafferty & Hidderley, 2004, 2007).

Various authors, particularly in the archival field, have called for visual literacy and learning how to "read" images (Burke, 2001; Lesy, 2007; Ritzenthaler & Vogt-O'Connor, 2006; Rose, 2007; Schwartz, 1995). Zinkham (in Ritzenthaler & Vogt-O'Connor, 2006, pp. 59, 64) states "a basic knowledge of visual literacy helps archivists work effectively with photographs because it helps them assess and identify the context, content, and methods of pictorial expression" and she notes how elements of visual vocabulary such as composition, focus, perspective or point of view, and sequence, can help determine important elements, indicate aspects the photographer intended to draw attention to, or create a narrative.

Warrant is not properly addressed in existing models of image analysis. Jaimes and Chang (2000) include visual content relationships in their model but these are used descriptively; for example, spatial relationships between items may be described but they are not used to help determine important elements in the photograph.

2.2.8 Summary: Image indexing and positivism

The review of literature in the preceding sections argues that professional image indexing has been built on a foundation of positivist LIS practices inherited from text indexing. This approach results in a narrow notion of the image subject and a focus on objective subject content (section 2.2.1). Current image indexing standards

[16] See section 2.3, p. 33, for further discussion of user interpretations.

provide rule-based advice and guidelines but little insight into what a subject is or what to index (section 2.2.2). Thus research is needed to investigate how this traditional approach affects what image subject content professional indexers represent.

Attempts to provide understanding and theory of image categorisation draw key ideas from the disciplines of cognitive science and art history.

Basic level theory and schemata support the assumption that there is a shared categorisation of concrete objects and suggest why viewers may pick out similar subjects (section 2.2.3). Furthermore, the potential effects of readily identifying objects and of classification languages in constraining subject analysis highlight the challenges for fully representing image subject content (section 2.2.4). Further research can help to determine how much shared categorisation is evident in the attribution of subjects by professional indexers and users.

Several models provide useful frameworks for understanding the range of attributes viewers may describe (section 2.2.5). Of these, the Shatford/Panofsky classification provides the most developed and detailed subject categorisation with its combination of levels and facets. Its usefulness as an explanatory and analytic tool for subjects has been highlighted by its use in a variety of recent research, allowing the findings of this research to be compared with findings from these studies. For these reasons the Shatford/Panofsky classification was selected as the analytic model for this research.

The continuing document-oriented approach in professional indexing highlights the need for LIS to develop useful tools for user-oriented image indexing (section 2.2.6). The lack of "image" warrant further limits professional indexers in analysing images (section 2.2.7).

In the next section the interpretivist approach and developing subject representation by "user-indexing" is examined.

2.3 Image indexing and interpretivism

Whilst less influential than positivism, LIS also has an interpretivist school of thinking, which is interested in the "meanings and experiences of human being" (Williamson & Johanson, 2013, p. 9) . The interpretivist approach in LIS and the key literature in this area are shown in Figure 2.3. The figure shows relationships between the major themes that are explored in the sections that follow. Relationships with preceding themes from the positivist literature are shown on the left side of the figure, as well as the relationship to subject representation in practice (section 2.4).

The traditional LIS positivist viewpoint is a significant hurdle for image indexing to surmount if it is to meet user needs for more interpretive subjects. Over 40 years ago Rice (1969, p. 633) recognised that images "must be 'read' and interpreted intelligently, but not speculated upon wildly...we must rely on subjective judgements...err on side of greater 'recall'." In an era of automated indexing, the LIS injunction to avoid subjective interpretation is "unfortunate and should stop...We need to add to the value of our human contributions to information retrieval by expressing qualitative judgments..." (Anderson & Perez-Caballo, 2001b, p. 273).

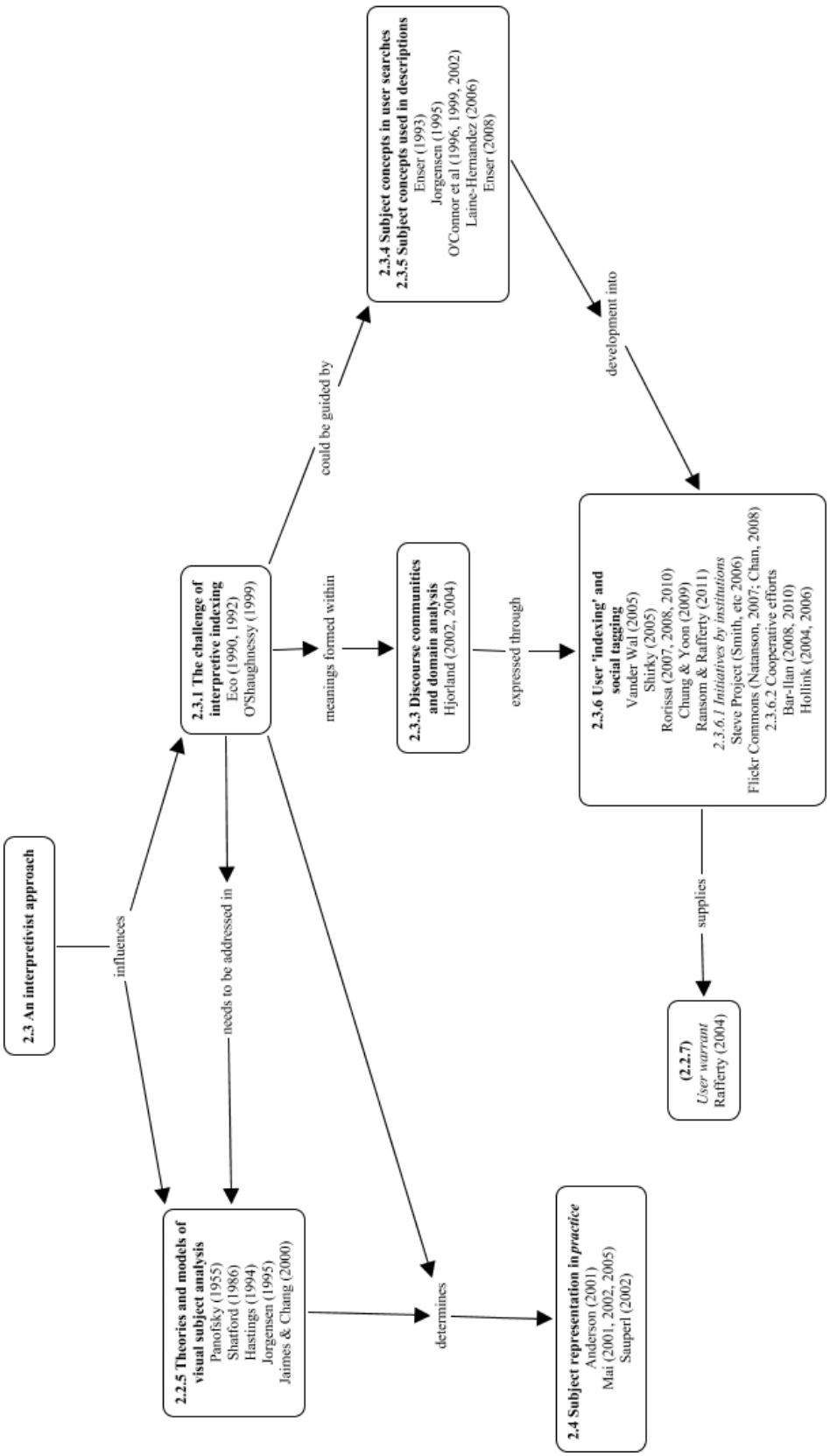


Figure 2.3 – A mapping of the interpretivist literature

A variety of approaches to image interpretation, from semiotics to user "indexing", are explored in the literature.[17] Understanding how users interpret and search for images is essential if indexing is to represent image subject content suitably for their needs. One response to the challenge is incorporating "user indexing" through the phenomenon of social tagging.

2.3.1 The challenge of interpretive indexing

Interpretivism has its roots in the nominalist position, that is the "social world is constructed by people" and that people are constantly interpreting the world (Williamson & Johanson, 2013, p. 9). Developing and limiting the meanings of images can be problematic as from a certain point of view everything relates to everything else (Eco, 1992, p. 48). However, there are "economical" interpretations, which take into account information about creator and historical context which limit what an interpreter can say about something (Eco, 1990, p. 5). Furthermore, the judgement of a community of users limits interpretation (p. 143).[18] The academic Michael Lesy, who has a strong interest in historic photographs[19] while labelling photographs "polymorphously perverse entities" (2007, p. 144), argues "images do have multiple meanings, but 'multiple' is not 'indefinite'; 'many' are not 'countless'. Framed by knowledge of context, confirmed by onlookers, an image's meanings cohere" (pp. 147-148).

Furthermore, while traditional LIS practice treats the meaning of an image as fixed, it can change over time. Poignant (1996, pp. 161-162) has described this as follows:

> Meaning accrues to a photograph in its dualities as artefact/image, and as representation/appearance; and value accorded it flows from the interpretation of meanings, which...change over time and within different cultural environments and contexts of use. For instance, a photograph may be

[17] "Methodologies" for interpreting "visual culture", including iconography, content analysis, contextual approaches, semiotics and deconstruction, discourse analysis and psychoanalysis, are covered in handbooks, such as by Adams (2010) and Rose (2007).

[18] This proposition is familiar from traditional LIS and echoes Cutter's suggestion that naming is a "consensus in usage" (1904, quoted in Miksa, 1983, p.60) and the ISO standard (1985) that concepts should be considered "appropriate by a given community of users".

[19] Historic photographs have provided the basis for some of his books.

> considered as a single entity; as part of a series, set or body of work; and as an item in an archive. Because of the ease of replication, it also has the capacity to exist in several frames of reference simultaneously: art/aesthetic, heritage, commercial, social and personal…a single image that is separated from its historical anchorage becomes temporarily free; it 'floats'... sometimes the image is simply absorbed into a different narrative.

Libraries have the "power of institutional practice to frame photographic meaning" (Schwartz, 2004, p. 121) and are participants in contributing to how the meaning of a photograph is shaped.

Image meanings are produced by different reading approaches. O'Shaughnessy (1999, p. 52ff.) provides a typology of readings: a "preferred reading", where the document is accepted as is; a "negotiated reading", where only part is accepted; and "alternative" or "oppositional readings", where the reading is completely contrary to that intended. The readings depend on the critical approach, the audience's knowledge, and the context. He further points out that the audience projects onto the text. The LIS literature does not discuss how these different approaches or changing readings over time should be addressed.

Different user communities and readings affect interpretation. Context and intent are complex and need to be better understood. The complexity of interpretation is illustrated by the photographs of the Lusitania presented in the introduction;[20] the indexer's reading produced a series of anodyne subjects in contrast to the caption recording the ship's tragic fate. A variety of formal tools, including semiotics and domain analysis, can help in interpreting images. More recently, social tagging provides a new way to enrich image indexing.

2.3.2 Semiotics

Pictorial semiotics studies images as vehicles of signification and is an influential theoretical basis for critiques of visual materials (Adams, 2010; Leckie et al., 2010; Rose, 2007). Semiotics supplies useful tools for understanding images and the social conditions of their creation and production, with an awareness that the viewer operates within the system of understanding. However, with its detailed readings,

[20] See p. 1.

difficult theoretical terminology, and lack of interest "in how different viewers interpret images differently" (Rose, 2007, pp. 103-106) semiotics does not provide other communities, including LIS, with a practical framework for the interpretation of photographs.[21]

2.3.3 Discourse communities and domain analysis

Another approach to interpretation is through the meanings formed within discourse communities or domains (Brier, 2004; Hjorland, 2004). The notion of discourse developed by Michel Foucault (1972) is a way of speaking about and understanding the world and negotiating meaning; thus it is important to understand who is speaking and the situation of the discourse. Foucault suggests that while there may be a succession of conceptual systems and changing concepts (pp. 56-57) the context in which something is created limits its meanings (p. 102ff.).

A variety of LIS writers (including Hjorland, 2004; Mai, 2005; Palmer & Neumann, 2002) suggest domain analysis could be a useful tool for classificationists with a "potentially high payoff in improved results for users" (Bates, 1998, p. 1200). Domain-centred indexing analyses the domain and the needs of the users, then the document in this context while keeping in mind the indexers' perspectives and roles (Mai, 2005, p. 607).

Importantly, there is a strong consensus about meanings within interpretative communities. Hjorland (1997; 2001) argues that consensus about subjects is determined by expertise rather than by majority, and that agreement is high among qualified people in a well-defined field and low where "concepts and documents are vague and multifarious" (2001, p. 776). However, evidence from tagging shows terms used by online communities also stabilise around concepts (Halpin et al., 2007). Where shared norms or criteria guide interpretation professional indexers can model a prototypic user's criteria for indexing.

[21] Yoon (2006) carried out an investigation of two thesauri within a semiotic framework. The findings have implications for information retrieval but the proposed model uses existing human indexing.

Domain indexing also takes into account the indexer's own domain perspectives. A LIS classification scheme "establishes and constrains the phenomena of study and prescribes the conceptual content that can be accommodated within the classificatory structure" (Jacob, 2001, p. 87). Thus, the classification subject headings can limit both indexing (Rafferty & Hidderley, 2004) and what searches the system can make (Jacob, 2004, p. 536). Jorgensen (2007) recognises indexing vocabularies must represent:

> multiple ontologies of images. Each vocabulary created for image indexing carries the assumptions and desires of a particular community as well as its own particular knowledge, and each vocabulary creates its own authority and world of meaning.

Such diverse indexing vocabularies can support user searching. However, library classification was intended to ensure conformity and homogeneity and as Melvil Dewey's[22] contemporary Charles C. Jewett stated "nothing, so far as can be avoided, should be left to the individual taste or judgment of the cataloger" (quoted in Svenonius, 2000). This fundamental purpose can act as a constraint on indexing.

Critics persuasively argue that LIS classification is biased in its social values and in what librarians represent (see, for example, Hutchins, 1975; Olson, 2002) and "valorises" some viewpoints and "silences" others (Bowker & Star, 1999, p. 5, 108ff.). These biases have been inherent since Dewey and Cutter in the nineteenth century; their approach assumed a singular public view and different viewpoints are "poorly represented or not represented at all" (Olson, 2002, pp. 114, 138).

Hjorland (2002) criticises LIS for the lack of research work on specialised domains and for ignoring the effect language and terminology have on meeting different needs. As well, Jorgensen (2007) argues that social tagging challenges traditional beliefs and practices and LIS as the locus of authority and meaning. Useful information about other domain perspectives can come from users themselves.

[22] Dewey created the Dewey Decimal System in 1876.

2.3.4 Subject concepts in user searches

Studies of user searching, despite criticism that they may be of limited help in guiding indexing because the experience of searching for unknown items is "phenomenologically different" to anticipating the need for an item (Bates, 1998, p. 1187), are important sources on topics ranging from subject interests to local indexing performance. However, there are some caveats to consider. Searching is affected by the indexing approach of the institution, the terminology in use, and the information retrieval system as users adapt to system constraints and use system appropriate terminology (Angeles, 1998, p. 5); indeed, Enser (1993, p. 27) suggests regular users become "trained" in the local system.[23] Furthermore, studies indicate humanities researchers prefer informal sources, such as consulting colleagues, instead of using institutional staff and finding aids, because they find information retrieval systems are difficult and don't meet their needs (Chen & Rasmussen, 1999; Duff & Johnson, 2003; Markey, 2007b). Thus, many users may be searching for known items identified from other sources prior to using the information retrieval system, or using subject terms that they expect will provide useful results but do not match how they normally conceptualise their information need. User studies do not adequately explore how users may adapt their searching to local conditions or be influenced by informal sources.

The most widely cited user study is Enser's (1993) analysis of over 2700 requests to the Hulton Deutsch picture collection.[24] He categorises queries as unique or non-unique and then by the facets of time, location, action, event or technical specifications. Most requests are for specific objects or events refined by one of the facets. Enser suggests this is because regular users become "trained" in how to express their needs to produce successful results. Subsequent studies of searches analysed by the same criteria reveal similarly high incidences of specific requests (Armitage & Enser, 1997; Chen, 2001; Chen & Rasmussen, 1999; Jansen, 2008; Pu, 2008), although Hider (2012, p. 22) has noted how "users' knowledge of a system may influence their inputs" and the importance of specific context.

[23] Some researchers suggest formally training users but users have shown themselves resistant to this and online users rarely use available online help (Markey, 2007a, p.1078).

[24] Now part of Getty Images.

In contrast, various studies report users employing many more generic or affective search terms (Choi & Rasmussen, 2003; Collins, 1998; Jansen, 2008; Jorgensen & Jorgensen, 2005; Yoon & Chung, 2011). Choi and Collins' investigations of searches on historic photographs revealed both a high incidence of specific and general terms and searchers' strong interest in context.[25] Internet searches provide evidence for thematic and descriptive searches, with more generic searches, and emotions and visual relationships emerging as search components (Jansen, 2008; Jorgensen & Jorgensen, 2005, pp. 1357-1358). Failed online queries "have far more conceptual refiners than perceptual refiners" (Pu, 2008, p. 285). Image searches on Google Answers and Yahoo Answers (Yoon & Chung, 2011) show a high level of queries relating to abstracts (16.46%) as well as other attributes.

The contradictory and fragmentary evidence has led Enser (2008) to conclude that research has failed to provide reliable information and better understanding of user searching. A key shortcoming is researchers' failure to explore how much the library or information retrieval system affects searching and search terms. Strangely, there is a LIS viewpoint that the user is largely responsible for failed searches because s/he doesn't use the "best terms" and has an ad hoc, unplanned approach to searching (Markey, 2007b, pp. 1125-1126). The implication is that indexing and retrieval systems are fine; it is the user who needs help.

2.3.5 Subject concepts used in descriptions

Research on user descriptions are another important source of information. Describing tasks:

> …can provide evidence of image attributes that the participant is consciously aware of and able to express in the form of descriptions. While it cannot reveal to what extent a participant deems an attribute 'important', it can reveal both the range and typicality (in terms of distribution) of attribute descriptions. (Jorgensen, 1995, p. 112)

[25] These findings are consistent with how humanities scholars search (Bates et al., 1993; Tibbo, 1994).

This research assumes that user descriptions form the basis of their search terms. This is supported by research where user description categories match, or are similar to, image queries (Chung & Yoon, 2009; Greisdorf & O'Connor, 2002; Hastings, 1994, pp. 56, 81; Ransom & Rafferty, 2011).

Jorgensen (1995) identifies a range of classes and attributes in which users are interested.[26] She finds users typically describe the "content/story" and other abstract and affective attributes and concludes that the describing task appears "to mirror a specific item search" (p. i) and indexing would benefit by addressing the "story" and other interpretive elements (pp. 270-272).

O'Connor and his colleagues (2002; 1996, chap. 9; 1999) reveal that individuals usually respond by simply naming objects in the photographs with a high level of narrativity, that is, by telling little stories, and different individuals can react in opposite ways to the same photograph. They suggest indexing interpretive attributes by gathering user assertions. Interestingly, they note users "see" things that are not there, such as a boat when only water is shown or fishing and walking where no one is doing these activities, and argue the viewer's creative rights should not be limited by the image's objective properties or the creator's imposed subjectivity as defined by title. This controversial proposition is poles apart from the traditional LIS approach.

A more structured analysis of user keyword and describing tasks uses Jorgensen's framework of classes (Laine-Hernandez & Westman, 2006). Keyword tasks elicit more interpretive and semantic summarising terms, including themes, abstract concepts, settings and events, and emotions or atmosphere. Describing tasks produce narrative forms of description, including the locations of objects within the photograph relative to one another and a greater enumeration of what is seen in the image with the distribution of descriptive terms broadly similar to Jorgensen's results (Jorgensen, 1995). The authors conclude user categorisation is based on interpretative levels, including abstract themes, and that image genre influences user responses; so a photograph classed as documentary or factual will truncate image

[26] See section 2.2.5, p. 27.

description. This latter conclusion has crucial implications for libraries which typically consider their photograph collections as "documentary".

User description studies provide evidence that a wide range of subject content is described. There is some evidence that image description can be affected by the context and task, yet there are consistent user traits across studies. A logical development from user description, as O'Connor and his colleagues' suggest, is to gather user input to enhance image indexing. This is explored in the next section on user indexing and social tagging.

2.3.6 User "indexing" and social tagging

The idea of users "indexing" images was investigated in the 1990s (for example, Brown et al., 1996; Jorgensen, 1996; O'Connor, 1996, chap. 9; O'Connor et al., 1999) and the topic has re-emerged in investigations of user-tagging (for example Hollink, 2006; Ransom & Rafferty, 2011), especially for museums (Smith, 2006; Trant, 2006; Trant & Bearman, 2007; van Vliet & Hekman, 2012; Wyman et al., 2006).

User indexing is the key to the current online classification development of social tagging and folksonomies, vocabularies resulting from personal tagging of items in a social environment (Vander Wal, 2005). An obvious attraction of tagging is its lower cost of labelling and that more users can tag more than institutions can index with current resources (Chi & Mytkowicz, 2008; Hider, 2012). User contributions "create words, categories and classifications for things in order to describe the world in a way that hold relevant meaning for them" (Neal, 2007, p. 9). The advantage of collaborative tagging is that it harnesses activity to organise and cooperate which leads to emergent categorisation shared by a community (Cattuto et al., 2007):

> The idea of integrating collaborative tagging and visual features derives from the concept of 'emergent semantics', where the meaning of an image emerges in the interaction between it and the user, and between it and the context it is placed in, such as the particular image collection or set of returned hits… Meaning in images has not been addressed by most visual indexing vocabularies, as meaning has been considered too subjective and changeable to be a reliable access point. Emergent semantics turns this restriction into an

> enabler, by allowing the creation of meaning in interaction and capturing this meaning for others to access. (Jorgensen, 2007)

User tagging replaces the "single minded way to construct maps of knowledge" of the traditional catalogue with multiple interpretations and "the democratic approach determines its authority from the agreement of its users: its warrant comes from the constructive interpretation of users" (Rafferty & Hidderley, 2007, p. 399).

Yet there have been very different views about how tagging compares with indexing. Shirky (2005), an early supporter, suggests tagging is a better match to the user search paradigm and moves to a probabilistic categorisation where a category equals what a percentage of people think. Moreover, tagging is done post-discovery and any subsequent user has a pre-filter of search results for relevancy (Halpin et al., 2007). The assumption that tags make useful search terms is supported by several studies (Golder & Huberman, 2006; Lee, 2011; Ransom & Rafferty, 2011; Sigurbjornsson & van Zwol, 2008; Suchanek et al., 2008) and it has the potential to supplement controlled vocabulary (Lin et al., 2006; Menard, 2007; Menard & Smithglass, 2012; Smith-Yoshimura, 2007). Criticisms of tagging, particularly from LIS practitioners, include its uncontrolled, even chaotic, set of terms, lack of hierarchy and precision, and vocabulary issues, such as misspellings, homographs, lack of synonym control, and the “long tail” of terms used by a few or only a single user (Furnas et al., 2006; Guy & Tonkin, 2006; Hider, 2012; Matusiak, 2006; Quintarelli, 2005; Spiteri, 2007). These factors move the costs of information searching onto the user (Macgregor & McCulloch, 2006, p. 294). The lack of research into how professional indexing compares with tagging led Choi (2011) to carry out an investigation focussing on consistency as a quality measure. She found tagging provided useful access to documents and provided additional access points over indexing for different audiences.

Tagging studies have focussed on the photo-sharing site Flickr, launched in 2004. Flickr is the object of many studies, including user motivations (Ames & Naaman, 2007; Angus et al., 2008; Nov et al., 2008, 2010), tag usage (Chung & Yoon, 2009; Marlow et al., 2006b; Ransom & Rafferty, 2011; Rorissa, 2010), and as a basis for a tag recommender system (Lee, 2011; Sigurbjornsson & van Zwol, 2008). Flickr has

fewer tags than other systems (Heckner et al., 2008).[27] Tags tend to be factual, subjective and personal tagging is low, leading some researchers to suggest that user tags are intended for searching (Bischoff et al., 2008; Heckner et al., 2008).

Various researchers have analysed Flickr tagging and its potential to enhance access in combination with controlled vocabularies (Beaudoin, 2007; Daly & Ballantyne, 2009; Menard, 2007; Menard & Smithglass, 2012; Winget, 2006) and as the basis for a user-centred thesaurus (Yoon, 2009).

Other researchers have investigated the subject content represented by tags. Stvilia and Jorgensen (2009; 2010) find extensive use of major categories such as the "who?", "where?", and "what?". Rorissa (2007; 2008; 2010) uses basic level theory to explore tag levels and finds a marked difference in the level of abstraction between labelling photographs individually or in groups, with respectively more basic terms or more superordinate concepts.

Chung and Yoon (2009) have analysed tags and queries using a combination of basic level theory and the Shatford/Panofsky classification. They conclude that the tags and search terms, despite similar categorical distributions, are statistically significantly different and they suggest their findings challenge the usefulness of tags for access.

Ransom and Rafferty's (2011) categorised tags and search queries using Shatford/Panofsky because it has been frequently used in image research and is well established for analysing subject content. Their investigation reveals generic tags are more frequent than specifics with abstracts used rarely. The subject facets (Table 2.3) are similar when compared by the facets of "who?", "what?", "where?" and "when?" (Table 2.4). In contrast to Chung and Yoon, they conclude there are broad similarities between tags and queries, despite some differences between specific and generic usage.

[27] However, this may be because users are organising photographs thematically using Flickr 'albums', rather than tags.

Table 2.3 – Comparison of tags and queries by subject level facet (Ransom & Rafferty, 2011)

Facet			% of tags	% of queries
S1	Specific	Who	11.6	24.3
S2	Specific	What	0.2	3.4
S3	Specific	Where	18.8	28.4
S4	Specific	When	1.8	5.8
G1	Generic	Who	38.1	21.4
G2	Generic	What	11.6	9.6
G3	Generic	Where	7.3	2.4
G4	Generic	When	2.0	1.5
A1	Abstract	Who	7.3	0.3
A2	Abstract	What	1.3	2.4
A3	Abstract	Where	0.0	0.0
A4	Abstract	When	0.0	0.4

Table 2.4 – Comparison of tags and search queries by facet aspect

	% of tags	% of queries
Who	57	56
What	13	16
Where	26	18
When	4	10

However, Cox et al. (2011) still point to the lack of a broader understanding of Flickr's overall make-up and member activity. This limits the extent to which the Flickr research findings can be generalised to other image tagging.

Research by Kim (2011) has shown that, in the context of a laboratory experiment, tags relating to photographs posted to the Flickr Commons by cultural organisations are useful for search purposes.

2.3.6.1 Tagging initiatives by cultural institutions

Tagging has attracted considerable attention in the library and museum area (overview in Trant, 2009).

A major museum project is the Steve project, a cooperative venture between seven major American museums (Smith, 2006; Trant, 2006; Trant & Bearman, 2007; Wyman et al., 2006). The researchers conclude tagging is effective for enhancing online collection information, although Smith notes artwork tagging consists mostly

of descriptions of pictorial elements and common abstracts. A laboratory study of paintings (Golbeck et al., 2011)[28] reveals that specifics are likely to be used first, visually complex images are tagged more, and abstract artworks receive significantly more tags relating to visual elements (e.g. colour). A Dutch museum study (van Vliet & Hekman, 2012) with lay and expert taggers shows both groups contribute similar numbers of tags (13.1 and 12.8 respectively) but tagging by laypersons is more retrievable and by experts more informative. Interestingly, there were few "spontaneous" contributions and most tagging was done in response to active approaches to join the research.

Libraries, also, are investigating social tagging and "Web 2.0" features allow end-user tagging to supplement catalogue subject term (Hider, 2012). From the beginning, however, there have been concerns about the quality of tagging and who should be able to annotate (Shabajee et al., 2002). More positively, it is proposed that users provide multiple perspectives and improve interpretation (Lehane, 2006). A key initiative is "The Commons", a Flickr project launched in partnership with The Library of Congress in 2008 to share photographs and increase awareness of cultural heritage collections. The pilot project (Springer et al., 2008) saw more than 500 catalogue records enhanced with new descriptive tags including place and time period, and subject words cover generic to abstract e.g. architecture and symbolism. The pilot identified issues such as vocabulary problems, personal tags of no use to others, and the lack of a way to correlate tags with searching.

The Commons partners now include over 70 international museums and libraries. An advantage to participating in such online projects is "such interactions underline how the photographer, subject, and viewer collaborate in interpreting images and investing them with meaning" (Natanson, 2007, p. 110). One participant, The Powerhouse Museum, highlights how online "images lose the boundaries placed on them by collecting institutions. They take on new contexts and meanings" (Chan, 2008, p. 6) and is using tags alongside their own subject indexing in the collection

[28] The Golbeck et al study used some procedures and data tags from the Steve museum project.

catalogue.[29] However, these initiatives provide limited interaction with or support to taggers.

2.3.6.2 Cooperative efforts

Researchers are looking at ways to support tagging. One approach is recommender systems, interfaces that suggest tags (Garg & Weber, 2008; Lee, 2011; Sigurbjornsson & van Zwol, 2008), or using CBIR to find images similar to ones that have been tagged and automatically annotating them (Lindstaedt et al., 2009). These systems have had limited application to date. Bar-Ilan and her colleagues (2008; 2010) explore different methods of support in experiments with student groups tagging 12 images related to Jewish heritage. In the first study students either free-tagged or completed a form with categorical fields and in another experiment they saw images either with or without information and tagged initially by themselves and then when seeing other tags. The results reveal popular tags are shared by groups and field tagging produces more detailed descriptions and when tagging together there are few differences between the image results, without or with information.

While the current consensus is that tagging is complementary to indexing (Enser et al., 2006; Hider, 2012; Menard & Smithglass, 2012) there has been little research about how it might effectively be used *with* indexing. Hollink and others (Hollink, 2006; Hollink et al., 2004) suggest there is a mismatch between user needs and current image descriptions: if an image is annotated based on one interpretation but a query is formulated based on another interpretation the image will not be found. In experiments, searchers performing a category search task use general descriptions most frequently (74%), followed by specific (16%) and abstract descriptions (9%) and use more specific and fewer abstract descriptions than people describing images. An acknowledged limitation of this research is that it did not include a study with real users.

[29] See catalogue at http://www.powerhousemuseum.com/collection/database/menu.php.

More recently LIS literature has recognised the phenomenon of "crowdsourcing" which uses the "crowd" as a source of expertise or skill in providing solutions.[30] Holley (2010) proposes libraries actively cooperate with taggers and provides information about how to motivate volunteers with a checklist of tips for successful projects. She notes that the profile of volunteers on major crowdsourcing projects reflects the motivations and attributes described in the tagging literature and typically 10% of the "super" volunteers contribute up to 80% of the work.

2.3.7 Summary: Interpretivism and image indexing

The review of the interpretivist literature shows the variety of approaches which have been taken in addressing the challenge of representing the meanings an image can hold for different people.

Methods, including semiotics (section 2.3.2) and domain analysis (section 2.3.3), can help in interpreting images, but are difficult or impractical frameworks for user-oriented image indexing because of their complexity and lack of specific guidelines.

Useful information about other domain perspectives can come from users themselves. Studies of user searching, despite criticism that they may be of limited help in guiding indexing, are important sources of user subject interests (section 2.3.4). However, user studies have not explored how much the library or information retrieval system affects searching and search terms. Another source of information is provided by research on user descriptions (section 2.3.5) which provide evidence that a wide range of subject content is described.

User interpretations and domain concepts can be directly incorporated through user indexing. More recently, social tagging provides a new way to enrich image indexing (section 2.3.6). However, few studies have been done on what subject content is tagged. Furthermore, there has been little research about how tagging might complement existing indexing or ways that tagging can be supported.

[30] Undoubtedly the best known crowdsourcing enterprise is Wikipedia.

2.4 Towards a model and theory of professional indexing

Understanding indexing remains a challenge because of its cognitive complexity; it is claimed that the process "seems not to be susceptible to precise rules" (Lancaster, 2003, p. 35). There is a surprising lack of empirical research and what little that has been done deals almost exclusively with text indexing.

There is a variety of theoretical discussions of indexing. The process has been summarised as follows:

> The general consensus among indexers and theoreticians is that human indexers perceive...a text, interpret the message encoded in the text as they understand it (influenced by previous experience and current personal knowledge, including their interpretations of any instructions given them), and then describe their version of the message, plus any important text or document features, in accordance to rules and patterns for the type of index they are working on. (Anderson & Perez-Caballo, 2001a, p. 233)

This describes the simplistic two-step model of subject analysis followed by translation into the system vocabulary and it is the prevailing view of the indexing process (see, for example, Lancaster, 2003; Mai, 2005). Other models elaborate on this. The three-step model divides the analysis stage into two steps, examining the item to establish its subject content and then identifying the principal concepts, followed by their translation into the indexing language (see ISO, 1985). The four-step model subdivides the translation of subject concepts into two steps, rendering into the vocabulary and formulating the entry (for example, Chowdhury, 2004, p. 74).

Mai explores indexing in more detail. He initially proposes a three-step interpretative process linked to four elements (document, subject, subject description, subject entry). These he argues can be viewed as a set of closely related interpretations which, as indexers move from novice to expert, may become almost simultaneous (Mai, 2000, pp. 294-295). Subsequently (2001) he applies Peircean semiotics[31] to understanding indexing and the multiple interpretations he proposes in his model of semiotic indexing.

[31] Based on Peirce's collected works (1931-1958).

Mai's model represents the complexity of indexing but it provides no direction. More recently (2005) he suggests a domain-centred approach as an alternative to document-centred indexing. This approach analyses the domain, then user needs, the indexer perspectives, and finally the document in the context of the domain and user needs (p. 607).

The few empirical investigations relate to text indexing and provide useful evidence and, assuming similar cognitive processes operate, guides to image indexing.

David et al. (1995), after an experiment with four experienced indexers, propose indexing as a problem solving activity with five stages related to specific knowledge areas: document scan (knowledge of procedures/librarianship); context analysis (domain knowledge); concept selection (domain knowledge); translation into descriptors (thesaurus or domain knowledge); and revision (knowledge of indexing policies, users, and databases).

Sauperl (2002), in a study of 12 cataloguers, identifies five stages: examine book and identify topic, identify author's intent, infer or anticipate readers' uses, translate and relate the topic to existing collection, verify the topic in the classification and subject heading list. The process is not linear but iterative. Subsequently, Sauperl (2004) introduces a more sophisticated discussion of interpretation using Beghtol's classification theory which looks at meaning from the perspectives of author, cataloguer, and reader (Beghtol, 1986a). While Sauperl considers cataloguers in her study were aware of potentially different meanings they develop the cataloguer's meaning. Her study reveals:

> six sources of inspiration for generating subject headings: (1) the document, (2) the cataloger's previous experience, (3) the cataloging practice and the catalog of the cataloger's library, (4) the catalogs of other libraries, the Library of Congress being the most authoritative, (5) the subject headings list, and (6) reference sources. (p. 62)

Only one, the document, is shared with the author, and one, information resources, with users. Sauperl concludes that "this implies that catalogers are more oriented

toward their professional community" (p. 62). She suggests the strategy of using existing cataloguing to contain semiosis when describing a new book is further evidence that cataloguers only build common ground with other cataloguers.

Fujita et al. (2003) in a study of reading for indexing identify two different levels of comprehension: micro integration and macro understanding of the indexer's own comprehension at a metacognitive level. The indexers employ different strategies through a variety of stages during which they keep objectives in mind, make associations with the documentary language and maintain thematic coherence and global comprehension of the text. The researchers conclude the reader-indexer is more proficient than normal readers and needs linguistic knowledge, textual structure knowledge and world knowledge. Other expertise effects are shown in a study of 20 text indexers (Bertrand et al., 1996) where indexers less familiar with content identify few concepts and base decisions on surface level features in comparison to more expert indexers. Cuing and prior knowledge, including of documentary language, influence some concept choices.

A major theme in the literature is inter-indexer consistency (Olson & Wolfram, 2008, p. 602). Consistency has been judged critical to retrieving relevant items, and studies show varying degrees of inter-indexer consistency (Chan, 1989). However, consistency is not necessarily the same as correctness or quality (Fugmann, 1999; Lancaster, 2003, p. 77; Soergel, 1994, p. 593ff.). More than forty years ago Cooper (1969) made the point that inconsistency is the rule and what matters is the effect on retrieval, what he terms "indexer-requester consistency" (p. 270), and precision (p. 272). There is some evidence that visual material may produce low levels of consistency (Enser, 1995; Markey, 1984) but other evidence points to greater consensus for objective subjects.

Over a decade ago, in a review of practice in 30 US institutions, McRae (2000, p. 4) decried the lack of knowledge and practice to guide professional indexers. The continuing lack of evidence about image indexing represents a basic gap in our understanding.

2.5 Literature review summary

Review of the literature shows image indexing to have been influenced by positivism and the related tenet of 'objectivity' (section 2.2.1) and to be rule-based in its methods (section 2.2.2). This approach emphasises specific and objective subject content. However, research is needed to investigate precisely how this approach affects what image subject content professional indexers represent.

Cognitive studies support the assumption that there is a shared categorisation of concrete objects and suggest why viewers may pick out similar subjects (section 2.2.3). Other research suggests factors such as classification languages can constrain subject analysis (section 2.2.4). Research can help to determine how much shared categorisation is evident in the attribution of subjects by professional indexers and users.

Several models provide useful frameworks for understanding the range of attributes viewers may describe (section 2.2.5) but the Shatford/Panofsky classification provides the most developed and detailed subject categorisation with its combination of levels and facets. It is "well established for the analysis of image content" (Armitage & Enser, 1997, p. 294). As well, it has come to the fore as an explanatory and analytic tool in a variety of recent research and this also allows easier comparison of findings and the opportunity to validate previous research.

Professional indexing continues to be dominated by the document-oriented approach (section 2.2.6). The lack of "image" warrant further limits professional indexers in analysing images (section 2.2.7). LIS needs to develop useful tools for user-oriented image indexing and the potential for warrant based on user interpretations.

The review of the interpretivist literature shows the variety of approaches which have been taken in addressing this challenge of representing the meanings an image can hold for different people (section 2.3.1). While tools, including semiotics (section 2.3.2) and domain analysis (section 2.3.3), can help in interpreting images they are difficult or impractical frameworks for user-oriented image indexing. User studies offer an alternative approach.

Studies of user searching are important sources of user subject interests (section 2.3.4). Another source of information is provided by research on user descriptions (section 2.3.5). One way to incorporate user interpretations and domain concepts is through user indexing and social tagging provides a new way to enrich image indexing (section 2.3.6). However, there is little research on what subject content is tagged. Furthermore, there has been little research about how tagging might complement existing indexing or ways that tagging can be supported to enhance subject representation.

Understanding how users represent subject content is essential if suitable practical approaches to enhancing intellectual access are to be provided. The research on user indexing and tagging, and various online endeavours such as the Flickr Commons, indicate opportunities for institutions to work with users to improve subject representation (sections 2.3.6.1 and 2.3.6.2). Finally, there is little evidence about the professional image indexing process and how this might affect the representation of subject content.

The review of the literature reveals that there is a gap in our understanding about how professional indexers and users attribute subjects to historic photographs. Evidence of difference between them is a prerequisite to investigating how user indexing can complement or enhance current professional indexing. The limited professional indexing resources that are available, and the likelihood that automatic tools such as CBIR are still a long way from providing the access required, make it essential for institutions to develop practical methods to work with users to enhance subject content representation. Research into these areas requires a common framework for understanding categorisation which makes it possible to compare and validate findings. The Shatford/Panofsky classification provides a good framework for structuring research analysing subject content and will allow such comparison and validation.

3 RESEARCH METHODS AND DESIGN

3.1 Introduction

This chapter presents a discussion of the research methodology and design used to undertake this study. As discussed in chapter one, the principal research questions that motivate this investigation are:

> *PQ1 - What is the evidence of difference between indexers and users in the way they attribute subjects to historic photographs?*
>
> *PQ2 - How can indexers and users work together to enhance subject content representation of historic photographs?*

The first principal research question (PQ1) has two related sub-questions. These questions are aimed at assessing the extent of difference between indexers and taggers as measured by subject attribution according to Shatford/Panofsky levels and facets. The first "problem-oriented" questions are:

> *RQ1 - How well does current indexing practice represent the different levels of subject content found in historic photographs?*
>
> *RQ2 - How well do users' descriptions and current tagging represent different levels of subject content found in historic photographs?*

The literature review highlighted the limited professional indexing resources that are available and the need for institutions to develop practical methods to work with user communities to enhance subject content representation. This latter aim is the focus of PQ2 and the following related questions:

> *RQ3 - How does training affect user annotation for representing the subject content in historic photographs and the resulting folksonomies?*

RQ4 - How should tagging be supported to achieve better representation of subject content found in historic photographs?

A challenge in discussing the research approach is that the use of terminology is "fluid" (Williamson & Johanson, 2013, p. 4). Crotty (1998) defined methodology as "the strategy, plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes". Williamson and Johanson (2013) suggest methodology is a theory or "entire framework or design of the research: the choice of paradigm, methods and tools or techniques to explore research questions" (p. 4); the methodology is the "overall logic of inquiry" (p. 55). The research purpose dictates the selection of an appropriate research methodology (Patton, 2002, p. 213-5; Williamson & Johanson, 2013, p. 120). Given (2006) underlines that this understanding is essential to selecting suitable methods and assessing the results of studies that employ them. Crotty (1998) defined methods as "the techniques or procedures used to gather and analyse data related to some research question or hypothesis". This is comparable to what Williamson and Johanson (2013, p. xix) label as "research technique", that is "a procedure or tool for undertaking research processes, e.g., selecting samples, collecting and analysing data".

In this research, the choice of methodology and methods is grounded in the main aim of the research - firstly, to gain insight into the interpretation of visual material; secondly, to develop indexing theory and guide professional practice; and finally, to contribute to practical methods for making images accessible.

3.2 Rationale for the research design

The evidence of professional and tagger indexing behaviour comprises index words and tags that together comprise observational data. To resolve details of the design and methods, the researcher turned to the mainstream literature on research methods and design for observational data. LIS can learn from other disciplines where research approaches have been investigated extensively. One such discipline is the field of Information Systems where Galliers (1990) has developed a taxonomy of research approaches (Table 3.1).

	Modes for traditional empirical approaches (observations)					Modes for newer approaches (interpretations)				
Object	Theory Proof	Laboratory Experiment	Field Experiment	Case study	Survey	Forecasting and futures research	Simulation and Game / role playing	Subjective / argumentative	Descriptive / interpretative (inc. reviews)	Action research
Society	No	No	Possibly	Possibly	Yes	Yes	Possibly	Yes	Yes	Possibly
Organisation/ group	No	Possibly (small groups)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual	No	Yes	Yes	Possibly	Possibly	Possibly	Yes	Yes	Yes	Possibly
Technology	Yes	Yes	Yes	No	Possibly	Yes	Yes	Possibly	Possibly	Yes
Methodology	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Theory building	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Theory testing	Yes	Yes	Yes	Possibly	Possibly	No	Possibly	No	Possibly	Possibly
Theory Extension	Possibly	Possibly	Possibly	Possibly	Possibly	No	No	No	Possibly	Possibly

Table 3.1 - Research approaches (Galliers, 1990)

Galliers' taxonomy provides a structured way for a researcher to choose an appropriate approach methodology relating to the research purpose and questions being investigated. Suitability is determined in relation to both the object of the research and the process of theory development. Galliers divides the approaches into two method groups: the empirical, based on observations, and the interpretivist. This broad division matches a similar grouping of research approaches in LIS (Cibangu, 2010; Williamson & Johanson, 2013) where the terms positivism and interpretivism are used.

Williamson and Johanson (2013) provide an overview of these research paradigms. Positivism applies scientific methods and quantitative data collection; common research designs are experimental and survey (p. 7). Interpretivism, sometimes referred to as naturalistic enquiry, encompasses a range of approaches which focus on meanings constructed by individuals and on qualitative data (p. 9ff.). Interpretative research designs "are mainly based on inductive reasoning and tend to be *iterative*" (p. 13). Critical theory shares with interpretivism a belief that individuals interpret or construct reality (p. 15) but emphasises gathering historical perspectives and insights and seeks not just to understand theory or the society which provides the context for that theory, but also to critique and change that society (Patton, 2002, pp. 130-131; Williamson & Johanson, 2013, p. 121).

The positivist paradigm and quantitative research methods almost completely dominated LIS literature until the late 1980s,[32] when interpretivist, qualitative research began to attract attention as a technique to help understand participants' experiences (Benediktsson, 1989; Williamson & Johanson, 2013, p. 55). When qualitative methods were applied to areas such as user studies, which had a corpus of quantitative data built up over more than 40 years, Wilson (2000) highlighted how this led to a better understanding of users and the ability to inform the design of better services and systems. More recently LIS has become interested in a third approach integrating qualitative and quantitative methods: mixed methods research (Cibangu, 2010; Fidel, 2008).[33] However, as with other research concepts, what

[32] Only 1.6 per cent of researchers employed qualititative methods in the period 1965 to 1985.

[33] Fidel stated the purpose of her paper was to bring mixed methods research to the attention of the LIS community.

constitutes mixed methods research is not agreed (Williamson & Johanson, 2013, p. 17).

Gallier's (1990) taxonomy and the broader LIS discourse on research methods for LIS supply clear direction on an appropriate research methodology for this research. Since one aim of the research is to investigate whether there are differences between how indexers and users attribute subjects to historic photographs, the role of observation is plain, suggesting field experimentation and survey as design elements within an overarching empirical methodology. Further, to investigate whether a training intervention has a significant effect on subject representation also requires using observational data, again suggesting the role of field experiment, that is an experiment carried out in the "real world" (Babbie, 2010, p. 244; Barnard, 2000, p. 125; Galliers, 1990, p. 161). Such an experimental approach is a common positivist research design (Williamson & Johanson, 2013, p. 311). Indexers and users are real world entities that exist in society outside the context of a laboratory and it is the real world attribution of subjects that provides the focus of this research. If taggers and professional indexers display cognitive dissonance, possibly rooted in different ontologies, understanding of such differences also suggests the role of an interpretivist, qualitative approach using interviews as an element of design (Williamson & Johanson, 2013, p. 9ff.).

So what are the strengths and weaknesses of such a selection of methods and design? Galliers notes that a strength of field experiment is its greater realism than laboratory experiments but a weakness is "achieving sufficient control to enable replication" (Galliers, 1990, p. 166). Tanner (in Williamson & Johanson, 2013) indicates that it is possible to "infer or hint what might be likely causal links" (p. 323). Bernard (2000, p. 126) notes that field experiments can give "powerful evidence for applications projects", a practical outcome that is an important motivator for this research.

Complementing the field experiment, surveys and interviews, can provide a "snapshot" of practice (Galliers, 1990, p. 162) and allow investigation of more variables than the field experiment. Surveys may be "used for descriptive, explanatory, and exploratory purposes" (Babbie, 2010, p. 234) and illuminate the

field experiment findings. Given the nature of the research with online taggers, online surveys are a practical way to gather information from participants.

Review of the research literature on visual interpretation reveals a variety of approaches in use in addition to the ones described. For example, previous research on visual interpretation (Angel, 2012; Bar-Ilan et al., 2008; Bar-Ilan et al., 2010; Chen & Rasmussen, 1999; Golbeck et al., 2011; Hastings, 1994; Hollink, 2006; Jorgensen, 1995; O'Connor et al., 1999) has used laboratory experiments, usually with students or academics. Laboratory experimentation ideally implies the use of control groups which may be difficult to set up and it can be intrusive. The field experiment, on the other hand, tries to recreate as much as possible a real world context. The real world setting of a field experiment suggests an important criticism of the experimental approach, namely that it artificially limits the degree to which observed phenomena may be generalised to real contexts (Trochim, 2001). Notwithstanding this criticism, issues of practicality also impact on the selection of field experiment as a major design element for this research. Taggers participating in the study were geographically dispersed and could only work remotely on scripted tasks via the Internet. As an unfunded project, no resources existed to gather subjects within a controlled laboratory setting.

Another approach which has been used in related investigations is case study, which focuses on in-depth study of an individual instance of some social phenomenon (Babbie, 2010; Williamson & Johanson, 2013), although what exactly constitutes this approach is debated (Babbie, 2010, p. 309; Schwandt, 2007). This approach has been used in investigations of text indexing (Bertrand et al., 1996; Sauperl, 2004) and in user research (Choi & Rasmussen, 2003; Collins, 1998; Enser, 1993; Jorgensen & Jorgensen, 2005).[34] While case study involving organisations that have indexing and tagging programs can provide valuable data of the kind proposed to be collected via field experiment, the researcher was not successful in recruiting taggers from existing case study projects, and this approach has had to be discarded.[35]

[34] See section 2.3.4, p. 39.

[35] See section 3.3.1.2, p. 66.

The combination of field experiment and survey elements in the design chosen for this research is augmented by a mixture of qualitative and quantitative methods. A mixed methods approach allows issues to be addressed more widely and completely than any one method (Fidel, 2008). Methods triangulation[36] allows checking the consistency of findings generated by different data collection methods (Fidel, 2008; Gray, 2009, p. 204ff; Patton, 2002, p. 556). The research approach allows triangulation between the data collected in the different studies.

The research balances the quantitative data to which are applied techniques of statistical analysis and inference with qualitative methods. The advantages of linking quantitative and qualitative data have been outlined by Miles and Huberman (1994, p. 41) and include:

- to confirm or corroborate each other by triangulation;
- to develop analysis by providing richer detail;
- to provide fresh insight; and
- to expand the scope and breadth of the study by using different methods in different components.

A mixed method design also finds warrant in some related investigations, for example Mai's (2000) study of indexing which called for further contextual studies and a shift from scientific to qualitative methods to achieve a better understanding of this topic. Further, the qualitative approach has been shown to provide a better understanding of users (Wilson, 2000). Consequently, qualitative methods have been selected as appropriate for use in Study A and the pilot Study B and for aspects of the subsequent studies (C to E) with taggers.

Qualitative data collection and analysis is based on interviews and comments made during photo analysis sessions, during commenting while tagging online, or in response to open-ended survey questions. The qualitative methods explore

[36] Triangulation involves the researcher taking different perspectives on the object of study which can be substantiated using several methods or theoretical approaches, and combining different sorts of data in order to produce knowledge at different levels (Flick, 2009, p. 445; Given, 2008, pp. 893-895; Schwandt, 2007; Williamson & Johanson, 2013).

participants' understanding of how they analyse and describe images, their knowledge of subject level concepts and related issues, and gauge their perceptions and attitudes. The qualitative analysis can help to confirm or corroborate the quantitative results and provide illuminating detail (Miles & Huberman, 1994).

The roles of quantitative methods in this research are, in summary:

- To explore the representation of subject facets and tagging activity. In this application of quantitative methods, participant subject terms or tags are categorised by the researcher using the Shatford/Panofsky classification matrix and descriptive and inferential statistics are used to analyse and interpret subject type distributions and relations between variables.
- To analyse participant perceptions (measured as an ordinal rank) from survey data contributed by taggers (see Appendix 2 - Studies C and D: Qualtrics Online Survey and Appendices 3, 4 and 5 - Study E Qualtrics Online Surveys). The relationship between subject representation and perceptions is important for the study.

Methods inform the research design, the subject of the next section.

3.3 Research Design

There are two main components to the research design: the first problem-oriented and the second solutions-oriented (Figure 3.1).

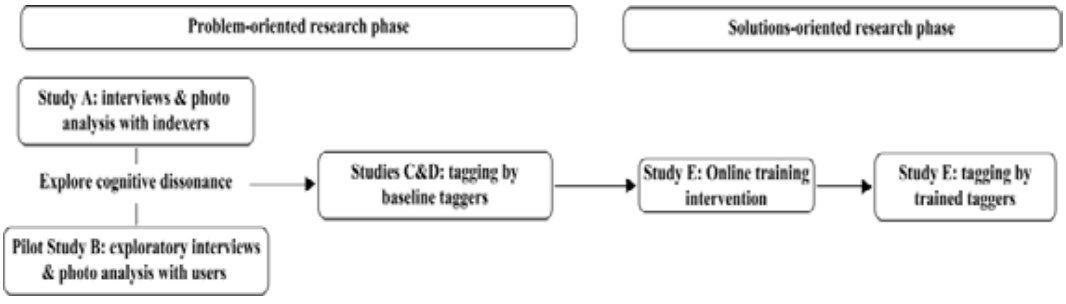


Figure 3.1 - Overview of the research design

The aim of the first stage is to explore how professional indexers and taggers approach the task of describing and representing the subject content of historic

photographs and to determine whether significant differences exist according to Shatford/Panofsky. The tagging studies in this stage provide "baseline" information about tagging behaviour, that is a control group whose tagging is measured and whose members do not receive the research intervention. The aim of the second stage of the research is to investigate if the tagging behaviour measured in the baseline studies can be modified by means of an online training intervention based on indexing with Shatford/Panofsky.

The first stage of the research, investigating indexers' and users' subject descriptions and their perceptions and understandings of subject content, is carried out in two phases. The first phase is made up of two studies. Study A investigates indexing with a purposive sample of professional indexers.[37] Study B is an in-person pilot study with a small group of users to test investigative approaches to be used in subsequent tagging studies. In both studies the data collection involves interviews and a series of describing tasks. The next phase is conducted online with taggers. Studies C and D investigate the tagging behaviour of 66 volunteers, made up by taggers from an online group and students enrolled at a large Australasian university. The data collection comprises evidence from the tagging on the research website and subsequent online questionnaire responses. Studies A to D explore the evidence of difference between indexers and taggers in the way they attribute the subject content of historic photographs, in terms of Shatford/Panofsky levels and facets.

The second stage of the research investigates how a treatment in the form of a training program in indexing with Shatford/Panofsky, might contribute to enhancing representation of the subject content of historic photographs through tagging. The participants in Study E comprise a group of 28 students enrolled at a large Australasian university. The data collection comprises evidence from the pre- and post-training surveys, the training exercises, tagging activity and subsequent online survey responses.

The research stages and the related studies are shown in Table 3.2.

[37] See section 3.3.1, p. 64, for the rationale for the purposive sample.

Table 3.2 – Summary of research design

Phase	Study	Participants	Tool & techniques used
Problem-Oriented	A –indexers	11 (Professional Indexers)	Semi-structured interviews Stimulus photographs and think-aloud protocols Statistical analyses of quantitative data and content analysis
	B – pilot with users	5 (Professional users of historic photograph collections)	Semi-structure interviews Stimlus photographs and think-aloud protocols Statistical analyses of quantitative data and content analysis
	C – baseline tagging study	22 (Online taggers from Picture Australia Community)	Observed online tagging Post-tagging online survey Statistical analyses of quantitative data and content analysis
	D – baseline tagging study	44 (University students)	Observed online tagging Post-tagging online survey Statistical analyses of quantitative data and content analysis
Solutions-Oriented	E – tagging intervention study	28 (different group of University students)	Pre-training online survey Online training exercises Observed online tagging Post-tagging online survey Statistical analyses of quantitative data and content analysis

3.3.1 The problem-oriented studies A to D

The problem-oriented stage of the research involves four studies, two preliminary in-person investigations (Studies A and B) and two on-line tagging studies (Studies C and D).

3.3.1.1 The In-person studies (Studies A and B)

The preliminary investigations are Study A, comprising interviews with a group of indexers, and Study B, a pilot study with a small group of users. The aim of these studies is to gather participants' knowledge and understanding of subject level theory and their perceptions of the importance of specific subject levels for intellectual access to the content of historic photographs.

Study A

Study A consists of in-person interviews and think-aloud protocols conducted by the researcher with eleven professional indexers tasked with indexing historic photographs in publicly available collections. These public collections range from

nationally important to small local studies collections in Australia (seven), New Zealand (two), and North America (two).

In this study, purposive sampling is used to provide a diverse range of indexers representing different professional levels, ranging from a library officer to a director of a digital libraries program. The nine female and two male indexers range in age from their twenties to sixties and their professional indexing experience from two to more than thirty years. However, their experience is largely in traditional text cataloguing; no indexer has more than about ten years working with images, and the average is close to five years.

Rationale of the purposive sample

The logic of the sampling is based on a purposive strategy, where the participants are chosen for their judged relevance to the research question and are likely to be "good informants" (Flick, 2009, pp. 122-123; Patton, 2002, pp. 230-243; Schwandt, 2007). Purposive samples are used widely in exploratory or pilot studies (Barnard, 2000; Williamson & Johanson, 2013). The strength of purposive sampling is in using "information-rich cases" which will "illuminate" the research questions (Patton, 2002, p. 230) and the use of purposive sampling has been shown as an effective technique for gathering rich description and accurate and reliable information (Johnson, 1990, p. 27ff.). The sample size may be small but there is considerable evidence that interviews with a small, or even very small sample can provide rich information (see, for example, Barry, 1994; Hastings, 1994; Oyarce, 2012; Saracevic, 2007b; Sauperl, 2002; Schamber, 2000). The validity and meaningfulness depends not on sample size, but on the information-richness of the selection (Patton, 2002), and the purpose of the research, although the results may not be generalisable (Williamson & Johanson, 2013).

Interviews and photo analysis sessions

The interviews are designed to elicit responses about indexers' approaches to indexing, and their understanding and perceptions of subject levels and their usefulness.

The photo analysis sessions examine what indexers do in practice and this is compared to what they say they do. Participant descriptions of stimulus materials (historic photographs) provide data revealing what attributes are typically perceived and how they are categorised. The dataset of images used in the fieldwork is a purposive selection of images available from collections where the interviewee works or uses. The dataset is intentionally diverse, with subject matter ranging from objects and portraits to complex scenes of events or historic places. Photographs that visually rich, or with potentially controversial or emotive content are expected to stimulate the most tagging responses. Observational methods include think-aloud protocols as each interviewee looks at and describes the historic photographs in the photo analysis sessions. Due to limitations of time, interviewees were asked to describe only two or three photographs.

The interview responses and photo analysis comments provide rich material for content analysis.[38]

Pilot Study B

Study B aims to refine the questions to be used with the online tagging groups. Five users (historians and professional researchers) were recruited who work with historic photographs in publicly available collections. The aim is to explore user approaches and understandings of subject levels in order to inform the subsequent online research work with taggers. This study is also to be analysed for any evidence of difference between indexers and users in how they attribute subject content.

3.3.1.2 The baseline tagging studies (Studies C & D)

Studies C and D comprise the next phase of the problem-oriented stage of the research programme. These studies employ more subjects (66), an online survey, and more photo analysis exercises. The aim of these studies is to investigate taggers' approaches and understanding of subject levels in a more structured way than has been done in previous tagging research. The studies are carried out on a Flickr site

[38] See section 3.4.7, p. 76.

where participants are able to view and tag the research dataset of photographs. Tagging and commenting on a dataset of historic photographs performs the same function as the photo analysis sessions with interviewees. After tagging, participants are invited to complete an online survey, which is designed to explore understanding of subject levels and perceptions of their usefulness (see Appendix 2 - Studies C and D: Qualtrics Online Survey). The studies provide baseline information about tagging behaviour prior to any intervention.

Study C includes members from an online tagging group and students. This baseline study is repeated in Study D because of problems recruiting participants, which resulted in a lower than expected number of participants in Study C. A larger group of students makes up Study D. The total number of participants in both studies is 66.

Population and Sample (Studies C & D)

The initial aim for the baseline studies was to recruit all participants from the "Picture Australia: People, Places, and Events" group.[39] This group was chosen as a case study group working in the problem domain. Reasons for the selection included size: Picture Australia: People, Places, and Events" group nominally comprises over 2000 real world users. Secondly, the group's affiliation with Picture Australia suggested a likely interest in the subject content of historic photographs. Finally, this community already worked with the National Library of Australia and members contribute their own images with tags to Picture Australia. The willingness of members to participate in the research also would provide a real world test of how interested taggers might be in contributing to an image tagging project.

Group members were invited to join the research through an invitation posted by the National Library of Australia and, when the first response was very low, through subsequent postings for volunteers. Unfortunately, the tactics used to engage Picture Australia taggers with the project were not successful, suggesting a gulf between the popular perception of levels of tagger engagement and the reality. On inspection,

[39] Since 30 June 2012 renamed the Trove: Australia in Pictures group, see http://www.flickr.com/groups/PictureAustralia_ppe.

only a handful of the two thousand account holders appeared to be active taggers and most tagging derived from tagging their own images. The smaller-than-expected number of Picture Australia taggers resulted in the recruiting of student volunteers from undergraduate and graduate students studying information science in a large Australian university (see participant demographics in section 7.2). The few participants in Study C (22) made further iteration of the design necessary, involving a shift in the target population from an online community of practice (Picture Australia) to university students (Study D). Like the previous study these were undergraduate and graduate students (see participant demographics in section 7.2). As a necessary precaution to ensure validity, tagging behaviour between the two groups is compared in data analysis and interpretation. The shift in target population limits the extent to which the findings can be generalised and may have affected the research results depending on the extent to which students may have been exposed to indexing theory.

The use of students as subjects is an established practice in field research where many researchers experience difficulty with recruitment. The practice has its advocates. Dobbins, Lane and Steiner (1988), in rebutting research by Gordon, Slade and Schmitt (1986), found that comparative studies of student and non-student based research showed a high degree of agreement between findings and they argued for the generalisability of applied studies using student subjects. Students also have been used in applied research for decades because of their availability. Highhouse and Gillespie (2009) defend these "convenience" samples on the grounds of efficiency, homogeneity, humanity ("people are people"), generalisability, and adequacy. They suggest field samples are no more representative and that students are a useful sample for testing how humans in general respond. Stevens (2011) argues that the theoretical scope and purpose of the study are important considerations; where the theories are universalistic and internal validity, that is "precision regarding the nature of cause-effect relationships" (p. 19), is important, student samples are useful. The research design, including the random assignment of participants such as students to different experimental conditions, can strengthen the internal validity and demonstrate the causal relationship between two variables (Babbie, 2010, p. 250ff.; Lavrakas, 2008; Stevens, 2011). Students have been effectively used in image research (Bar-Ilan et al., 2010; Chen, 2001; Jorgensen, 1995). The research problem

about which the students are consulted here is, as the responses show, of real interest for them.

The dataset of historic photographs for tagging

The dataset of images used in the fieldwork is selected from images available on Picture Australia (now known as Trove). The purposive selection is designed to represent the variety of historic photographs found in publicly available collections. Various factors guide the choice of photographs. The dataset is intentionally diverse, with subject matter ranging from objects and portraits to complex scenes of events or historic places. Photographs that are "iconic", visually rich, or with potentially controversial or emotive content are expected to stimulate the most tagging responses.

The same dataset of photographs is used for all the tagging studies. To test documentation effects on tagging twenty-two (22) photographs are provided with basic information, comprising the title, date and photographer, and eleven (11) photographs have no accompanying information.

The use of the same dataset for all the tagging studies provides a measure of control over a key variable, the visual stimulus. Any significant differences in taggers' responses are more likely to be linked to the other key variable, the training intervention. On the other hand, the use of the same dataset does not allow the research to study the effects different datasets might have on the results.

The research project website

The tagging studies are conducted on a Flickr site created for the study. This provides a standard interface and functionality for taggers and, importantly, is currently used by many institutions which participate in the Flickr Commons.[40] The research website includes a screen of information in the "profile" section inviting

[40] See section 2.3.6.1, p. 45.

taggers to provide tags and comments and giving basic information about the project aims and how to contribute a tag.

The use of a standard interface makes it less likely results will be influenced by technical issues arising from an untested interface and, for Flickr users, reduces the problems of having to learn a new system. Flickr has the additional advantage of access to site statistics and reporting features which are used in the analysis of the research website data. The use of Flickr also strengthens the "real world" application of the research. As noted, Flickr has been and is being used for projects with the tagging community, and using this service will allow the research tagging results to be more easily compared with other projects. The Flickr website and the APIs[41] to download data were pre-tested prior to the tagging studies in a pilot using tags on a variety of images created by a volunteer.

The online user surveys

All taggers are asked to complete a short online survey administered through a Qualtrics[42] questionnaire. The questions, developed from the previous interviews, are designed to elicit responses about their tagging, including the usefulness of different subject levels for description and for searching. Participants also are asked for feedback on the project and if they would be interested in contributing to future projects tagging photographs held in public collections. The participant responses are analysed quantitatively and qualitatively, using content analysis.

3.3.2 The solutions-oriented study (Study E)

The second phase of the research investigates how online tagging can be supported to enhance the representation of the subject content of historic photographs. Study E is a solutions-oriented investigation following the baseline studies C and D in the problem-oriented phase.

[41] Flickr provides an API (application program interface), a protocol for building software applications, which enables programmers to create applications for use on the site, such as getting a list of tags on photos.

[42] Qualtrics software is an online survey tool which enables creating and distributing surveys, data storage, and analysis.

Study E involves a different group of 28 participants recruited from university students (see participant demographics in section 8.2) The aim of this study is to investigate if the tagging behaviour measured in the baseline studies can be modified by means of an online training intervention based on the application of Shatford/Panofsky. Prior to training, participant knowledge is investigated through a pre-training survey (see Appendix 3 - Study E: Qualtrics Online Pre-training Survey). The pre-training survey investigates what participants know about the Panofsky/Shatford classification matrix or the concepts of levels and facets. The survey provides baseline information about the extent of knowledge prior to training. The participants then are trained in the Shatford/Panofsky classification matrix and carry out various training exercises.

The training intervention is designed to trial a basic method which institutions can implement easily. The study results therefore can indicate what a real life application might produce. The training consists of a basic primer and online exercise delivered using Qualtrics (see Appendix 4 - Study E: Qualtrics Online Training). The primer explains subject theory and facets and provides a Shatford/Panofsky template to help participants analyse and describe subject content in historic photographs. The primer is followed by a series of practical exercises involving categorisation of subject terms by subject level or facet and tagging historic photographs. The data from the training is analysed for information about how training affects participant knowledge and tagging.

Following training, the participants tag on the research website. After tagging, the participants complete a post tagging survey (see Appendix 5 - Study E: Qualtrics Online Final Survey). The Flickr website and dataset of images are identical to the previous tagging studies, as are the data collection and analysis techniques.

The survey results allow comparison between groups and provide information about participants' willingness to participate in similar projects.

3.4 Instrument design, data collection and analysis techniques

The purpose of this section is to provide an overview of the research instruments, data collection and analysis techniques used in the research. These comprise:

- in-person interviews;
- photo analysis sessions (including observation and the use of think-aloud protocols);
- online surveys; and
- a Flickr website for capturing user tagging behaviour.

Additionally, the research uses the Shatford/Panofsky subject level classification matrix to analyse subject terms and tags. Use of the matrix ensures intellectual rigour in the categorisation analysis and facilitates comparison of the findings with other research. In the data analysis interpretation chapters that follow, qualitative and quantitative data analyses are performed using a variety of analysis tools including QSR N6, IBM SPSS Statistics 19 and Microsoft Excel 2010.

3.4.1 Semi-structured interviews

According to Denzin & Lincoln (2000, p. 633) interviews can be used to produce "situated understandings grounded in specific interactional episodes." There are three types of interview: structured, semi-structured and unstructured (Barnard, 2000; Gray, 2009; Patton, 2002; Williamson & Johanson, 2013). A semi-structured interview approach, based on an interview guide or written list of questions to be asked in order but allowing the interviewee to probe or follow up on responses, was chosen as a good compromise between the predefined and constrained script of the structured interview and the unstructured approach in which topics are left to the interviewee and key issues for the researcher may not be covered. The semi-structured approach usually leads from initial general questions allowing the interviewee to speak in his or her own terms, to more specific queries enabling the researcher to get answers on research-related issues. The interview guide, or list of questions, helps to structure the interviews and maintain a broad focus in which interviewees could shape responses in their own ways (see Appendix 1 - Interview

Questionnaires and transcripts in Appendix 7 - Electronic Data Files). The semi-structured interview is recommended for situations where there will be only one chance to interview a subject (Barnard, 2000) as anticipated in this research. The semi-structured interview has the advantage that it provides opportunities for participants' direct quotations to support research findings (Williamson & Johanson, 2013, p. 361).

Interviewing was selected as appropriate for the field research with indexers and users (Babbie, 2010, p. 318ff.). The interviews are designed to elicit information in five broad categories:

- demographics (questions about background and experience);
- perceptions of the "subject" (subject definition);
- perceptions of how subjects are determined for indexing or for description/searching (the process);
- perceptions about the importance of subject levels; and
- perceptions about contextual factors, including collection context, systems and other factors.

Pilot interviews are also used to test the effectiveness of the questions and methods in eliciting useful data for analysis. Workflow for interviews includes recording, transcription and content analysis using QSR N6, software enabling the analysis, identification and coding of code content-bearing units in the text. Units of analysis occur in "chunks", varying in size from words, phrases, and sentences to whole paragraphs. The content analysis is further discussed in section 3.4.7.

The quotes from the interviews are identified by the participant's alphabetic identifier and the text unit number of the transcript (e.g. Subject A, text unit 27).

3.4.2 Stimulus photographs and "think-aloud" protocols

The use of stimulus materials, historic photographs in the case of this research, is a well-established technique to help informants discuss "complex interrelationships and dimensions… [and] can lead to the generation of important theoretical dimensions" (Johnson, 1990, pp. 36-37). The technique has been used extensively in

investigations of visual understanding (Angel, 2012; Bar-Ilan et al., 2008; Bar-Ilan et al., 2010; Golbeck et al., 2011; Hastings, 1994; Jorgensen, 1995; O'Connor et al., 1999; Rorissa & Iyer, 2008). In this research the stimulus photographs are used to obtain data as the subjects "think-aloud" while describing images. Think-aloud protocols, have been used in information science since the late 1970s (Fujita et al., 2003). Think-aloud protocols are useful when dealing with complex processes, because people generally are not adept at recalling and explaining the processes and associations involved in carrying out a task after the fact, and spontaneous verbalisations can externalise mental processes. Such protocols also have been used by previous researchers to obtain data about how people describe visual material (Hastings, 1994; Jorgensen, 1995; O'Connor et al., 1999). There has been some criticism of the validity of think-aloud protocols by behaviourists, but cognitive scientists consider them a useful means to collect data about mental processes (Fujita et al., 2003, p. 4).

The purpose of the describing tasks is to gain insight into how participants analyse the subjects of historic photographs. A richer understanding of descriptive behaviour can emerge from triangulation with interview data. Each interview is followed by a 15 to 20 minute session in which participants look at and describe aloud two to three historic photographs (see photo analysis images and transcripts in Appendix 7 - Electronic Data Files). These sessions are aimed at observation of participant actions when looking at and describing an historic photograph. To help participants in the describing task a series of question prompts is used.

3.4.3 Online surveys (Studies C to E)

Online surveys are used to collect data from the taggers. The questionnaires are designed to elicit information in the same five categories as the interviews. The surveys have been developed using guidelines on questionnaire construction outlined in Babbie (2010, p. 253ff.) and Fink (2009). Questionnaires are a common research technique in LIS (Williamson & Johanson, 2013, p. 350).

A limitation of the surveys is the need to keep them as brief and easy to complete as possible to ensure high rates of completion. Likert scales are used for attitudinal questions. Only a few questions require a free-text response. Additional data on the

usefulness or interest of the tagging study is collected from online participants through questions asking for feedback on the project. The survey forms for Studies C to E are included in Appendices 2, 3 and 5 and the responses referenced in Appendix 7 - Electronic Data Files.

The survey is designed to explore tagger attitudes to tagging and subject levels. The research design did not allow for test-retest reliability, that is making the same measurement more than once, but the survey includes internal consistency reliability by measuring attitudes to the perceived usefulness of tagging for different tasks. The ability to compare the survey responses to the actual behaviours observed when participants tag addresses criterion-related validity, that is the degree to which the survey measure can be used to predict tagging behaviour (Babbie, 2010, 150ff.). A limitation of the online surveys is the potential for self-reporting to be inaccurate and that the responses may lack depth or context.

The survey responses in Studies C and D are identified by the survey question number and in Study E by the survey identifier (e.g. *Pre-training Survey=PS; Post-training Survey=TS; Final Survey FS)* followed by a slash and the question number.

3.4.4 The research website

The research website has been described in section 3.3.1.2. After each tagging study the tagging and commenting data on the online Flickr site needs to be "cleansed" for the next study. To ensure the original data is available for checking or re-analysis, once each tagging study is complete the website is captured using HTTRACK, software which allows downloading a copy of a website for offline browsing. The website copy provides a record of the study activity. An advantage of the Flickr website is that tags and comments which participants contribute can be extracted using a variety of available Flickr APIs. This allows website data to be downloaded for qualitative and quantitative analysis.

3.4.5 The Shatford/Panofsky analysis tool

The Shatford/Panofsky classification matrix (Table 3.3)[43] is used in this research to categorise subject terms and tags.

Table 3.3 - Subject level classification matrix

	Iconography (S=Specifics)	**Pre-Iconography (G=Generics)**	**Iconology (A=Abstracts)**
Who?	Individually named person, group, thing **(S1)**	Kind of person or thing **(G1)**	Mythical or fictitious being **(A1)**
What?	Individually named event, action **(S2)**	Kind of event, action, condition **(G2)**	Emotion or abstraction **(A2)**
Where?	Individually named geographical location **(S3)**	Kind of place: geographical, architectural **(G3)**	Place symbolised **(A3)**
When?	Linear time: date or period **(S4)**	Cyclical time: season, time of day **(G4)**	Emotion, abstraction symbolised by time **(A4)**

The matrix enables subject descriptors to be classified by the subject levels of specifics, generics or abstracts, and then by the facets of "who?", "what?", "where?", and "when?" The Shatford/Panofsky classification matrix was used in pioneering user research by Armitage and Enser (1997) and increasingly is being used in contemporary tagging research (Chung & Yoon, 2009; Ransom & Rafferty, 2011) and as a theoretical foundation for new studies into how we think about images (Benson, 2011; Oyarce, 2012). It provides an effective tool to analyse subject content descriptors. Using a standard classification tool increases the value of the current research as it allows comparing the findings with other research and to future studies that use the tool.

Matrix analysis data describing description behaviour is presented in tabular form using a simple coding scheme (Table 3.4).

Table 3.4 – Shatford/Panofsky matrix display for findings

	S = Specifics	**G = Generics**	**A = Abstracts**
Who?	S1	G1	A1
What?	S2	G2	A2
Where?	S3	G3	A3
When?	S4	G4	A4

[43] See section 2.2.5, p. 25, for a fuller discussion of the Shatford/Panofsky model.

The research data is categorised by the researcher. In most cases the classification is straightforward. However, there are a number of caveats. The analysis inevitably involves some judgements about the appropriate facet in which to place a particular indexing term or tag. The use of an expert panel to validate researcher classification of subjects was assessed as unfeasible given the volume of subject terms involved in the various studies. Hence the possibility of some bias or error in classification cannot be excluded and constitutes an acknowledged limitation.

3.4.6 Statistical analyses of quantitative data

Descriptive statistics are used to describe features of the quantitative data collected and for data screening. These include statistics that describe central tendency, deviation and normality. Frequency distributions are used to present analysis outcomes from the classification of tags and subject terms according to the Shatford/Panofsky classification matrix.

Inferential statistics are used to test hypotheses that relate to the research questions (Williamson & Johanson, 2013, p. 408). For example, inferential statistics are used to determine whether the behaviour of indexers and taggers is significantly different in the treatment of generics, specifics and abstracts. Since data is mostly not normally distributed, a variety of non-parametric tests are used, including the chi-square test of independence, the Wilcoxon signed-rank test, and the Mann-Whitney U test.

3.4.7 Content analysis

Content analysis is a well-established method for making meaningful inferences from text by categorising data into clusters to identify patterns and relationships (Flick, 2009, p. 323ff.; Given, 2008, pp. 121-123; Schamber, 2000, p. 735; Williamson & Johanson, 2013). The method is "a way of reducing data and making sense of them" (Given, 2008). The method has been described (Babbie, 2010, p. 121) as "essentially a coding operation", in which the textual data is coded or classified according to some conceptual framework. In inductive content analysis the data is reviewed, categories or labels are assigned to "chunks" of varying size, such as words, phrases, sentences or whole paragraphs, and typically the labels on review

generate more abstract categories (Miles & Huberman, 1994, p. 56). Schamber (2000) explains:

> The analytic process requires the use of a coding scheme, which consists of categories and operational definitions for specific variables (e.g., images of a certain societal group). Content-bearing units are identified in the texts and coded for appropriate categories. Categories can be derived inductively from the texts being analyzed, adapted from previous studies, or adopted unchanged from previous studies. Inductive content analysis is particularly appropriate for research that takes a grounded theory approach, or which derives theory from data rather than verifies existing theory. The development of new schemes entails decisions about units of analysis, category construction, and coding procedures. (p. 735)

The technique has been used widely in LIS research for both qualitative and quantitative analysis (White & Marsh, 2006).

The use of interview guides for the interviews may suggest that a deductive or "a priori" approach is adopted for the coding framework, but while the guides are useful for structuring interviews, participants are able to respond as they choose. The subsequent analysis of responses identifies themes emerging from the data through a process referred to as "open coding" (Strauss & Corbin, 1998). In this process conceptual categories are identified and grouped to create a framework. The coding scheme is generated from close examination of the data and the creation of codes that most closely describe the content.

A content analysis software program (QSR N6), into which data from the interviews and photo analyses are entered, supports the analysis, identification and coding of code content-bearing units in the text. The use of computer-assisted qualitative data analysis provides quick and accurate processing and a reliable general picture of data, although it may guide the direction of research or distance the researcher from the data (Welsh, 2002). Use of software can assist with validity as it provides a record of how data are analysed and may help reduce errors stemming from coding inconsistencies.

Content analysis is used in both stages of the research, with the data from the interview and photo analysis sessions, and with the survey responses provided

during the tagging studies (C to E). During content analysis a codebook is developed to control terms and ensure consistency as the coding scheme goes through various stages of development and refinement. Development and coding varies from the generally straightforward, because of manifest content or concrete terms found in the text, to more challenging analysis, based in part on latent or underlying meaning identified in interpreting the text (Babbie, 2010).

3.4.7.1 Content analysis workflow

The identification of categories and themes is proposed to follow a series of steps which are similar to those outlined in the literature (Williamson & Johanson, 2013). For example, each of the interviews in Studies A and B, are to be transcribed by the researcher and the transcription closely reviewed. Prior to coding, the researcher is to read through the interview transcripts noting any issues of key interest or significance. Throughout this process, the researcher is to note possible coding terms. At the next reading, the researcher is to begin to develop a list of key terms to be used in the coding and further developed through notations, which include keywords and themes, in the content analysis software QSR N6.

Beginning coding early in the data collection process allows for growth in understanding, which informs subsequent data gathering. As interviews are conducted and transcribed, the researcher is proposing to add new terms as necessary and to modify the coding list as appropriate. Some text units may be coded to more than one category.

The researcher is then to review this list of codes. This review is to take into account the research purpose, the research questions and the transcripts. The coding terms be to be considered against the terms and categories used in previous studies to determine the most suitable terminology. Links or relationships between the codes are to be identified, leading to the emergence of concepts and themes.

Once the list of codes is refined the researcher is to re-examine, reduce and code the data. Data reduction is “the process of selecting, focusing, simplifying, abstracting and transforming the data that appears in written-up notes or transcriptions” (Miles & Huberman, 1994, pp. 10-11) enabling a more focussed analysis and revealing of

further connections, patterns and emergent themes. Data reduction is an iterative process that continues until the final report is written (Miles & Huberman, 1994, pp. 10-11; Patton, 2002, pp. 436-437). According to Given (2008, p. 121) iterative analyses helps to improve trustworthiness and credibility.

The list of codes developed working with the interview transcripts is to be used and tested against the survey response data from the tagging studies C to E.

The themes and an example of the process of the content analysis are provided in Appendix 6 - Themes from the Content Analysis and a Detailed Example of the Process of Data Analysis.

3.5 Limitations

This research investigates indexers' attitudes and approaches to indexing but the sampling and methodology potentially limits what it can reveal about the extent to which these may be affected or shaped by different work contexts and local factors.

The indexing and tagging are not "real" tasks but experimentally derived. The experimental settings have the potential to affect outcomes, amounting to the so-called Hawthorne effect. For example, the fact of being observed may alter participant behaviour and produce atypical results. The possible Hawthorne effect needs to be kept in mind when considering the observed results. Another potential limitation concerns sample sizes that work to limit the generalisability of findings. Section 3.3.1.2 explains factors that contributed to the modest levels of participation recorded. The use of information science students may also have biased results, depending on the students' prior exposure to indexing theory.

3.6 Summary

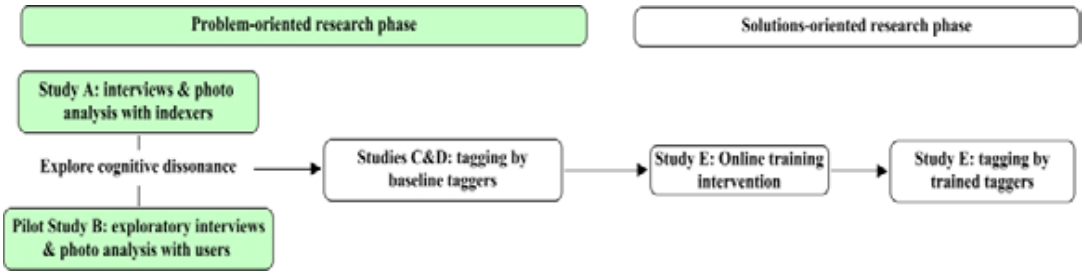
The purpose of this chapter is to provide a rationale for the research approaches and a detailed outline of the design.

The research uses a mixed approach with quantitative and qualitative methods for analysing the data which have been gathered through in-person interviews, think-aloud protocols during photo analysis sessions, online surveys, and a Flickr website

for tagging. The triangulation of the research helps strengthen the overall research design and validity of the findings.

The first stage of the research design is problem-oriented and investigates the nature of cognitive dissonance between how professional indexers and taggers approach the description of the subject content of historic photographs. The second stage is solutions-oriented and investigates how a training intervention affects tagging behaviour and can improve the description of subject content.

4 DATA ANALYSIS & INTERPRETATION: PRELIMINARY STUDIES A & B PHOTO ANALYSIS



4.1 Introduction

The first phase of the research consisted of two preliminary studies (A and B) that form part of the "problem-oriented" stage of the research. The primary aim of the two preliminary studies was to explore the Principal Research Question (PQ1):

PQ1 - What is the evidence of difference between indexers and users in the way they attribute subjects to historic photographs?

And two related research questions that focus on attribution behaviour of indexers and taggers in their own right:

RQ1 - How well does current indexing practice represent the different levels of subject content found in historic photographs? *RQ2 - How well do users' descriptions and current tagging represent different levels of subject content found in historic photographs?*

This phase of the study was exploratory in nature. It aimed at establishing whether a warrant existed for a larger study of the phenomenon of cognitive dissonance comprising Studies C and D and also to scope these studies.

A purposive sample of indexers (Study A)[44] was recruited to furnish data that could be used to investigate RQ1. Pilot Study B initiated the investigation of RQ2 which was subsequently followed up in Studies C and D with taggers (see Chapters 6 and 7).

The chapter presents the data relating to the participant demographics (section 4.2) and to the photo analysis (section 4.3). The photo analysis data is presented in two parts:

- Study A, the professional indexer subjects (section 4.3.1), and
- Study B, the user subjects (section 4.3.2).

After the presentation of the data from the two studies a preliminary comparison is drawn between the subject attributions made by professional indexers and users (section 4.3.3). The data for Studies A and B are referenced in Appendix 7 - Electronic Data Files. The data collected in Studies A and B as a consequence of investigation of both RQ1 and RQ2 enabled a preliminary finding to be made in regard to PQ1.

4.2 Participant demographics

A purposive selection of indexers, representing different professional levels, ranging from a library officer to a director of a digital libraries program, working in national to small local studies collections, provided the subjects for Study A.[45] The indexers came from collections in Australia (seven), New Zealand (two), and North America (two). The pilot Study B involved five users working with historic photographs in publicly available collections Australia and North America. The studies consisted of 16 interviews and 40 photo analysis sessions carried out through think-aloud protocols (Table 4.1).

[44] The results of Study A were published in a refereed article "Getting the Picture: An exploratory study of current indexing practices in providing subject access to historic photographs" in the Canadian Journal of Information and Library Science (vol. 34, no. 3, 2010).

[45] The logic of the purposive sampling can be found in section 3.3.1.1, p. 64.

Table 4.1 – Studies A and B: Overview

Study	**Interviews (s=16)**	**Photo analyses (n=40)**
Study A - Indexers	11	28*
Study B - Users	5	12

*Note. Due to a problem with recording equipment only ten of the eleven indexers participated in photo analysis sessions.

The distributions of gender and ages in the two groups of participants are shown in Table 4.2 and Table 4.3.

Table 4.2 – Studies A and B: Participant genders

	Study A: Indexers (s=11)	**Study B: Users (s=5)**
Male	2	3
Female	9	2

Table 4.3 – Studies A and B: Participant age ranges

Age range	**Study A: Indexers (s=11)**	**Study B: Users (s=5)**
20 or younger	0	0
21 to 30	1	0
31 to 40	4	1
41 to 50	4	2
51 to 60	1	2
61 or older	1	0

Participants' experience varied from less than five years to more than twenty-five (Table 4.4). No indexer in Study A had more than about ten years' experience working with images, and the average was close to five years. The users in Study B were highly experienced with four of the five having 24 or more years in their fields and one 5 years.

Table 4.4 – Studies A and B: Participants' experience

Years	**Study A: Indexers (s=11)**	**Study B: Users (s=5)**
Less than 5	2	0
5-9	4	1
10-14	2	0
15-19	2	0
20-24	0	1
25 or more	1	3

Study B was intended as a pilot exploration with a small group of users to test themes and questions which were to be used with the online tagging groups. The more detailed information from this group helped to corroborate and illuminate particular questions relating to the user behaviours described in the literature of user studies.

The research design, which was discussed in Chapter 3, allowed data to be collected through direct observation and participant responses. The describing tasks were designed to complement and amplify the information gathered during the prior interviews. Participant descriptions of stimulus materials (historic photographs) provided data revealing what attributes are typically perceived and how they are classified. The interviews with indexers and users aimed to gather participant knowledge and understanding of theory and subject levels when indexing, or describing or searching for historic photographs.

The data collected during the photo analysis sessions and interviews were analysed within three broad categories:

- participants' subject descriptions during the photo analysis sessions;
- participants' understanding and perceptions of what constitutes a "subject" of historic photographs and of subject levels; and
- participants' self-reported understanding of the process of indexing and the actual processes observed during the photo analysis.

Results from the photo analysis sessions are reported below. Results from analysis of interviews and self-reported understanding of the indexing process are reported in Chapter 5.[46]

4.3 Research findings from photo analysis sessions (Studies A & B)

The photo analysis sessions provided experimental evidence of how professional indexers and users represent the different levels of subject content in historic

[46] See p. 96.

photographs. (See transcripts and photo analysis subject files listed in Appendix 7 - Electronic Data Files.)

The subject terms used by participants during the photo analyses were analysed using the Shatford/Panofsky classification matrix[47] (Table 4.5). Terms were classified by the specific, generic or abstract level and then by the facets of "who?" (S1, G1, A1), "what?" (S2, G2, A2), "where?" (S3, G3, A3), and "when?" (S4, G4, A4) for each level.

Table 4.5 – Shatford/Panofsky matrix display for findings

	S = Specifics	**G = Generics**	**A = Abstracts**
Who?	S1	G1	A1
What?	S2	G2	A2
Where?	S3	G3	A3
When?	S4	G4	A4

4.3.1 Study A: Professional indexer subjects

Study A with indexers investigated the first research question:

RQ1 - How well does current indexing practice represent the different levels of subject content found in historic photographs?

The number of subject terms identified by ten indexers[48] during the 28 photo analysis sessions totalled 223. Indexers, as shown in Figure 4.1, overwhelmingly used specifics (116 or 52.0% of the total) and generics (103 or 46.2%), which were largely related to the generic term for categories of specific things. Only a very small percentage of subject terms were abstracts (4 or 1.8%).

[47] Its use as the analytic model is discussed in section 3.4.5, p. 75.

[48] Due to a recording problem only 10 of the 11 indexers did photo analysis sessions.

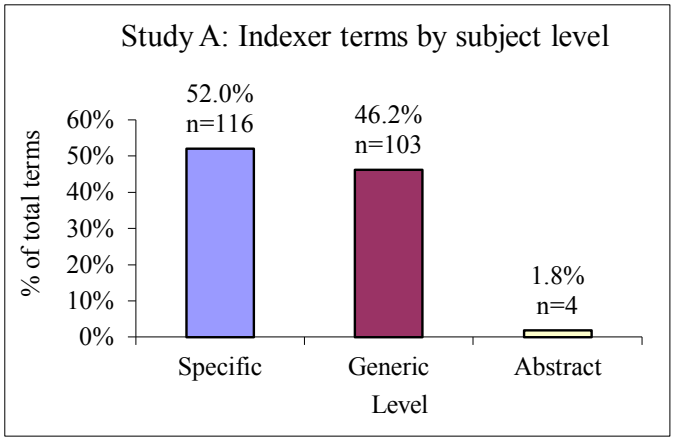


Figure 4.1 – Study A: Indexer terms (n=223) by subject level

The distribution of subject terms by facets is shown in Table 4.6 and Figure 4.2. The facet G1, the kind of person or thing, had the greatest number of subjects (82). The specific facets of "where?" (S3) and "who?" (S1) were the next largest with 43 and 40 respectively. While one indexer mentioned four subjects relating to the abstract "what?" (A2) in analysis, he indicated he probably would not use them when assigning final subject headings. The "who?" facets (S1, G1) with a total of 122 subject terms showed indexers strong interest in this aspect.

Table 4.6 – Study A: Indexer terms by subject facet (n=223)

	Specifics	**Generics**	**Abstracts**	**Totals (%)**
Who?	40	82	0	122 (54.7%)
What?	4	10	4	18 (8.1%)
Where?	43	11	0	54 (24.2%)
When?	29	0	0	29 (13.0%)

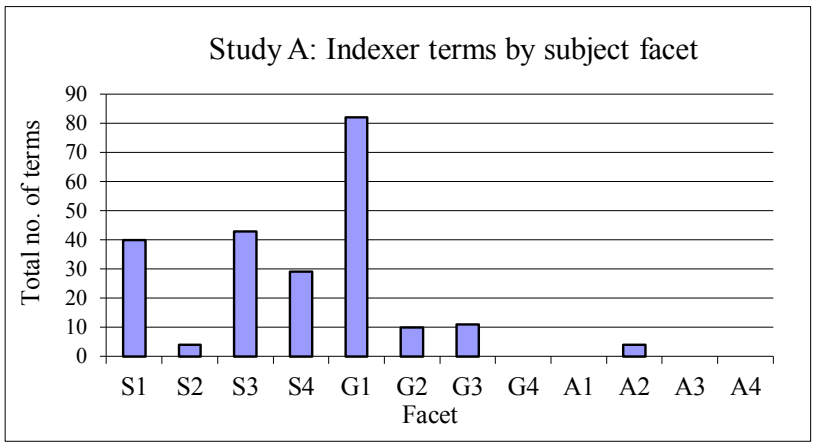


Figure 4.2 – Study A: Indexer terms (n=223) by subject facet

Analysis of skewness with the data produced shows asymmetric distribution by subject facet to be typical across all three levels. With specifics the skewness was negative (-1.38) (*M*=29.00) indicating a greater number of larger values. Generic subjects (*M*=25.75) displayed positive skewness (1.89), seen in Figure 4.2, with G2, G3 and G4 less used. Abstract subjects were not preferred by indexers with a mode 0 and 4 instances overall.

During the 28 photo analysis sessions, indexers identified a mean of 8.0 subjects per photograph in each session: 4.1 specifics, 3.7 generics, and 0.1 abstracts (Table 4.7). Medians for specifics and generics were both 3.5, describing good central tendency and modest variation in behaviour across these levels. The mode for abstracts was 0, describing a strong propensity not to allocate abstract facets.

Table 4.7 – Study A: Indexer subject facets by photo analysis session (n=28)

	Specifics	**Generics**	**Abstracts**
Mean	4.1	3.7	0.1
Median	3.5	3.5	0.0
SD	2.2	2.3	0.4

Thus the data in Study A showed that the professional indexers:

1. Had a propensity for specifics and generics, recording similar number of specifics and generics attributed overall.
2. Displayed a greater propensity to assign subjects across specific facets (S1, S3 and S4) while the generic data showed a bias toward the "who?" facet (G1).
3. Rarely attributed abstract subjects.

The distribution of individual indexers' subject terms (Figure 4.3) revealed that only one indexer (Subject L), working in an academic setting, had used abstract subjects.

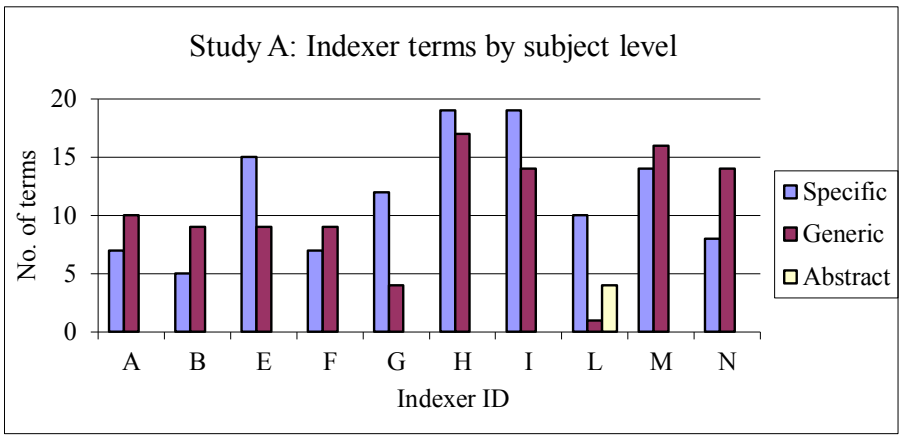


Figure 4.3 – Study A: Indexer terms (n=223) by subject level

Each indexer used a mean of 22.3 subjects, with the means for specific and generic subjects 11 and 9.5 respectively (Table 4.8).

Table 4.8 –Study A: Indexer terms by subject level

	Specifics	**Generics**	**Abstracts**
Mean	11.6	10.3	0.4
Median	11.0	9.5	0
SD	5.0	5.1	1.3

Further analysis of the data by facet (Table 4.9) showed that indexers recorded similar data points for the specific facets of "who?" (S1), "where?" (S3), and "when?" (S4), with medians of 3.5, 3.5 and 3.0 respectively. For generic subjects, the skew (1.9) showed a strongly asymmetrically distributed set of data points, biased toward subjects related to the kind of person or thing (G1).

Table 4.9 – Study A: Indexer terms by subject facet

	S1	**S2**	**S3**	**S4**	**G1**	**G2**	**G3**	**G4**	**A1**	**A2**	**A3**	**A4**
Mean	4.0	0.4	4.3	2.9	8.2	1.0	1.1	0	0	0.4	0	0
Median	3.5	0	3.5	3.0	7.5	1.0	1.0	0	0	0	0	0
SD	2.1	0.5	3.2	0.6	5.0	1.1	1.0	0	0	1.3	0	0

The asymmetry of the subject distribution is clearly shown in Table 4.10 which displays the individual indexer mean terms per subject facet. Professional indexers' subject terms, as classified by the Shatford/Panofsky classification matrix, covered only half (6) of the total facets (12).

Table 4.10 – Study A: Individual indexer subject facet means

	Specifics	Generics	Abstracts
Who?	4	8	0
What?	0	1	0
Where?	4	1	0
When?	3	0	0

The limited facet representation was evident when examining the terms used on each photograph. Typically, indexers provided subject terms for only one third (4) of all facets (12).

In conjunction with the photo analysis activity, participants were questioned about what subjects had been easy, or alternatively, difficult to identify. Not surprisingly, given the evidence from observations presented so far, specific facets were more frequently mentioned (67 times) and then generic (21 times) and abstract (6 times) facets. Again the evidence pointed to professional indexers focus on specifics and generics. The reported difficulties with specifics may reflect the lack of available documentation during the photo analysis sessions. In the subsequent tagging studies, some stimulus photographs were supported by documentation to test what effect this would have.

Finding 4.1. The findings show professional indexers' propensity for specifics and generics and their rejection of abstracts for subject representation. The result is consistent with an objectivist construction of the task of indexing.

4.3.2 Study B: User subjects

Study B, a pilot study with users, began the investigation of the second research question:

RQ2 - How well do users' descriptions and current tagging represent different levels of subject content found in historic photographs?

The focus of this study was to explore and test concepts and questions to be used in the subsequent studies (C and D) with taggers.[49] The small sample size means that the statistical analyses must be treated with caution. Their value was to illuminate, explore and to inform the subsequent tagging studies.

The total number of subjects identified by users during 12 photo analyses was 101. As shown in Figure 4.4, almost half were specifics (47 or 46.5%). The other half was divided between generic subjects (30 or 29.7%) and abstracts (24 or 23.8%).

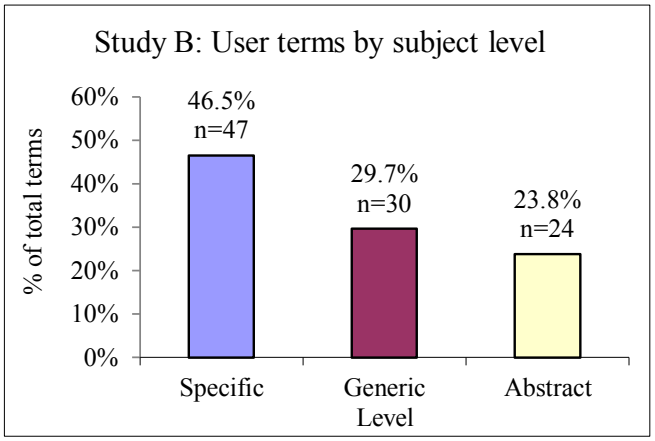


Figure 4.4 – User terms (n=101) by subject level

The distribution of subject terms by facet is shown in Table 4.11 and Figure 4.5. The greatest number of subjects (23) related to the abstract "what?" facet (A2) followed by the generic "who?" (G1), and the specific facets of "where?" (S3) and "who?" (S1). The few terms relating to the specific "what?" (S2) may have been due to the difficulty of identifying this facet with no documentation. The majority of terms related to the "who?" (32) and the "what?" facets (35).

Table 4.11 – Study B: User terms by subject facet (n=101)

	Specifics	**Generics**	**Abstracts**	**Totals**
Who?	14	18	0	32 (31.7%)
What?	4	8	23	35 (34.7%)
Where?	17	2	0	19 (18.8%)
When?	12	2	1	15 (14.9%)

[49] Tagging studies C and D are discussed in Chapters 6 and 7.

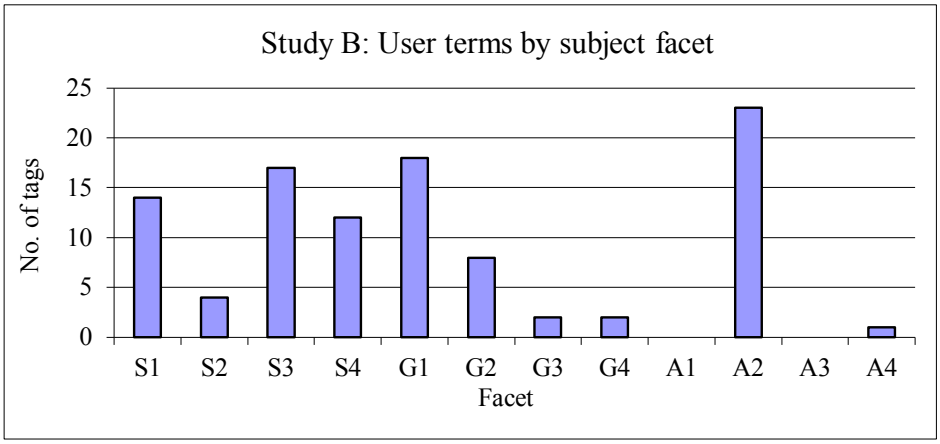


Figure 4.5 - Study B: User terms (n=101) by subject facet

Further analysis of the Table 4.12 subject facet data displayed in Figure 4.5 showed that the data were not normally distributed across any level. Specifics displayed negative skewness (-1.20) (*M*= 11.75), that is a propensity for more S3 and S4 tags to be used. Generic subjects displayed positive skewness (1.28) (*M*=7.50), seen in Figure 4.5 where G3 and G4 recorded modest use, relative to G1 and G2. Abstract subjects also displayed positive skewness (1.99) (*M*=6.00) with only one facet, A2, well represented in terms of tags used (see Figure 4.5).

Users identified a mean of eight subjects per photograph in each photo analysis session: 3.9 specifics, 2.5 generics, and 2.0 abstracts (Table 4.12). The medians for generics and abstracts were both 2.0.

Table 4.12 – Study B: User subject facets by photo analysis session (n=12)

	Specifics	**Generics**	**Abstracts**
Mean	3.9	2.5	2
Median	4	2	2
SD	1.6	1.6	1.5

The data from pilot Study B provided preliminary evidence that users:

1. Had a propensity for specifics.
2. Have similar propensities to assign subjects to generic and abstract levels.
3. Favour abstract subjects relating to the abstract "what?" (A2).

While the sample of users was too small to draw meaningful information about individual activity there were some interesting indicative results. As measured by SD, users' behaviour in terms of propensity to allocate specifics was similar. Greater variability is seen with generics and abstracts. The breakdown by facet shown in Table 4.13 revealed that slightly more than half (7) of the total facets (12) were represented by means of one or more subjects. Typically, for each photograph, users provided subject terms for half (6) of all facets, higher than the four facets represented by indexers.

Table 4.13 – Study B: Individual user subject facet means

	Specifics	**Generics**	**Abstracts**
Who?	3	4	0
What?	1	2	5
Where?	3	0	0
When?	2	0	0

During the photo analysis sessions participants were questioned about what subject aspects had been easy or difficult. Like indexers, the aspects mentioned most often related to specifics (28 out of 41 comments). Specifics were "easy" when the user was familiar with the subject matter and "difficult" when unfamiliar and without research.

Finding 4.2. As measured by aggregate tags used by level, the pilot study with users suggests that users have a propensity for specifics and a lesser, but similar propensity for generics and abstracts.

4.3.3 Preliminary comparison of professional indexer and user subjects

Studies A and B began the investigation of the principal research question:

PQ1 - What is the evidence of difference between indexers and users in the way they attribute subjects to historic photographs?

A preliminary comparison of the professional indexer and user subjects shows differences both in the attribution of subjects to historic photographs and in the respective approaches to image subject content.

Indexer and user attribution by subject facets

A comparison of skewness data from the photo analysis sessions shows that:

- with Specifics, both indexers and users show a propensity to attribute to the subject facets of '"who?" (S1), "where?" (S3) and "when?" (S4) but not to "what?" (S2);
- with Generics, both groups show similar propensity attribute to the "who?" (G1) subject facet and attribute less to "what?" (G2), "where?" (G3) and "when?" (G4); and
- with Abstracts, both groups had a propensity as measured by skewness to the "what?" (A2) subject facet, with very modest attribution overall, and users recording many more attributions in aggregate than professional indexers.

Objectivism and interpretivism in indexing

A clear difference between professional indexers' and users' overall approaches to image content was demonstrated by aggregate subject terms used in photo analysis (Figure 4.6). Professional indexers used subject headings which were almost all objective with 98.2% relating to specifics or generics and avoided abstracts (1.8%). In contrast, users named almost as many abstract subjects (23.8%) as generics (29.7%).

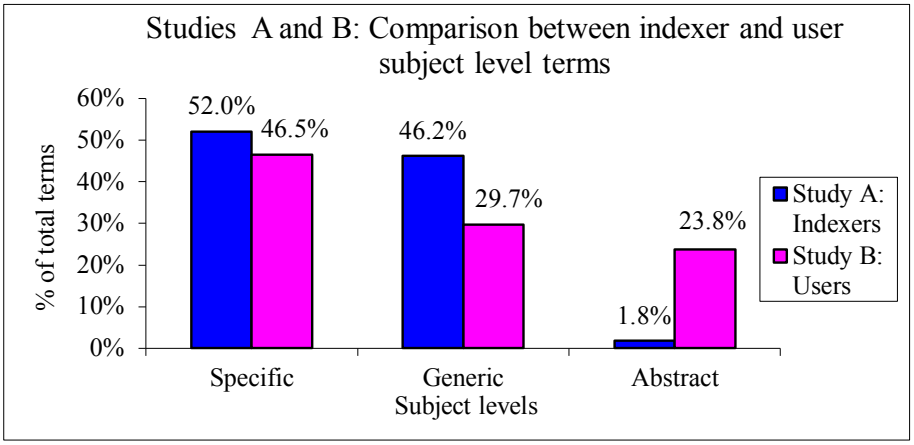


Figure 4.6 – Studies A and B: Comparison between indexer and user subject level terms (n=324)

A comparison of subject facets showed clear differences between the attributions of subjects to G1 and A2 facets (Figure 4.7). Professional indexers used generic subjects related to the kind of person or thing (G1) most frequently (36.8%). In contrast, users used abstract subjects related to the "what?" facet (A2) most often (22.8%).

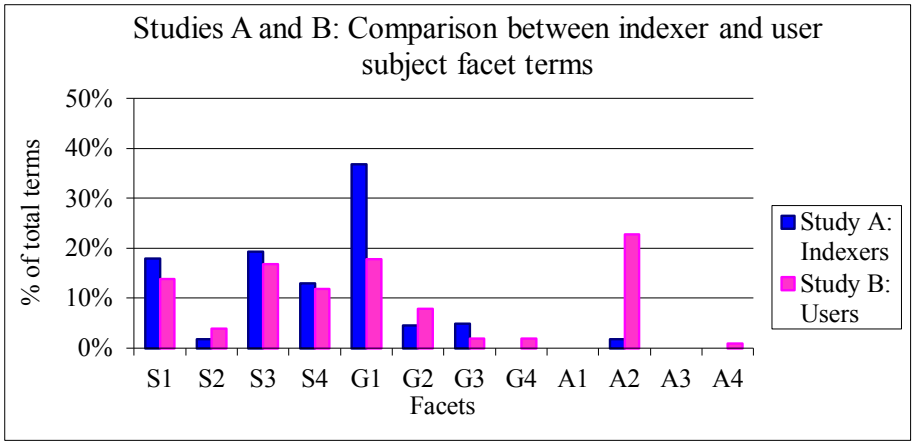


Figure 4.7 – Studies A and B: Comparison between indexer and user subject facet terms (n=324)

Comparative data showed differences between how professional indexers and users approached and attributed subject content in historic photographs. There was no evidence that the gap was caused by perceptual differences; the observed behaviour during the photograph analysis sessions showed common perceptions of subjects such as objects, people, and activities. The differences are more likely attributable to indexers' and users' different approaches and interests in historic photographs (see further summary and discussion in section 5.4).

Finding 4.3. The evidence suggests cognitive dissonance between how professional indexers and users approach and attribute the subject content of historic photographs as measured by the Shatford/Panofsky matrix.

4.4 Summary

The photo analysis evidence showed that at the perceptual level concrete and specific subject matter was perceived similarly by participants. However, clear evidence of

difference arose in the attribution of subjects. Professional indexers showed a propensity to identify specific and generic things, and almost completely avoided abstracts. Users, while they showed a propensity for specifics, showed almost equal propensities for generics and abstracts.

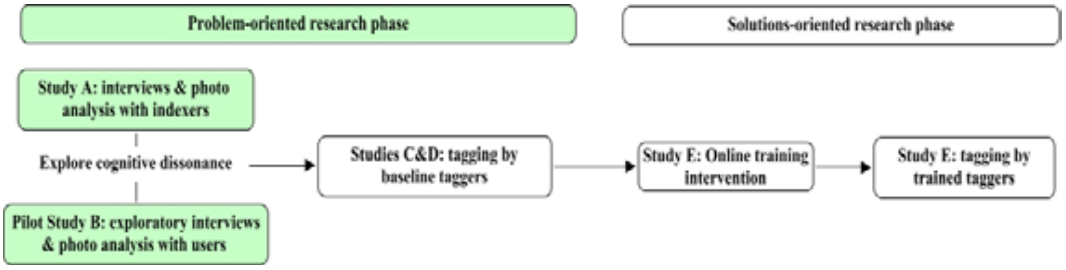
The "gap" between indexers and users suggests cognitive dissonance between how professional indexers and users approach and attribute the subject content of historic photographs. Table 4.14 summarises findings from the two preliminary investigations:

Table 4.14 –Studies A and B: Summary of Photo Analysis Findings

<u>Finding 4.1.</u> The findings show professional indexers' propensity for specifics and generics and their rejection of abstracts for subject representation. The result is consistent with an objectivist construction of the task of indexing. *<u>Finding 4.2.</u> As measured by aggregate tags used by level, the pilot study with users suggests that users have a propensity for specifics and a lesser, but similar propensity for generics and abstracts.* *<u>Finding 4.3.</u> The evidence suggests cognitive dissonance between how professional indexers and users approach and understand the subjects of historic photographs as measured by the Shatford/Panofsky matrix.*

These results were encouraging and suggested the value of further study aimed at exploring cognitive difference in authentic settings, such as folksonomic indexing of historic images over the Internet. The following chapter explores the themes that emerged during the content analysis of the interviews and photo analysis data and the evidence of cognitive dissonance that this provided.

5 DATA ANALYSIS & INTERPRETATION: PRELIMINARY STUDIES A & B INTERVIEWS AND PHOTO ANALYSIS COMMENTS



5.1 Introduction

Chapter 5 continues the investigation of the first phase or "problem-oriented" stage of the research. The investigation began in the previous chapter with the presentation of the evidence from the photo analysis sessions carried out in two preliminary studies with indexers (Study A) and a pilot group of users (Study B).

This chapter presents analysis and findings from investigation of interview and observational data collected from these studies. In doing so it builds on the discussions and findings of Chapter 4 and contributes to the ongoing investigation of the principle research question:

PQ1 - What is the evidence of difference between indexers and users in the way they attribute subjects to historic photographs?

As with the previous chapter, the discussion and findings from Study A[50] with profession indexers investigated the research question:

[50] As previously noted, the results of Study A were published in a refereed article "Getting the Picture: An exploratory study of current indexing practices in providing subject access to historic photographs" in the Canadian Journal of Information and Library Science (vol. 34, no. 3, 2010).

RQ1 - How well does current indexing practice represent the different levels of subject content found in historic photographs?

The findings and discussions related to pilot Study B with users continued to explore the research question:

RQ2 - How well do users' descriptions and current tagging represent different levels of subject content found in historic photographs?

This chapter expands on the elements and attributes that contribute to representing the different subject levels in historic photographs. The analysis and interpretation are grouped under themes that emerged from the interviews and comments during the photo analyses as follows:

- The first group of themes (section 5.2.1) addresses theoretical perspectives;
- A second theme relating to subject levels is discussed in section 5.2.2; and
- Finally, the professional process of indexing photographs is addressed in section 5.3.

The research process of developing the themes is described in Chapter 3 (section 3.4.7). The themes are summarised in Appendix 6: Table 1 (p. 330). Examples of the data may be found in Appendix 6 - Themes from the Content Analysis and a Detailed Example of the Process of Data Analysis.

5.2 Research findings: Interviews and photo analysis comments

This section discusses the first group of themes relating to theoretical perspectives (section 5.2.1) followed by the second theme concerning subject levels (section 5.2.2).

A protocol was adopted for identifying participants and coding interview and photo

analysis text.[51] The data in Studies A and B (Table 5.1) consisted of 16 interviews and 40 photo analysis sessions carried out through think-aloud protocols.

Table 5.1 – Studies A and B: Overview

Study	Interviews (s=16)	Photo analyses (n=40)
Study A - Indexers	11	28*
Study B - Users	5	12

*Note. Due to a problem with recording equipment only ten of the eleven indexers participated in photo analysis sessions.

The questions for the interviews and photo analysis sessions are included in Appendix 1 - Interview Questionnaires, and the full transcripts are referenced in Appendix 7 - Electronic Data Files).

5.2.1 Theoretical perspectives

Participants' theoretical understanding of the "subject" and their approach to analysing subject content are explored in relation to the following themes which emerged from the content analysis described in section 3.4.7:

- theory and praxis (section 5.2.1.1),
- what is a "subject"? (section 5.2.1.2), and
- models and approaches (section 5.2.1.3).

5.2.1.1 Theory and praxis

A number of the interview questions were designed to elicit participants' understanding of theory and its implications for their indexing practice. Surprisingly, during the interviews and photo analyses no professional indexer referred to the extensive LIS literature relating to theory or indexing guidelines (reviewed in Chapter 2), including standard texts such as the *Thesaurus for graphic materials I: subject terms (TGM I)* (1995).[52] Indexers also appeared uncertain about applicable policy or indexing guidelines in their own institutions. Two indexers (Subjects G and

[51] The research participants are identified by alphabetic identifiers and quoted extracts by the text unit number in the interview and photo analysis transcripts. The analysis of subject categorisation uses the Shatford/Panofsky classification matrix.

[52] See section 2.2.2, p. 21.

I) even indicated they did not know of any local policy. Only one indexer (Subject L) referred to institutional "policy", although this did not appear to be a formal, written policy, and another discussed using a local pictorial indexing manual which "covered all the tags and the fields" (Subject F, text unit 258). All the other indexers appeared to understand indexing "policy" in terms of the local subject thesaurus, a guide to terms allowed for subjects:

> We have set down the policy, the subjects that we're to use. If we need a new subject heading at all, we go to the thesaurus which we all use. (Subject H, text unit 70)

> Ah, well, we don't really have a policy as such beyond that we use the Australian Pictorial Thesaurus. (Subject N, text unit 122)

> I can't really say exactly what the library's policy on subject indexing is. I guess we are committed to it. We are committed to using Library of Congress subject headings. (Subject O, text unit 64)

These results are surprising. It is difficult to assess how the admissions of ignorance affected indexing in practice. However, it suggests that indexing was largely subjectively determined by individual indexers.

Professional indexers did not suggest that indexing photographs required any approach or training different from traditional text cataloguing. It was a user, who suggested the possible limitations of this thinking:

> There are also rules about how subject cataloguers choose subject headings which are derived in my view really from the world of books. And those rules don't always apply perfectly well to pictures. For example, if the […] subject aspect […] is only ten per cent of the book, they will generally be instructed not to give a subject entry for that minor viewpoint. Whereas […] an object that might occupy a very tiny portion of the picture can be quite significant. (Subject P, text unit 16)

One professional indexer recognised that LIS practice ("conditioning"), reflected in the instructions set out in standard LIS guidelines on image indexing such as *TGM 1*

(Betz, 1997),[53] led to an emphasis on indexing specifics (Subject I, text unit 50). A user memorably described the effects of this traditional approach:

> Well…if you're looking for a subject in a library, I guess, because of the nature of the finding aids, you have to pervert your thought processes to try to think a bit like a cataloguer. (Subject C, text unit 18)

Another user echoed "the indexer's mind does not work the same way as mine" (Subject D, text unit 85). The gap between indexing and user subjects might be bridged by terms found in other catalogue data, such as captions or notes (Subject D, text units 52 and 54).

For professional indexers, warrant in the allocation of subjects, was communicated by contextual information and metadata of various kinds. All professional indexers commented on the importance of source documentation, and most cited checking this as the first step in indexing. Checking text documentation is the starting point in indexing guidelines, such as *TGM 1* (Betz, 1997), and in the tradition of LIS textual warrant.[54] Again, this is reflected in numerous comments made by participants about their use of documentation and metadata, such as captions or titles, and points to text and the literary warrant it supplies as an important factor in deciding on subject matter. Internal evidence, such as information on signs captured in the photograph, provided another source of text-based warrant. Professional indexers also found warrant in the library thesaurus and, in one case, the vocabulary of other domains in providing terms for their "professional users" (Subject L, text unit 42).

There was no evidence in interview data of the concept of a distinctively *visual* warrant. The absence of comment highlights the need for visual literacy which a number of researchers have called for (Burke, 2001; Lesy, 2007; Ritzenthaler & Vogt-O'Connor, 2006; Rose, 2007; Schwartz, 1995; Svenonius, 2000).[55] However, only users suggested that this might be a shortcoming. One user mentioned the problem, often raised in the literature, that images generally lack words to describe

[53] Discussed in section 2.2.2, p. 21. The limitations of LIS guidelines are summarised on pp. 21-22.

[54] Discussed on p. 20.

[55] See section 2.2.7, p. 31.

themselves (Subject J, text unit 65); another alluded to this when describing a searcher "translating the visual into some words" in order to search (Subject P, text unit 24). Uniquely, a user suggested the need for specific visual skills or training in "understanding the way different artefacts can convey information" (Subject K, text unit 66). The deficiencies of image description in dealing with basic spatial concepts, such as fore- and background, or expressing processes or relationships between elements in the photograph was highlighted by another user (Subject P, text unit 18).

5.2.1.2 What is a "subject"?

Participants, when asked to define a "subject" in the interviews, did not refer to the extensive LIS literature on the subject, either in relation to text (see section 2.2.1) or to image guidelines and models (see sections 2.2.2 and 2.2.5) or to theories of categorisation (section 2.2.3). One professional indexer considered subjects might be allocated on the basis of hierarchy and proximity to the indexer, i.e. "the things that obviously are large and stand out that you're familiar with" (Subject H, text unit 78). However, other indexers reported that images might be open to multiple interpretations and different viewers "would probably see different things unless it was very obvious what the overriding theme was" (Subject B, text unit 40). Yet the subject differences might be more a matter of what the viewer attends to, "there's more than one element in a photograph that people could be interested in" (Subject D, text unit 22). None of the indexers suggested that any viewer might have different perceptual responses to an image,[56] and there was a tacit assumption in responses, reflecting the traditional LIS concept of a cultural or majority consensus, namely that viewers would agree about what subject content was important.[57]

Users, while not suggesting any perceptual differences, were less confident about any consensus and more convinced of multi-dimensionality:

> There's so many different ways of looking at the image because the image can be read in so many different ways according to what your particular interest is

[56] This view supported by the literature on perception and cognition reported in section 2.2.3, p. 23.

[57] Traditional library classification since the nineteenth century has tended to assume a singular public view (see p. 38). See section 5.2.2.1, p. 113, for the implications of this approach in relation to specifics.

> and that can be... open a real minefield in terms of trying to address what you want to emphasise… (Subject K, text unit 59)

As well, users were aware that over time changing reception affects how an image is interpreted as "each generation or each sort of group of people that come to it bring a different interpretation and they see different things in it….in 1900 it would have been read completely differently from 1950, from 2000" (Subject C, text unit 34). This is similar to Foucault's notion of changing meanings[58] and contrasts with the "fixed" meaning underpinning the practice of traditional LIS cataloguing, where subject attribution is seldom revisited.

Professional indexers typically indicated what they considered the photographer's intent, or what they saw as its 'focal point' (Subject B, text unit 20). The notion that subject content can be determined on the basis of authorial intent is problematic, although *TGM 1* (Betz, 1997) suggests indexers try determine authorial intents.[59] However, it is clear that what professional indexers frequently described as 'intent' equates to the 'ofness' of a photograph.

> Usually I look at the whole or what the photographer meant to take the photo of, so if it's a street, he's looking down the street and he meant that photo to be of the street. (Subject A, text unit 12)

At times, even with reasonable grounds for supposing a photographer's intent, indexers might prefer to leave this up to the user's interpretation.

> Like we've got cases of photographing early Maori where I think the photographer was doing it with a bit of tongue-in-cheek and set up to possibly maybe ridicule, … I don't think that you would say anything about that in the indexing because it is what it is. You let the person looking at it then... (Subject H, text unit 56)

In addition to perceived intent, the 'focal' subject operated as an effective tool in narrowing attention to certain elements of the subject matter. The focal subject might be determined from accompanying documentation or collection context, the perceived straightforwardness of the image or the needs of the institution's clientele.

[58] Discussed in section 2.3.3, p. 37, and in the Summary and Discussion, section 5.4, p. 132.

[59] See section 2.2.2, p. 21.

This enabled indexers to both develop and limit the range of possible readings of the photographs and to quickly identify subject concepts.

> I'd look at it first and work out what the main focus of the photograph is. But you also have to look at the photograph overall as well and try to work out what different aspects of the photo different people will want to know about. (Subject B, text unit 10)

The photo analysis sessions provided evidence that recognisable scenes or activities were important determinants of focal subjects and what subsequently would be indexed. The first 'subject' or summarising concept identified by indexers in 21 of the 28 photo analysis sessions matched the first index subject heading they chose.

Users were aware that authorial intent might be problematic ("Now we can't always read his or her mind", Subject D, text unit 50), even if they considered it. They were more interested in the context of the photograph's creation, the 'why' – "What was he trying to capture…in taking this picture?" (Subject D, text unit 24). Context was regularly commented on during the photo analyses when users queried or speculated on why a photograph had been taken:

> If you don't have the context, or the sort of extra knowledge about what's happening on… happening in the photograph you might, sort of, go down th[e wrong] track. [...] So, yeah, so I think there are broader things outside the image that need to be considered when…when arriving at a subject for the photograph. (Subject C, text unit 34)

The users' perceptions of the importance of context reflect a more complex approach and understanding of image meaning than shown by the professional indexers, an approach that resonates with thinking on the meaning of texts, such as Foucauldian discourse analysis and Derrida's ideas of the *parergon* (i.e. the frame).[60]

On the other hand, users did remark that subjects could be straightforward and sometimes "if there is an element that is front and centre that in and of itself becomes a meaningful statement of why the photograph was taken" (Subject K, text unit 68).

[60] For a discussion of post-modernist and structuralist theory on the attribution of meaning see the discussion in the Summary and Discussion, section 5.4, p. 132.

Furthermore, objects or aspects which might have been peripheral, or even unintended, could be equally important.

> So the intention of the creator is…may not…may not be important to indexing the photograph. Oh, I'm sort of getting back into the realms of literary theory, and, yes, yeah, also historical theory as well, about the author being dead. And, I guess, that's true up to…up to a point with images but only up to a point because images without a context and information about the creator, the creative purpose, the context in which the image was made, you know, they might be…they might look pretty but they won't necessarily mean anything unless you have the added information. So, I guess, it's a bit of…a bit of both. I'm hedging my bets there. (Subject C, text unit 54)

The whole issue was summed up by one user who said "who judges the photographer's intent apart from the photographer... You can only do a certain amount to leading them in that way [by indexing] in an ethical way" (Subject P, text unit 68).

5.2.1.3 Models and approaches

Interview data did not provide evidence of the use of any formal theory or model found in the literature review, such as the Shatford/Panofsky classification matrix.[61] However, professional indexers and users did display distinct approaches to subject matter.

A common theme amongst indexers was that historic photographs are "documenting what they see and that is more objective than, say, a photographer who is pursuing an artistic theme" (Subject N, text unit 70). By framing historic photographs in this way it was sufficient to index the ostensible subject content. When indexers occasionally acknowledged that their indexing might be subjective (for example, B, text unit 40) or inconsistent, these inconsistencies were explained by a variety of factors, including differences in attention, biases, or differing levels of knowledge and experience (Subject O, text unit 62).

[61] See section 2.2.5, p. 25.

Professional indexers consistently referred to user-centred indexing,[62] based on how they perceived their institutional mission and its clientele. Yet in the photo analysis they referred to client needs in only 10 of the 28 sessions, each time in relation to concrete objects. Typically the reference was negative, such as "not clear enough to be of interest to anybody" (Subject A, text unit 95) or "no one is going to ask me about the roses" (Subject E, text unit 124). Why an indexed item might be useful was seldom explained. Indexers did not mention professional guidelines, formal methods or research informing how they determined subjects. They frequently cited personal experience of users' questions when working on reference desks and asserted that "you know the sorts of things that people ask for" (Subject A, text unit 57).

Professional indexers recognised the need to cater for differing user knowledge (Subject H, text unit 12). Ultimately, for users who need more assistance in finding items than provided by the catalogue, "the reference librarian has to be there" (Subject E, text unit 49) – a pragmatic viewpoint which might help professional indexers in deciding how much to index.

While professional indexers considered their indexing was suitable for reasonably knowledgeable users, users commented frequently on the gap between indexing and their subject needs.

> [...] what you come up against is the limitations of knowledge of the people who are actually doing the cataloguing. [...] I mean, more or less, I've had to be satisfied with photographs that are at least classified by some sort of locality, such as a street or square, and more or less a decent date at which the photograph was taken. And after that I use my own knowledge to establish whether or not the content of the photograph is pertinent for my particular research purposes. (Subject K, text unit 24)

All participants recognised the (perceived) clients and mission of the institution influenced professional indexing. Users understood "what subjects get indexed depends on the purpose of the institution doing the indexing" (Subject E, text unit 20). This emphasis was pronounced in local studies collections where professional indexers tended to self-imposed limitations.

[62] Also referred to as request-oriented indexing (see section 2.2.1, pp. 18-19).

> So, at the [state library] the terms that they would apply would be quite different to what I would apply and even though I know we have got some of the same photographs… (Subject E, text unit 75)

Professional indexers working with collections serving a wide variety of clients found indexing more challenging. They knew searchers might approach the same image from diverse viewpoints. Despite this, their indexing remained resolutely objective. This was noticeable enough to be commented on by a user who imagined an advertiser in search of image of "happy children" would find "it's not something that libraries normally do" (Subject D, text unit 46).

Users' were aware their search needs or research interests provided a frame of reference[63] affecting what they perceived as subjects:

> It's very much in the eye of the beholder. … I think the indexer needs to be conscious … that there may be, there's more than one element in a photograph that people could be interested in. There might be a picture of a street scene in [City] in 1910. Some people are looking at the building, other people will be interested to see what…how people are dressed, how the people are dressed walking in the street. There are lots of different things and indexers have to be conscious of that. There are lots of different users. (Subject D, text unit 22)

Whatever the institutional setting, professional indexers agreed that their readings should be "objective" and their indexing was constrained by a perceived need for neutrality. An indexer expressed concisely the standard viewpoint:

> But part of the point of indexing it is to rein in that subjectivity and provide as much access as you can without going overboard, which is… which is an objective exercise. (Subject E, text unit 82)

Only one professional indexer, directing the digital program of an academic library, recognised that indexing could readily shade into interpretation and asked "when do we cease being documenters and when are we interpreters?" (Subject L, text unit 72). This suggests the possibility of indexers moving toward a post-modern

[63] See the Summary and Discussion, section 5.4, p. 132, for a discussion of user frames of reference.

interpretation of images, but he was reluctant for indexers to take on this interpretative role.

The idea of indexers "interpreting" an image was equally problematic for users. Users saw their role as interpreters but felt it was legitimated because it was clearer to others that they were engaged in an act of interpretation which was open to debate. In contrast, the catalogue was seen as much more authoritative (Subject C, text units 54, 58). Users did not appear to consider that restricting professional indexers from "interpreting" would consequently limit indexing to concrete and specific subjects and reinforce the existing "gap". That any sort of indexing is, by its nature, an act of interpretation was not raised.

Reflecting another aspect of traditional practice, professional indexers commented on approaching each photograph as a standalone object, although some did mention considering the context in which the photograph was created or originally collected as potentially useful in understanding and identifying subject content. Many institutions use provenance as an organising principle for part or all of their collections; for one user the "ideal" online library cataloguing systems would provide this sort of contextual access (Subject P, text unit 56). Users almost invariably sought to contextualise images and relate their subject content to broader themes and search interests.

Provenance, the previous creation or ownership of an item or collection, was routinely cited as important in understanding and identifying subject matter. However, only a few professional indexers articulated how this influences their reading of its subject matter.

> ....you try to establish how does this single image fit into the collection. And you'd be trying to...you'd be assuming there's a consistency and you'd be looking for it I guess. So you'd have that in mind. Yeah, I guess that's it. (Subject N, text unit 50)

To users "how the collection was built up, how it may have been perceived by the creator" might be critical to their understanding of a photograph and "how far to push an analysis through a particular source" (Subject K, text unit 60). But they were

"not sure, that's how an indexer works" (Subject C, text unit 50) and for indexers contextual factors were secondary considerations. Indexers tended to the item-by-item approach in their indexing. In some cases this approach might produce absurd results such as when

> …a collection of watercolours from a voyage led by Captain Freycinet, um, and […] I noticed that the word Freycinet did not occur anywhere in the record, okay. And [laughs], and they'd been, I mean the cataloguer had followed the rules. […] Whereas a lot of people, the significance, the intellectual content, is, it's example of what was done on the Freycinet voyage. So that's a really important subject approach for them. (Subject P, text unit 62)

Professional indexers were concerned about how indexing too many photographs with the same subject or with too many subjects might affect searching by amplifying recall at the expense of precision.

Indexers determined what to index based on the quality of the thing as an example of its type, or the technical quality of the photograph, and became more selective with experience (Subject A, text unit 21). In 11 of 28 photo analysis sessions professional indexers commented about object quality when considering what to index. However, this was not a hard and fast rule as even a difficult to recognise building might be indexed "if we didn't have anything else" (Subject N, text unit 74). In fact, during the photo analyses, professional indexers tended to take a more inclusive, enumerative approach. Less experienced indexers tended to index more and with less discrimination.

Quality was often judged in relation to other photographs in an institutional collection: "there are much better photos showing much better detail" (Subject A, text unit 94) or "it's no good indexing if it's just the side of a building or something...because I've got much better photographs" (Subject G, text unit 132). Like specific objects, generic terms were more likely to be used on better quality photographs - "[I would] use the generic one of 'roads and streets', because it is such a good shot" (Subject N, text unit 142) to illustrate a class of items. On the other hand, a generic term equally might be used in the absence of specific indexing:

> There's another generic heading for 'buildings' as well. So I might have to put that because I don't know what any of these are, they're not clear enough to identify singly (Subject N, text unit 142).

Related to the quality of the image was its uniqueness. An atypical, unique or special item might be indexed even if the quality was not high.

The depth or exhaustivity of indexing, that is the extent to which all objects or parts will be indexed, was an important concern for both indexers and users. All participants considered that indexing everything in a photograph was impossible because of the resources it would require. They also considered it would be unhelpful to users because of the threshold of pertinence and when it stops "being meaningful" (Subject L, text unit 72).

Users accepted that indexers had to make professional judgements in indexing because they could "never do anything exhaustively" and

> …it's always a compromise and given the number of images that we want to provide access to, you can't afford to spend too long on any single image. And it's up to the indexer to pick out the main objects, the main subjects that should be indexed and perhaps disregard the rest that's just…I think that's dealing with reality. (Subject D, text unit 32)

It was not a problem that a large part of the analysis of images is left for the users because "they've got eyes in the head and they can work things out for themselves" (Subject C, text unit 24). The importance of indexing for unusual or distinctive examples was reflected in this user's subsequent comments (Subject C, text unit 28). Similarly another user commented:

> It depends how detailed it is in the image. There are some in the… site, the history of architecture site. There are some views specifically of windows, in some houses in the 1930s, so they would certainly need to be indexed there's a 'Window', you know. There are other more distant shots of the same home where you wouldn't mention the windows I don't think. (Subject D, text unit 34)

However, he noted where in-depth indexing has not been provided the user will search on a broader term. The limitations of this strategy might be when the part can be found in a variety of objects, such as in the window example mentioned.

> I suppose, if I came in as a searcher, wanted pictures like windows, I would look first for 'Windows'. Yeah, and then realised that they're going to be in buildings and looked for 'Houses' or whatever, 'Offices', whatever sorts of buildings I wanted to look for to see how windows were constructed in [them]. Again, working from the particular to something more general. (Subject D, text unit 36)

Users even when they "would like to see all sorts of things being indexed on some of these historical photographs" appreciated that institutions did not have resources to do extensive indexing (Subject K, text unit 26).

Indexers' and users' own domain knowledge and language affect subject descriptions. No indexer suggested that the local subject headings might influence what they chose to index. However, the subject systems used by institutions were structures which users found difficult and only learned to navigate through experience.

> With the cataloguing, the indexing, I take it you're talking about the subject, the terminology that's used. I find all that very bizarre. […] sometimes it's a bit like a catch-[22] thing where you end up in this endless circular loop and that doesn't seem to serve any function. And, I'd say, my knowledge of that is not great. As a tool for searching, for images I probably…probably don't use it as much as theoretically indexers would like me too. […] it's a secondary source to finding images. (Subject C, text unit 63)

Regular users of a collection noted that they learnt to adapt their search methods to the local indexing. For example, one user (K) highlighted the superficiality of cataloguing in the collections he regularly used for his specialised research on the history of the urban environment and adopted institutional terms which previous experience had shown would produce useful results.

5.2.1.4 Summary of theoretical perspectives

Participants' understanding of the "subject" and their approach to analysing subject content are summarised in Table 5.2.

Table 5.2 – Studies A and B: Overview of sources of dissonance

Theme	**Study A: Professional Indexers**	**Study B: Users**
Theory and praxis	Systems/ process oriented based on LIS classification methods and practices No reference to LIS theory Concept of warrant based on printed texts	Limitations of LIS approach
What is a "subject"	Self-evident ,"objective" subjects Assumption of shared readings Photographer's intent and 'focal' subject help to determine subjects	Multiple possible readings (multi-dimensionality) No fixed reading, changing reception Importance of context of creation and collection in understanding
Models and approaches	User needs and institutional mission determine what is indexed Photos "documentary" and indexing objective or neutral Each photo an individual item and 'exemplars' and quality help determine what is indexed and depth of indexing LIS language (thesauri)	User needs Viewer's frame of reference Interpretative Photos considered in context Domain language

In summary, the data shows that professional indexers considered their practice was based on several fundamentals: perceived client needs, the institutional mission, and indexing "objectivity". They take an objectivist approach to subject representation and rely on LIS vocabularies. However, professional indexers did not refer to any LIS theory underpinning their approach to indexing, and many even appeared unaware of any local institutional guidelines. The literature on image indexing[64] is notably lacking in studies of actual indexing and these findings can help explain observed outcomes. The implications of these findings are discussed in the Summary and Discussion, section 5.4.

For users one factor predominated: the relevance of a photograph's subject to their needs. Users showed more consideration of theoretical issues and noticed that current professional indexing was deficient by not addressing these issues. More fundamentally, users highlighted the gap between current professional indexing and their subject needs and needing to "think" like a cataloguer in order to successfully

[64] See sections 2.2.2, p. 21, and 2.2.5, p. 25.

find items.[65] In terms of participants' understanding of the "subject" and their approach to analysing subject content, the interviews provided clear evidence of dissonance. The issue is discussed further in the Summary and Discussion, section 5.4.

Finding 5.1. Professional indexers demonstrated an objectivist approach to professional indexing based on perceived user needs.
Finding 5.2. Users were more aware that images can be read in a variety of ways and that interpretations are affected by contextual factors. Users recognised a "gap" between professional indexing and their needs.

Participants' understanding of subject levels is dealt with in the next section.

5.2.2 Subject levels

While the interview and photo analysis session data included frequent references to different types of subjects the attributes were not always clearly delineated. Many interviewees did not appear to distinguish between levels and sometimes appeared confused about what a particular subject level encompassed.

The data analysis did not provide evidence that participants have clearly formulated concepts of subject levels such as defined in the Shatford/Panofsky classification matrix (Table 5.3).

Table 5.3 - Shatford/Panofsky subject level classification matrix

	Iconography (S=Specifics)	**Pre-Iconography (G=Generics)**	**Iconology (A=Abstracts)**
Who?	Individually named person, group, thing **(S1)**	Kind of person or thing **(G1)**	Mythical or fictitious being **(A1)**
What?	Individually named event, action **(S2)**	Kind of event, action, condition **(G2)**	Emotion or abstraction **(A2)**
Where?	Individually named geographical location **(S3)**	Kind of place: geographical, architectural **(G3)**	Place symbolised **(A3)**
When?	Linear time: date or period **(S4)**	Cyclical time: season, time of day **(G4)**	Emotion, abstraction symbolised by time **(A4)**

[65] This is similar to Enser's (1993, p. 27) suggestion that regular users become "trained" in the local system.

Statements made by participants in relation to subjects showed they considered specific subjects the simplest to identify and generics the most problematic. Participants during photo analysis frequently used a generic term synonymously with a specific term, for example "shops" to refer to the specific shops in a photograph and not to a class of buildings. This usage is evident in the propensity for generic subjects shown in the data analysis of subject terms used by participants.[66] While professional indexers consciously avoided abstracts, users would comment "looking at it, I want to do all sorts of abstract ideas (Subject D, text unit 72). Again, evidence of dissonance between professional indexers' and users' understanding of image subject levels was emerging.

The evidence for participants understanding and perceptions of the different levels is explored below as follows:

- specifics (section 5.2.2.1),
- generics (section 5.2.2.2), and
- abstracts (section 5.2.2.3).

A summary of subject level understanding (section 5.2.2.4) is provided after these sections.

5.2.2.1 Specifics

The data from the interviews and photo analysis sessions showed that professional indexers considered the specific objects, people, activities or places – the "who?", "what?", and "where?" – shown in photographs to be obvious or straightforward, and they were most comfortable indexing this level. There was an assumption that specifics do not require any "interpretation", in contrast to other subject levels.

Indexing specifics was seen as critically important for user access:

> …we attempt to be as complete as possible in providing access to those objects, and that's our ultimate goal. (Subject L, text unit 24)

[66] See data analysis presented in section 4.3, p. 84.

Some professional indexers appeared relatively undiscriminating and indicated "I'd try and cover as much as I could" (Subject F, text unit 22). During the photo analysis sessions, all indexers tended to enumerate objects and had a greater propensity to assign subjects across specific facets.[67] That this reflected actual work practice is shown by interview information, for example that articles worn by sitters in portraits were similarly described when indexing a collection of portrait photographs (Subject H, text unit 18).

Even at the specific level considerable judgement was used in choosing what to index. Professional indexers were aware of the practical difficulties and possibly limited usefulness of indexing all objects in a photograph. In deciding what to index they took into account factors such as what users might request, the historic significance of the item or the technical quality of the photograph.

> For example, there might be a street scene that had got good examples of old types of street lighting or gas lamps or something like that. And I think if it's a good representation of something like that, then I think it's certainly worth making a point and giving a subject heading.… It is fairly subjective, but I think you have to try to think in historical terms what might be of interest to people doing historical research. (Subject B, text unit 22)

The decision about what to index could be difficult. An inexperienced professional indexer might be less selective; "you can have so many things happening in a photo that you want to sort of make sure you encompass everything" (Subject F, text unit 24). Even experienced professional indexers found "busier" images challenging. Ultimately indexing rested on a subjective decision, weighing "how many different objects are there, are they worthy of their own subject heading in the context of the whole image.… Like, it's subjective what you decide" (Subject N, text unit 20). An aid to decision-making was considering the type of library and its clientele "you couldn't index […] every single object.… It really depends on the type of clientele, the type of library that you're in" (Subject B, text unit 24).

[67] See data analysis in section 4.3.1, p. 85.

Professional indexers were interested in objects which help to date or identify a location. The object might not be indexed but it would establish a timeframe for the objects which were indexed. As one indexer succinctly explained "probably the only thing I do with cars is the fact it helps sometimes with the time frame" (Subject G, text unit 25). Again, this was shown in the subject terms used in the photo analysis sessions where professional indexers showed a propensity to assign subjects to the specific "when?" facet (S3).[68]

LIS texts recommend indexers use only the most specific terms, and this remains a basic rule of indexing (Lancaster, 2003; Svenonius, 2000).[69] Professional indexers did not refer to this cataloguing maxim, but they claimed their experience provided support for using specifics.

> Also I tend to be as specific as possible because I have found that people do tend to ask for specifics. They will ask for petrol pumps rather than petrol stations or stations - don't they? (Subject A, text unit 58)

In contrast, users were interested when "the object is unusual or it is the only image of a particular [object], then, yes, it should be indexed. But I don't think objects are particularly important subjects for indexing" (Subject C, text unit 22).

Users instead expressed interest in more general or abstract subjects and this was reflected in their use of subject terms in the photo analysis sessions which showed similar propensities for generic and abstract levels.[70] Broad categories or generic headings producing large browsable sets of images satisfied some users (Subject C, text unit D) who felt they could use these to find objects which were natural subsets of other categories, such as elements of costume which are a natural feature of portraits.

[68] See data analysis in section 4.3.1, p. 85.

[69] See section 2.2, p. 16.

[70] See data analysis in section 4.3.2, p. 89.

The perception of user interest in specifics may be explained by users' remarks about how they have to use specific terms to match indexing subjects which provide an entry point to images of interest. For example, searching on street names

> you might see things such as the early horse drawn street cars, which could be interesting in terms of just identifying the historical evolution in terms of mass transit in an urban environment. Then you go to the first street railway cars, and then later more of electrified service and so forth, and it becomes increasingly sophisticated. And you can certainly see that as you go through photographs of a street over a period. And that becomes an interesting element, just to bring out in terms of the street infrastructure. You also have such things as lamp posts, as they're changing in terms of gas light to electrical lighting. (Subject K, text unit 28)

Furthermore, object indexing might prove useful later for users studying topics which may not have been anticipated at the time of indexing (Subject P, text unit 28).

5.2.2.2 Generics

Participants' responses on the attributes of generic subjects demonstrated confusion and misunderstanding about what a generic subject is. During the interviews half the participants needed to be prompted with examples of generic headings. Most of the other half responded requesting clarification; often asking "do you mean" followed by an example of a type of generic heading. The most commonly referred to generic examples, "portraits" or "streetscapes", related to factual descriptions. Occasionally terms relating to the photographic format, such as ambrotype, were suggested.

LIS cataloguing, as previously noted, advises indexers to avoid generics "if you can find more specific terms that describe what's in the image" (Subject N, text unit 38). In some cases professional indexers might have recourse to generic headings simply because specific items could not be identified (Subject E, text unit 51).

Two main issues about generic subject headings usage emerged: how generic headings should be employed and their effect on retrieval.

Professional indexers most often considered adding a generic heading when they felt specifically identified concepts needed a broader subject term. The decision might depend on how significant the item was in the photo.

> Every time you've got a picture of a house, should we put a subject heading 'Houses' or 'Dwellings', and I have tended to. If there just happens to be a house in the photo, I have not done it. (Subject A, text unit 30)

Some professional indexers appeared to automatically add generic subjects such as "portrait" to provide a "broader context" (Subject E, text unit 84). Other indexers might put a generic heading or description in a note - "I tend to put that in a notes or summary field where it said 'family portrait' or whatever" (Subject F, text unit 32) - rather than as a subject. Whether this example reflected uncertainty about the proper use of generic terms or an idiosyncratic usage is not clear.

The second, frequently mentioned, issue was the effect of generic indexing on retrieval and "the danger that you'd end up with 2 million records with the same heading on it" (Subject A, text unit 29). However, there was no clear consensus about when generic headings became a problem:

> …I think certain categories like portraits. I think some people do want to come in and they want to look at that type of photograph so I think it's probably important, but I think… I don't think you want too many of them; it can generalise the collection. (Subject B, text unit 30)

Some users were quite happy to search by generic headings, such as portraits, and willing to go through "a thousand photographs of different people from different decades being able to identify ties and dresses for myself" (Subject C, text unit 22),[71] although, even so, at some point generic terms could be counter-productive (Subject C, text unit 28). The problem was seen to increase with collection size when generic subjects might only be useful if combined with other search terms (Subject P, text unit 36), an issue which users, who assumed specific headings were not needed because these are sub-sets of broader headings, appeared not to have considered.

[71] Some photograph collections are organised by generic headings and a user might consider this arrangement, which allows browsing pre-arranged groups, as a more effective way to access collections than the online catalogue (Subject K, text units 34-36).

Users' positive opinions about generics were anchored in the user frame. A historian, with an interest in the development of the built environment, searched on broad terms he felt likely to produce appropriate items to browse through as "I certainly don't find that the indexing goes to any great depth at all" (Subject K, text unit 30). This user was interested in terms such as urban development, but cautious about their use because of the difficulty in defining and applying such terms. Given this, more concrete, specific terms might be preferable.

> …I find that 'urban development' can be so many different things. […] I think the trouble with the big, the generic terms is that they're so broad, is that you could end up... I can think of any one of a number of images of say a particular street that could represent elements of urban development but that doesn't help me winnow it down. I'd end up... If I did urban development I'd do a catch-all on that particular street without any kind of filter. (Subject K, text unit 42)

Special format photographs, such as postcards, were routinely mentioned by professional indexers because to some users "the form of the photo, like postcard is important" (Subject A, text unit 25).

5.2.2.3 Abstracts

The data showed that both professional indexers and users appeared ambivalent about indexing abstracts. The most frequently cited reason for this was that they considered the interpretation that this required was largely the domain of the user.

Professional indexers uniformly expressed great reluctance to use abstract subject headings. This reluctance is shown very clearly in the avoidance of abstracts during the photo analysis sessions where only 1.8% of subject terms were abstracts.[72] There appeared to be a general doubt about how useful these are and whether a user would "look under 'Happy' and 'Peace'" (Subject F, text unit 38). Participants rarely commented on the symbolic aspect of a photo (e.g. Subject L, text unit 130, a customs house symbolising commerce in a 19th century port; Subject P, text unit 129, sheep near Parliament House epitomising "Canberra the bush capital").

[72] See data analysis in section 4.3.1, p. 85.

There was a consensus that abstract headings are difficult to agree on and involve too much interpretation on the part of the professional indexer. A number of professional indexers suggested abstracts were more influenced by personal bias than specific or generic subject headings.

Many of the professional indexers considered their institutions collected "documentary" photographs, which do not contain abstract subjects (or at least these aspects are unimportant to their meaning). The view that documentary photographs represent essentially straightforward and factual subjects was frequently stated, even when the indexer might have some doubts:

> …documentary photographs - they don't really have abstract concepts in them, but of course we know that's not really true. (Subject N, text unit 58)

While professional indexers emphasised indexing for user needs, they avoided abstract concepts even when they knew these might be useful. Indeed, there appeared to be an implicit decision against catering for such needs (Subject I, text unit 46, and example of advertising agencies). Professional indexers even queried what a searcher for abstracts is "actually after" (Subject E, text unit 43). These issues highlighted how professional indexers make judgments about what to index, based on their perceptions of who their users are or, perhaps, "should" be. Consciously or unconsciously, professional indexers discriminated between subjects which are or are not "valid". One indexer justified this from established library practice.

> The APT [Australian Pictorial Thesaurus] has abstract subject headings that, like there's six branches of the hierarchy and one of them is 'Ideas and concepts' but we're not supposed to go beyond a certain point in Dewey, because it's based on that idea that photographs don't convey abstract ideas. (Subject N, text unit 40)

The exception appeared to be online "exhibitions". These usually place library items in a context and consider their relationships to other materials. On these sites interpretation has a key role in creating richer access to the material than normally provided by indexing and the approach would appear to be much freer:

> … what we're really concerned with is drawing out for the users and, as a consequence of that we would feel indexing this information, drawing out from the prints not only the historical information, but also the iconographical information so we have a symbolic layering that we're pulling out of there. (Subject L, text unit 44)

In contrast, users' interests in photographs were often expressed as abstract concepts and during the photo analysis sessions 23.8% of the subject terms used were abstracts.[73] However, users recognised potential problems with abstract indexing, including the need for professional indexers to have a good understanding of the context of an image, and this made them ambivalent about the value of abstract indexing. Users, while wanting some way to retrieve relevant images, generally agreed that abstract terms involved interpretation and professional indexers should leave this "up to the people who are using the photographs for their own research to interpret" (Subject C, text unit 34). How a user might readily find relevant photographs relating to abstract subjects was not made clear.

5.2.2.4 Summary of subject level understanding

An overview of participant perceptions of subject levels is shown in Table 5.4.

Table 5.4 – Studies A and B: Overview of subject levels

Subject Level	**Study A: Professional Indexers**	**Study B: Users**
Specifics	Objective Straightforward Selectivity versus exhaustivity	Unusual or distinctive Entry point
Generics	Confusion about concept Prefer specifics Unsure when to use Concern about "generalising" effect	Usefulness in accessing groupings Potential to capture broad concepts but difficulty In use
Abstracts	Avoid because requires interpretation	Context and expertise

There was no evidence of clearly formulated concepts of subject levels, such as defined in the Shatford/Panofsky classification matrix. Both professional indexers and users considered specifics straightforward but differed about the relative importance of indexing at this level. Participants were generally unclear about generics but users appreciated their ability to create browsable sets. While professional indexers were reluctant to use abstracts, users expressed a much greater

[73] See data analysis in section 4.3.2, p. 89.

interest in them. However, all participants were concerned about the interpretation involved with abstracts.

Participants' perceptions of subject levels clearly translated into practice as shown by the comparative propensities to use particular subject facets during the photo analysis sessions (see section 4.3.3).

Finding 5.3. Professional indexers lacked any clearly formulated concepts of subject levels. They emphasised the objective and specific aspects of subject content and a strong reluctance to use abstracts.

Finding 5.4. Users demonstrated an interest in a wider range of subject matter and in higher levels of interpretation than professional indexers.

5.3 The professional indexing of photographs

Professional indexers' theoretical perspectives, understanding and perceptions of subject levels discussed in the preceding sections provide useful insights into their approaches to indexing the subject content of historic photographs. To gain further understanding of current professional indexing this research explored the indexing process. The interviews included questions to elicit data about how professional indexers carried out their indexing. The process of the data content analysis is described in section 3.4.7.1. The data analysis from the interview descriptions provided by the professional indexers is displayed in Appendix 6 - Themes from the Content Analysis and a Detailed Example of the Process of Data Analysis.

Participants' understanding and descriptions of the indexing process are explored in the following sections:

- the professional indexing process: the participant frame (section 5.3.1),
- the professional indexing process observed (section 5.3.2), and
- a model of the professional indexing process (section 5.3.3).

5.3.1 The professional indexing process: the participant frame

During the interviews, as has been discussed (see section 5.2.1), no professional indexer mentioned any theoretical basis for their indexing or referred to the extensive LIS literature on indexing[74] or standard pictorial indexing guidelines such as *TGM 1* (Betz, 1997).[75] Even experienced indexers appeared surprisingly ignorant of any institutional policies or guidelines.

> Well… I don't… I don't know, I can't really say exactly what the library's policy on subject indexing is. Um, I guess we are committed to it. (Subject O, text unit 64)

Instead, professional indexers routinely referred to using thesauri, most often the Library of Congress Subject Headings, as if these provided an indexing framework (Subject E, text unit 84; H, text unit 70; M, text unit 100; O, text unit 64). A professional indexer might recognise the need to develop policies and guidelines specifically for photographic indexing.

> Library of Congress Subject Headings. And, yeah, we've probably created our own in-house manuals beneath that for the creation of index records, particularly in the Pictorial Collection. So we have…we are in the process of creating and developing standards for pictorial indexing and cataloguing. (Subject B, text unit 80)

However, time and work pressures left little capacity to develop policies and procedures, especially in small organisations like local studies collections (Subject G, text unit 94).

The apparent lack of theoretical knowledge and policy frameworks may have been a reason why professional indexers had difficulty in articulating a process for indexing. They described indexing as several basic steps or as a vaguer process. One indexer described indexing as "intuitive", although the respondent recognised the lack of a formal process might be problematic (Subject E, text unit 14).

[74] See discussion in the literature review, section 2.4, p. 49.

[75] See section 2.2.2, p. 21.

An experienced professional indexer (Subject A) provided the best and most complete description of the indexing process. Her description went from initial examination of documentation to the assignment of subject headings.

> First I look to see if we know anything about the photo or if the donor has given us any information and if the photographer has written any information on the photo. Sometimes then especially if it is a street scene and there is a sign and you can research to see which street it's in and that sort of information. Then you look at the major thing in the photo and if it's a street, then the major subject would be the name of the street or the name of the person. After that, I look at minor things that are in the photo that somebody might be interested in, for instance things like if it was in a street if in the foreground there is particularly good detail of street lighting I would give that a subject heading. I go through those sorts of steps. (Subject A, text unit 8)

Later she summarised her process of identifying subjects as follows:

> Usually I look at the whole or what the photographer meant to take the photo of, so if it's a street, he's looking down the street and he meant that photo to be of the street. And then I look at the smaller parts of that particular building or other thing which a photographer may have taken incidentally, sometimes there are very interesting things in there that the photographer just took incidentally and obviously didn't mean anything to him at the time (or her). (Subject A, text unit 12)

The researcher, as described in the process of data analysis (see section 3.4.7.1), identified, coded and refined common themes from these responses and the data from the other interviews. As a more detailed analysis of the content was completed a series of categories emerged. The categories may be shown as a sequence of steps in the professional indexing process (Figure 5.1).

Initiation: Gather details from existing documentation (file or from text on photograph)	Ë Primary subject identification: photographer's "intent" (as determined by the indexer, e.g. "street scene")	Ë Information collection: (e.g. Information from internal evidence of photograph and / or research to identify buildings, etc. in street scene)	Ë Explore :major things	Ë Explore: minor things; details and things "incidentally" in photograph	Ë Decide subjects

Figure 5.1 - Professional indexing steps

What emerged early in the analysis was the professional indexers' clear focus on specific and concrete objects. This emphasis was reflected in the photo analysis sessions when professional indexers demonstrated a propensity to specifics and the generic terms relating to these subjects.[76] Professional indexers' theoretical perspectives and perceptions of subject levels[77] further underscore the narrow focus of their indexing. This reflects the positivist LIS viewpoint underpinning standards for cataloguing images.[78]

While professional indexers might struggle to describe the process, they were able to clearly identify practical factors in determining what was indexed and the depth of their indexing. The key factors were the perceived mission and clientele of the institution. For example, in local studies collections the image was first assessed for local subjects and then it might be explored for other subjects (Subject H, text units 8 and 12). This approach might impose severe limitations:

> I suppose it's [abstract subject is] very important in a social context but I'm not, I haven't done anything like that because people are interested in buildings, streetscapes and they're not really interested in looking at how people looked. (Subject G, text unit 43)

A professional indexer working in a larger library serving a recognisably more varied clientele would do further analysis "and try to work out what different aspects of the photo different people will want to know about" (Subject B, text unit 10). At what may be termed the top end of the scale, staff in an academic library were conscious of trying to index for complex research needs "by creating quality subject headings, keywords and other indexing resources and building those and providing access to the object" (Subject L, text unit 24).

The themes and patterns identified in the analytic process were used in creating an overview of the indexing process (Figure 5.2). The process that emerges is more complex than the standard two- to four-step models described in the literature.[79] The

[76] See data analysis in section 4.3.1, p. 85.

[77] Discussed in sections 5.2.1, p. 98, and 5.2.2, p. 112.

[78] See section 2.2.2, p. 21.

[79] See section 2.4, p. 49.

process has more professional "decision points" and iterations than existing descriptions and theory would suggest.

		Iterations (changes and shifts in focus)				
Step:	Initiation	Concept identification	Exploration (examination)	Clarification	Information collection	Decide Subjects (summation)
Activities:	Gather information on photo or its collection.	Identify main subject then secondary subjects	Scan	Question: What is this? What do I need to know?	Check other sources. Verify identification of objects, etc.	
Steps: Each step includes decision points about depth of work and when to stop Process: The above process acted on by situational relevance (e.g. context) including task complexity, cognitive style difference influence, time pressure, etc.						

Figure 5.2 - The indexing process described by professional indexers

The steps shown in Figure 5.2 may be briefly summarised as follows. Prior to indexing the indexer reviews available documentation. The indexer initiates indexing by viewing the photograph and then moves through a series of steps during which each subject concept is identified, explored, clarified and finalised. Subject identification may not be sequential, but instead progress through a variety of changes or shifts of focus, often beginning a new subject identification process before one is completed. At any point the indexer may stop to collect information or decide that enough subjects have been identified.

The process that emerges emphasises the photograph as a discrete item and the indexing of objective subject content. This process reflects the positivist tradition of library cataloguing and shapes how professional indexers attribute subjects to historic photographs.[80]

5.3.2 The professional indexing process observed

The steps that emerged from the analysis of the interview data were compared to the data from the photo analysis sessions, which provided the opportunity to observe the

[80] See the Summary and Discussion, section 5.4, p. 132, for further discussion.

indexing process and gather information through the think-aloud protocols.[81]

A limitation of the information gathered in the photo analysis sessions is that participants might have been sensitised to certain ideas by the preceding interview and by questions asked during the photo analysis sessions. This might even have caused some participants to tailor responses to what they perceived as the interviewer's intent. This effect was observed when one participant responded to a question with "Ah, me or what you want me to say?" (Subject G, text unit 153).

The analysis of the data from the photo analysis sessions revealed a series of steps that matched those described by indexers during the interviews. The process in the photo analysis varied, depending on the indexer's expertise or familiarity with the image at hand. In some sessions distinct steps might be difficult to distinguish, some steps might be combined or omitted, and many of the sessions included shifts in focus or iterations that made the sequence of steps difficult to determine.

The photo analysis tasks did not provide participants with the documentation that might accompany photographs in a work setting. However, two indexers did refer to information that might come with photographs (Subject M, text units 123 and 139; Subject H, text unit 93). Two other professional indexers began their descriptions by referring to the captions they had seen on the photographs (Subjects M, text unit 145, and N, text unit 138).

The next series of steps ranging from the main subject concept identification through to closure varied across the photo analysis sessions. Subject identification frequently was not sequential, but instead progressed through a variety of changes or shifts of focus, often beginning a new subject identification process before the previous one was completed. Subjects identified might be quickly discarded for a variety of reasons. At any point the indexer might indicate they would normally stop to collect information or had decided that enough subjects had been identified.

[81] The stimulus photographs and think-aloud protocols are discussed in section 3.4.2, p. 72. Ten of the eleven professional indexers participated in photo analysis sessions. Due to failure of recording equipment no photo analysis sessions were done with one indexer, Subject O.

A good and detailed example of the photo analysis description was provided by Subject G:

> All right. It's a photograph taken of St George's Terrace, probably, I'd say around the forties, because the CML Building is there, which was 1937 I believe. I would index the different buildings that I could recognise. Well, the ones that had a good…I mean it's no good indexing if it's just the side of a building or something. But, um, for myself, like, the photograph of the T&G Building, I probably wouldn't index the one in this, because I've got much better photographs. So, um, the same with like Stirling Gardens, it's there but it's so far away. If it showed something…if it was a bit closer and showed something like the old brush fence then I would index it. I wouldn't index it under 'Brush fence' but I would index it so that people would have…would have it as a source. So, probably, I would leave that as just 'Street scene, George's Terrace' and try and get the magnifying glass out and look at some of the cars. And I would definitely put the CML Building down. And I think it's one of those…and that's down there…that's…I'm not sure what that building is there, but I would probably try and index those two. Find out what the two more prominent buildings are. The spire of the Wesley Church is not enough, the fact that…and especially if the building is still there. You know, it is more important to me to index something that no longer exists. (Subject G, text unit 132)

The methodical and sequential examination of an image, including references to points where information would be clarified or further information collected was provided by Subject H:

> Right. So... Looking east down Wellesley Street, from possibly Albert Street, showing Queen Street intersecting, left to right in the centre and the Art, the Auckland Art Gallery in the middle centre distance. On your left, immediate left, Opera House something or other. Street intersection. And then if I had this photograph I would probably be able to magnify the name of what that business is there. So I would work up the side. On my right, immediate right is Grove's Grocers the Grocer, Smith the whatever, working my way through, intersected by Queen Street and then carrying on up there with the names of whatever businesses I could see. Trams, and I would be able to find out where that tram was. This would be in the description. This isn't subject, right. Pedestrians, a man with a...pushing a pram. I would possibly look to see if there were any gas lamps or anything like that around there. And that would probably be it, I would think. Yup. (Subject H, text unit 85)

In contrast some professional indexers appeared to go directly to describing the information that would appear on their final catalogue record:

> 'A crowd being addressed by John Scaddan during the West Guildford Gala Day circa 1913' would be the title, which is obviously taken from the caption. And the caption on the bottom of the photograph. So how I'd describe it? In the summary I'd make mention of there's a pavilion, um…oh sorry, I'd say at Pickering Park. Yeah…in the summary I would say 'John Scaddan on pedestal, crowd facing him with a pavilion in the background', just something like that. Again, the pavilion's fairly… the pavilion adds the idea that it might have been an important event, I'm starting to interpret there and I get quite reluctant to do that, you see what I mean. You don't know, that tent might have been there from the day before. Yeah. (Subject E, text unit 145).

The participants referred frequently to steps involving clarification and information collection that they would do when in the workplace. This might include using a magnifying glass to better see parts of the image (Subject H, text unit 85 and 110, Subject M, text unit 162) or increasing the size of the digital image (Subject A, text unit 94, Subject F, text unit 143). All of the professional indexers made reference to doing various types of further information collection or research (Subject A, text unit 85 and 103; Subject B, text unit 107; Subject E, text unit 100, Subject F, text unit 124, Subject G, text unit 132, Subject H, text units 85, 87, 93, and 127; Subject I, text unit 130 and 132; Subject M, text unit 146; Subject N, text unit 146).

The data analysis also showed that similarities in indexing styles were stronger within groupings relating to professional training, experience and institutional situation. Overall, the librarians working in larger institutions (Subjects A, B, M, and N) and in local studies collections (Subjects E, G, I, and J) were more likely to suggest they would do research to identify specific objects or events, or to provide context for the photograph. They were more likely to determine whether to index objects by evaluating quality or other factors. The local studies librarians (Subjects E, G, I, and J) were particularly influenced by the institutional mission and perceived client needs and they focussed on indexing a narrow range of local topics. Library technicians/assistants (F and H) were likely to check standard reference tools, such as post office directories, but were more focussed on objects and tended to list these more comprehensively.

There also were distinctions related to an indexer's personal style. Some indexers took a holistic view to describing and indexing an image and others tended to take a "building blocks" approach, focussing sequentially on discrete elements in an image.

The observed indexing process reflects the objectivist construction of the task of indexing which emerged from the indexers' descriptions described in the previous section. As already noted, this translated into professional indexers propensities in attributing subject headings.[82]

5.3.3 A model of the professional indexing process

The categories and themes developed from the analysis of the data gathered in the interviews (section 5.3.1) and in the photo analysis sessions (section 5.3.2) are represented in the workflow model shown in Figure 5.3.

Iterations (arrows show changes and shifts in focus, including returns to earlier steps)

Step:	Initiation	Concept identification	Exploration (examination)	Clarification	Information collection	Subject
Activities:	Preceded by information gathering; Initiation may not appear as a distinct step.	Identify main subject then secondary subjects	Scan	Question: What is this? What do I need to know?	Check other sources. Verify identification of objects, etc.	Decide on preliminary subject headings

Steps: Each step includes decision points about depth of work and when to stop.
Process: The above process is acted on by situational relevance (e.g. context) including task complexity, cognitive style difference influence, time pressure, etc.

Figure 5.3 – Workflow model for the professional indexing process

Although the model is presented as a sequence of steps, professional indexers were observed to skip some steps, combine others, or jump back from an advanced stage to an earlier step. The steps all involve decision points where the indexer makes choices about whether to proceed, go back, stop or change to begin identifying another subject. The steps shown in the model are described below.

[82] See the Summary and Discussion, section 5.4, p. 132, for further discussion.

In the first step, prior to examining the photograph, the indexer will check available documentation. The sources might include information from the photographer, the collector, published sources or other items already in the collection. This preliminary stage determines the relevance and importance of the photograph to the institutional mission and how much time and effort the indexer will spend on it. Sometimes the indexer may decide that the photograph is not relevant and should be discarded.

The next phase usually begins with the indexer identifying the main specific subject, often from the caption or other text, and suggesting a tentative subject heading. If the main subject matter is not immediately identifiable the indexer will explore the photograph searching for clues, such as identifiable elements or text within the image (e.g. street or shop signs). Subject clues are combined with the knowledge and experience of the indexer in identifying concepts. The mission of the institution, particularly local studies or special collections, can be an important factor in guiding what the indexer initially looks for in the way of subjects. If an indexer cannot identify image specifics, she may ask for help from colleagues or move on to identify generic items. For example, an unidentified street scene may get a general term such as "streetscapes".

The identification of the main subject or subjects is often combined with the indexer devising a title for the photograph if none already exists. The activity of indexing is often inseparable from this titling task.

After identifying the main subject matter the indexer will usually go on to suggest a tentative location, if the location information itself is not seen as the main subject, and a date for the photograph, if none has been supplied. For local studies collections the identification of location may be the initial step in determining if the photograph is relevant and whether to continue to work on it. To determine the date the indexer will examine the photograph for internal date indicators, such as costumes, vehicles, etc. If no precise date can be determined from internal evidence or additional research the photograph may be assigned a decade or other more general date.

Following the identification of the main subject or subjects, the indexer may explore the photograph further, clarifying additional concepts and deciding if further

information is needed. These elements will help to clarify and confirm early concepts or suggest new ones. Further topics for additional information gathering and research may be identified. For example, an indexer may examine the photograph using magnification and then consult a contemporary street directory to confirm the street identification or the names of shops. This use of internal evidence and research is frequently employed to identify objects, events and locations precisely.

When examining the photograph the indexer uses specific domain knowledge gained from experience indexing her collection, the library authority files, and information resources, such as directories or specialised works on the photographer or costume. Occasionally, the indexer may refer to library catalogues, predominantly the institution's own catalogue, to see how similar photographs have been indexed. In some institutions, there is scope for creating local headings and this option may be proposed

The examination of the photograph results in the creation of a set of subject concepts or tentative headings. The point at which the indexer starts determining the subject headings will depend on her confidence in her assessment of the photograph. This may depend on the perceived straightforwardness of the image and her familiarity with the identified subject content. More experienced indexers, or indexers working with straightforward photographs, may decide on the subject headings in the early stages. Very experienced indexers may determine a subject heading almost simultaneously with seeing the photograph.

When specific subject matter is to be given a heading the indexer usually adds the related generic subject headings. Some institutions have general category terms built into classification - e.g. buildings; portraits - others add broad category terms to the bibliographic records.

Once the preliminary subject headings are decided the indexer translates these concepts into the controlled language of the subject headings used by their institution. While the controlled vocabulary potentially can be a factor influencing

indexing and indexers' choices of concepts (see section 2.2.4) this final stage was not investigated as part of the research design.

An indexer also may provide a summary description, often including perceptual information, in a note field. The notes may be used to add natural language subjects which are not part of the institutional authority lists or provide additional topical information which the indexer does not feel justifies a separate subject heading.

Subject identification is not a single stage or step as some models in the research literature suggest.[83] Rather, what emerged from the photograph analysis is a complex series of iterations. At any point the indexer may decide to move to translating the subject concepts into subject headings from the institutional subject authority lists. The complexity of the process and the steps that emerged from the analysis resemble the findings from Sauperl's (2002)[84] investigation of text cataloguers.

The workflow model demonstrates indexers' objectivist approach to indexing and use of domain knowledge and tools. The subject matter which is indexed tends to consist of specifics with their related generics. Abstracts are avoided. Textual information is used where available to assist in identifying subjects. These issues are discussed further in the next section.

Finding 5.5. Indexers focus on an essentially objectivist approach to the indexing process based on traditional LIS practices.

5.4 Summary and discussion

The key findings from the fieldwork presented in this chapter are:

Table 5.5 –Studies A and B: Summary of Findings

Finding 5.1. Professional indexers demonstrated an objectivist approach to professional indexing based on perceived user needs.

[83] See discussion in the literature review, section 2.4, p. 49.

[84] See section 2.4, p. 50.

Finding 5.2. Users were more aware that images can be read in a variety of ways and that interpretations are affected by contextual factors. Users recognised a "gap" between professional indexing and their needs.

Finding 5.3. Professional indexers lacked any clearly formulated concepts of subject levels. They emphasised the objective and specific aspects of subject content and a strong reluctance to use abstracts.

Finding 5.4. Users demonstrated an interest in a wider range of subject matter and in higher levels of interpretation than professional indexers.

Finding 5.5. Indexers focus on an essentially objectivist approach to the indexing process based on traditional LIS practices

Professional indexers primarily justify their subject choices on the basis of user needs. However, their approach was objectivist and they focussed on indexing specific subject content and had a strong reluctance to use abstracts. They demonstrated little knowledge of theoretical issues or any formal analytic method. Several professional indexers commented that the interview had "brought it to my attention" (Subject I, text unit 46) or "raised some issues that have got me thinking" (Subject L, text unit 72). The apparent absence of a theoretical basis or institutional framework to guide professional indexing is a serious shortcoming in current professional indexing practice.

The proposed model of the professional indexing process clearly demonstrates that current indexing is conditioned by the positivist tradition and practices of LIS.

Users identified a "gap" between current professional indexing and their needs for higher levels of subject interpretation. However, users did not consider interpretation should be carried out by professional indexers. The consensus was that "interpretation" is the province of users. A potential way that this "gap" can be addressed is by having historic photographs "indexed" by users themselves. How

user interpretation can be harnessed is explored in the tagging studies discussed in the following chapters.

'Cognitive dissonance' is used in modern psychology to describe the condition of conflict arising from inconsistency in an individual's beliefs and actions. The term, as used in the context of this research, is intended to convey the conflict between how indexers' and users' appear to think about and interpret images. Importantly, fieldwork, in the form of interviews, showed evidence of cognitive dissonance between indexers and users in subject attribution. Interviews also provided good insight into frames and assumptions that underpin observed differences in the attribution of subjects reported in Chapter 4.

The professional indexers' self-reported approaches to subject attribution are shaped by the positivist traditions of library cataloguing practice (see Table 5.2, p. 108, and Table 5.4, p. 117). Their image analysis is essentially carried out at the pre-iconographic level defined by Panofsky (1955),[85] the first step where subject description relates to everyday objects and events and requires no specialist knowledge. The second and third levels of meaning, iconographic and iconological, are typically not addressed. This approach resulted in a demonstrated propensity for specific and generic subjects and an almost complete avoidance of abstracts in the photo analyses sessions.[86] The professional indexers' approach to historic photographs as documents objectively rendering subjects reflects "the naïve view that underlies much early photography … was that the camera was an opinionless copying device",[87] photographs are mimetic, and thus a straightforward mirroring of reality.

Professional indexers' assumptions about shared meanings and unproblematic relationships between their indexing and the truth or reality of the images do not take into account other ways of knowing and prominent theories, such as semiotics and

[85] See discussion in section 2.2.5, p. 25.

[86] See section 4.3.1, p. 85.

[87] Godfrey, T. (1998). *Conceptual Art*. London: Phaidon, p. 303.

discourse theory, which have been applied to visual interpretation (Adams, 2010; Leckie et al., 2010; Rose, 2007).

Sign theories developed from the work of the Swiss linguist Ferdinand de Saussure and the American philosopher Charles Sanders Peirce have been applied to the visual arts. Saussure explained a sign and its interpretation as a two-part process containing first a sound or image, called a *signifier*, and the concept for which it stands, called the *signified*. Saussure felt that the main concern of semiotics should be "the whole group of systems grounded in the arbitrariness of the sign" and that "any means of expression accepted in a society rests in principle upon a collective habit, or on convention - which comes to the same thing".[88] The arbitrariness of signs emphasises that the relationship between the signifier and the signified is *conventional,* that it means what it does because we collectively agree to let it do so. At about the same time Saussure was formulating his structuralist methodology, Peirce was independently developing his own model of the sign. In contrast to Saussure's self-contained dyad, Peirce offered a triadic model made up of the *sign*, its *objects* and its *interpretant*. The notion of the importance of sense-making, which requires an interpreter, has an extensive LIS literature,[89] and rejects the equation of "content" and meaning. The meaning of a sign is not contained within it, but arises in its interpretation. Whether a dyadic or triadic model is adopted, the role of the interpreter must be accounted for. Mai's exploration of indexing is founded on Peircean semiotics[90] but there was no evidence that these ideas influenced any of the professional indexers.

The trend for the modern semiotic interpretation of photography was set by Roland Barthes through his various writings.[91] In *The Photographic Message* (1961), he states that the reading of the photograph, thanks to its code of connotation:

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[88] *Course in General Linguistics*, 1916 (trans. Roy Harris, London: Duckworth, p. 68).

[89] In particular the work of Brenda Dervin and her colleagues, although she does not cite semiotics as a source for her research.

[90] See section 2.4, p. 49.

[91] Collected in *Roland Barthes: Image – Music –Text*, ed. Stephen Heath. London: Fontana Press, 1977.

> is thus always historical; it depends on the reader's 'knowledge' just as though it were a matter of a real language, intelligible only if one has learned the signs. To find this code of connotation would thus be to isolate, inventoriate and structure all the 'historical' elements of the photograph, all the parts of the photographic surface which derive their very discontinuity from a certain knowledge on the reader's part, or, if one prefers, from the reader's cultural situation.

In a later essay, *The rhetoric of the image* (1964), he notes that "the variation in readings is not, however, anarchic; it depends on the different kinds of knowledge (i.e., practical, national, cultural, aesthetic) invested in the image and these can be classified, brought into a typology". In short, the viewer is decoding the image, without dependence on its creator, and indexing (or tagging) is a matter of understanding the "connotators" in the Barthesian sense. The semiological approach provides useful tools for understanding the structure of an image and the social conditions of its creation and production, with an awareness that the viewer operates within the system of understanding.[92]

Texts, including photographs, have no absolute, but only a socially constructed, meaning which may not necessarily have any relationship to the creator's original intended meaning. The text also may be reinterpreted to suit changing interests and concerns. The professional indexers' apparent belief in stable meanings is in contrast to work by poststructuralist theorists, such as Derrida, who refuted the idea that there is a stable meaning "resting on a correspondence between sign and object" (Leckie et al., 2010, p. 81) and challenges librarians' ways of knowing and objectivity.

Furthermore, while professional indexers professed a strong interest in indexing for user needs, they did not appear to employ any sort of domain analysis, as suggested by Hjorland and other researchers,[93] in order to understand what indexing what might be most effective for their users. Instead they approached subjects from the perspective of the LIS domain and its vocabularies. This approach lacks reflexivity

[92] However, semiotics with its detailed readings, difficult theoretical terminology, and lack of interest "in how different viewers interpret images differently" (Rose, 2007, pp.103-106) does not provide a practical framework for the interpretation of photographs.

[93] See section 2.3.3, p. 37. From the 1990s onwards a variety of researchers have adopted discourse analysis approaches to the LIS context (Leckie et al., 2010, p. 71).

and disregards the Foucauldian notion that individuals' constructions of meanings are bound to existing discursive networks. Foucault traces how each discipline develops a specialised language, or discourse, that determines what can and cannot be said and how statements are framed. However, the professional indexers did not appear to be aware how the institutional setting acts in potentially framing the meaning of the photographs[94] and how classification by pre-existing schemes reproduces ideologies inherent in the structures of their practice. Library systems of representation shape and limit the representation of the item, an effect commented on by one user (Subject C, text unit 88), and the emphasis on the informational content of photographs and the item-level description further constrains interpretation. The user-centred indexing approach cited by professional indexers makes many assumptions about the user and marginalises other viewpoints (Leckie et al., 2010, p. 83). A way to reduce some of these effects is to empower users to contribute to indexing, and thus create their own structures of knowledge, an option many librarians seem to resist.[95]

Users demonstrated a more complex and nuanced approach to understanding and interpreting images than the professional indexers (see Table 5.2 and Table 5.4). While users did not explicitly refer to any particular theory or critical approach, they commented on how different factors can affect understanding photographic meanings, ranging from the importance of context and creation, different domain perspectives and changing reception, and the lack of "fixed" meanings. They were aware that photographs had multiple meanings and these meanings are shaped and re-shaped in encounters with each viewer and depended on the domain perspective. Users considered photographs firstly through their own domain and research needs.[96] However, they viewed the nature of the photograph as much more active than indexers; a photograph actively functions in a variety of discursive contexts, moving from the discourse in which it was created to the discursive spaces to be constructed by future users.

[94] See, for example, Rose's (2007) discussion of this issue in relation to galleries and museums.

[95] See some of the criticisms of user indexing/tagging by library professionals in section 2.3.6, p. 42.

[96] As well, researchers may study images through a variety of contextual approaches, such as Marxism, colonialism or feminism. See Adams (2010).

Where professional indexers' approach appears to assume the notion of a singularity or purity of meaning contained within the image, the users were interested in what may called a more poststructuralist, Derridean analysis. Jacques Derrida's theoretical writing on images is contained in his *The Truth in Painting.*[97] In this he discusses the *parergon* (the frame) and the *ergon* (the work). The "interiority of meaning" is contrasted with the larger ideas of how culture, institutions and individual experience frame our perceptions of an image. The "inside" and the "outside" are no longer simple and distinct categories, but the interior meaning depends on the exterior. Furthermore, in a sense, users' recognition of the exclusionary biases or limits of indexing can be viewed as a deconstructive analysis (Leckie et al., 2010, p. 82).

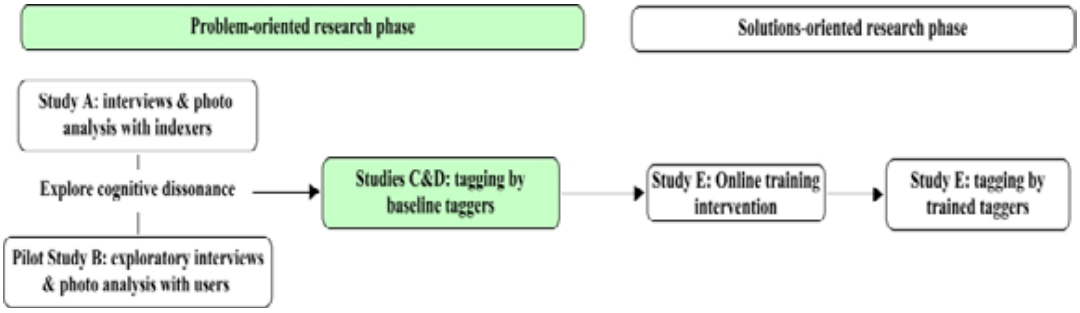
In comparison to the LIS grounding in notions of truth and objectivity, users were aware that there wasn't a stable foundation of meaning based on the correspondence between sign and object. Where LIS attempts to create stable contexts through its indexing schemes, the poststructuralist approach recognises that meaning rests on shifting and arbitrary systems of relationships and that there is no way to assure correspondence between an image and its meaning. In indexing images libraries are also constructing their meaning. The controlled vocabularies and objectivist approach to image subjects limit and effectively exclude subjects which are not expressed. The contrasting styles of professional indexers and users in their approaches to images points to a cognitive dissonance between how they read and attribute subjects to historic photographs.

Chapters 4 and 5 have discussed the evidence for difference between indexers and users in the way the attribute subjects to historic photographs as part of the investigation into PQ1. The evidence shows that current indexing practice represents only a limited range of subject content and that users represent and are interested in a wider range of subject matter. The differences point to cognitive dissonance in how professional indexers and users attribute subjects to historic photographs. The evidence for cognitive difference will be investigated further in the following chapters which investigate folksonomic approaches to indexing.

[97] Translated by G. Bennington and I. McLeod, Chicago: University of Chicago Press, 1987.

The attributes, elements and themes that have emerged through the data analysis in Chapter 5 are revisited in the analysis and interpretation of the data from the tagging studies in Chapter 7.

6 THE PREPARATION AND DEVELOPMENT OF THE TAGGING STUDIES



6.1 Introduction

The first phase of the research consisted of the two preliminary studies (A and B) discussed in Chapters 4 and 5. The two tagging studies C and D constitute the second phase of the "problem-oriented" stage of the research and continued the investigation of the principal research question:

PQ1 - What is the evidence of difference between indexers and users in the way they attribute subjects to historic photographs?

Tagging studies C and D measured user tagging behaviours to investigate the research question:

RQ2 - How well do users' descriptions and current tagging represent different levels of subject content found in historic photographs?

The two tagging studies C and D provided a reference group to gather baseline information about tagging behaviour. How taggers and professional indexers might work together to enhance access to historic photographs is the subject of a further investigation undertaken as Study E.

This chapter discusses issues in the preparation and development of the studies as follows:

- the Flickr website host (section 6.2);
- challenges of "real life" recruitment (section 6.3); and
- precautions to ensure reliability with a cohort of taggers and students (section 6.4).

6.2 The Flickr website host

A Flickr website hosting a library of images was used to explore tagging behaviour in Studies C & D. While a few participants initially had problems logging on, all participants were able to view photographs and tag on the website with apparent ease. The Flickr API was used to create online reports describing tagger behaviour. These reports were subsequently exported to Microsoft Excel for data analysis.

The research website was copied using HTTrack. This provided both a record – the site was re-used for each study and re-use required the erasing previous activity – and ensured that the original activity could be checked or re-analysed later in the research.

6.3 Challenges of "real life" recruitment

The online participants for tagging Study C were initially recruited from the more than 2000 members (at the time) of the Flickr group "Picture Australia: People. Places, and Events",[98] by means of an invitation posted on behalf of the researcher by the National Library of Australia. However, despite the institutional affiliation of the group and the support of the National Library, recruitment was not successful. Few members volunteered in response to the posted invitation and subsequent follow-up postings.

In an effort to recruit more participants, the researcher reviewed group members' personal Flickr sites and sent e-mail invitations to join the study. While Flickr provides the capacity to send invitations to other Flickr members, this did not lead to improvement in participation. Detailed review of members' Flickr websites showed

[98] Located at http://www.flickr.com/groups/PictureAustralia_ppe). The group is now renamed "Trove: Australia in Pictures".

that many accounts had been inactive for some time and few members seemed to be taggers. A significant number of photographs were personal and did not relate to the group's ostensible association with Picture Australia. This information challenges assumptions about members' real interest in Picture Australia. Why many members choose to join is an open question.

As discussed in the research design, the smaller-than-expected number of participants (22) in Study C made further iteration of the design necessary, involving a shift in the target population from an online community of interest (Picture Australia) to university students (Study D).

Extending the research sampling

The failure to recruit enough taggers for Study C highlighted the need to re-think the research methodology. A key research aim was to carry out a "real life" investigation into tagging. The poor response from online taggers and problems with direct recruiting meant this approach was not viable. At this stage a decision was made to recruit students. The students were not necessarily active taggers or Flickr users. A rationale for this necessary adaptation in the design is provided in Section 3.3.1.2 (p. 65).

Students have long been established as surrogate subjects in research and have been used in a number of image studies (see literature review Chapter 2).[99] As a precaution to ensure validity and reliability, Study C provided an opportunity to compare the tagging of the Flickr group members ("authentic" taggers) to that of the students. The results demonstrated similar tagging behaviour (see section 6.4). However, delay and difficulties in starting study C resulted in only 22 of 29 original volunteers participating, once again a small number. Study D, the second tagging study, was based exclusively on students and involved 46 student volunteers, two of whom did not participate.

[99] See the more detailed discussion of sampling in section 3.3.1.2, p. 66.

6.4 Precautions to ensure reliability with a combined cohort of taggers and students

In Study C, the tagging behaviour of taggers and students was evaluated using the Shatford/Panofsky classification matrix. Results showed similar usage of subject level tags by both taggers and students (Table 6.1).

Table 6.1 – Study C: comparison of tagger and student subject level tags

	Study C: Taggers		
	Specific	Generic	Abstract
Mean	5.5	22.8	2.8
Median	3	8	3
SD	6.3	28.9	3.1

Study C: Students		
Specific	Generic	Abstract
7.5	18.5	2.3
1	4	1
10.7	27.3	2.9

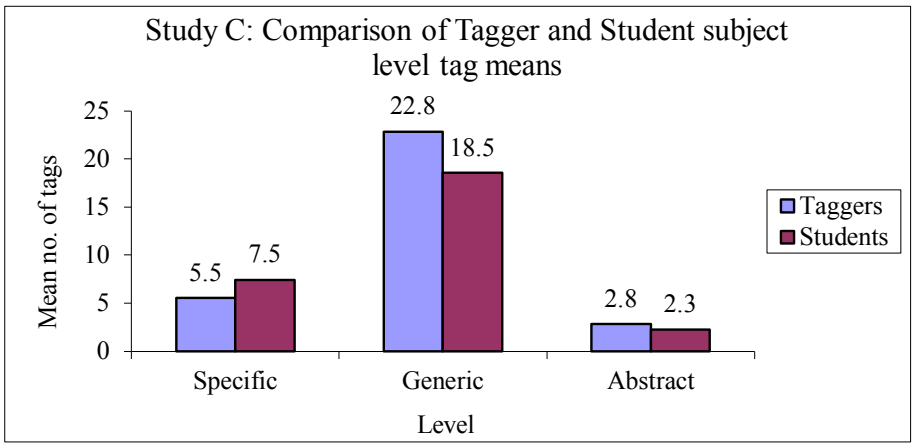


Figure 6.1 –Study C: comparison of tagger and student subject level tag means

The data were further explored using a Mann-Whitney U Independent Samples test (significance level α=0.05) to see if the frequency of terms across facets (Table 6.2) was the same for individual taggers and students. The test revealed no significant differences in facet tagging between taggers and students.

Table 6.2 - Mann-Whitney U test of tagger (n_1) and student (n_2) subject level facets (Study C) (n_1=11, n_2=11)

Facet	ρ	Decision
S1	0.455	Retain the null hypothesis - No significant difference between taggers and students
S2	0.723	Retain the null hypothesis - No significant difference between taggers and students
S3	0.790	Retain the null hypothesis - No significant difference between taggers and students
S4	0.479	Retain the null hypothesis - No significant difference between taggers and students
G1	1.000	Retain the null hypothesis - No significant difference between taggers and students
G2	0.769	Retain the null hypothesis - No significant difference between taggers and students
G3	0.627	Retain the null hypothesis - No significant difference between taggers and students
G4	0.478	Retain the null hypothesis - No significant difference between taggers and students
A1	0.317	Retain the null hypothesis - No significant difference between taggers and students
A2	0.653	Retain the null hypothesis - No significant difference between taggers and students
A3	0.469	Retain the null hypothesis - No significant difference between taggers and students
A4	0.340	Retain the null hypothesis - No significant difference between taggers and students

The size of each sample limits the extent to which generalisation should be attempted. However, the evidence points to no significant differences between how the two groups tagged subject levels in the study, suggesting that the adaptation in sampling to provide a viable cohort of participants had not compromised reliability. One explanation may be that all participants' reactions to the images and subsequent tagging behaviour reflect broader shared responses to visual stimuli as discussed in the literature review (section 2.2.3). This possibility is supported by the similar patterns of subject levels observed in the photo analysis carried out with the interview subjects in studies A and B.

The volume of tagging was similar. The participants from the online tagging group contributed more tags (343) than the students (311), most noticeably for generics.

When the tagging totals of individuals in the two groups were ranked from low[100] to high they showed a remarkably similar distribution (Figure 6.2).

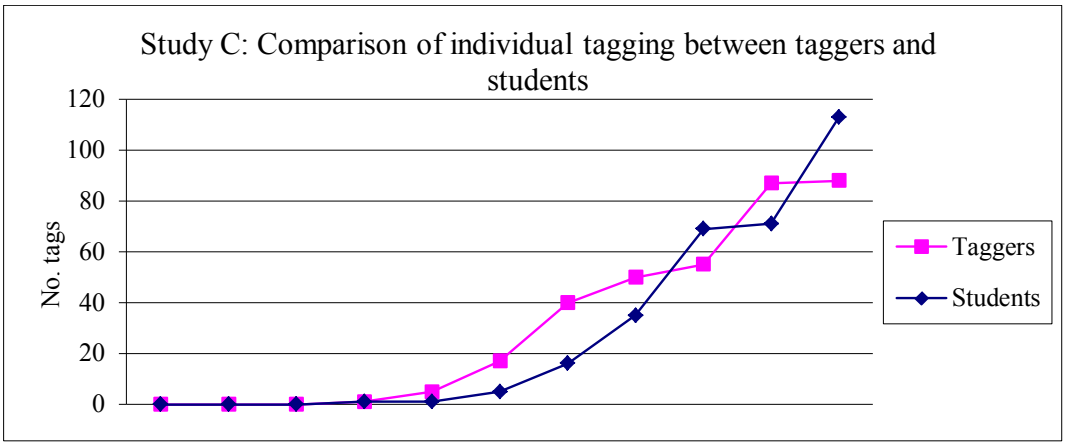


Figure 6.2 – Study C: Comparison of individual tagging between taggers and students (individual totals shown in ascending order)

6.5 Summary and discussion

The need to augment the recruitment of taggers with students made Study C less "real life" than planned but provided an opportunity to compare how the two groups tagged. The fact that taggers and students displayed similar tagging behaviour was encouraging in terms of resolving the dilemma posed by failure to recruit a suitable sample from a single tagger population, namely the Picture Australia group. The results suggest that if the students had any prior learning of indexing theory that this did not have a significant effect on their tagging.

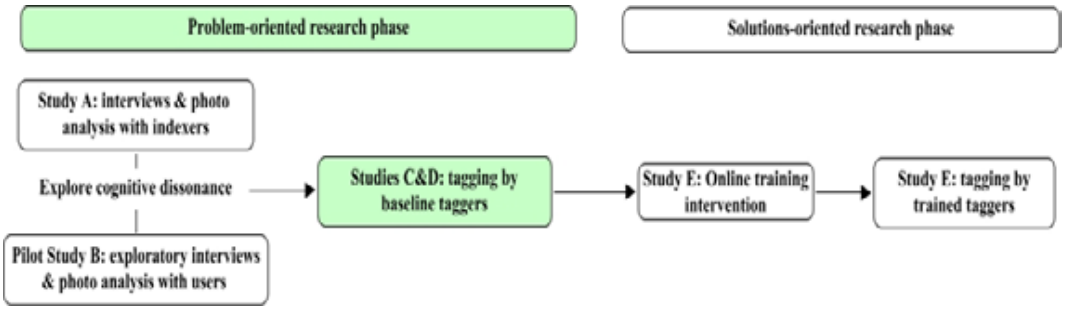
The recruitment problems, even with the National Library support for the research, suggest that taggers, even in apparently strongly affiliated groups, may not be highly motivated to participate in tagging projects. Institutions planning to work with the online tagging community will need to consider how to get the taggers' "buy-in" if projects are to be successful.

The selection of students in studies C and D may limit the extent to which statistically valid inferences can be drawn. However, the findings can illuminate

[100] Six participants, three from each group, did not tag and are the zero values.

specific behaviours and suggest interesting avenues for future research. The standardised methods to collect data in Studies C and D allowed the data to be effectively combined in the presentation of the findings in the next chapter. Where appropriate, results from the two studies are presented comparatively.

7 DATA ANALYSIS & INTERPRETATION: THE BASELINE TAGGING STUDIES C & D AND COGNITIVE DISSONANCE



7.1 Introduction

The tagging studies C and D were part of the "problem-oriented" stage designed to investigate the principal research question:

PQ1 - What is the evidence of difference between indexers and users in the way they attribute subjects to historic photographs?

The aim of these studies was to provide baseline information to investigate the related research question:

RQ2 - How well do users' descriptions and current tagging represent different levels of subject content found in historic photographs?

The chapter presents the data relating to the baseline studies C and D. The participant demographics and experience are presented in section 7.2. The data collected through the online website activity and the survey are then analysed under three broad headings:

- participants' tagging (section 7.3) and commenting (section 7.5) on the dataset of historic photographs during their participation on the online website;
- tagging activity and potential activity effects (section 7.4); and

- participants' self-reported perceptions of tagging in survey responses (section 7.6).

After the presentation of the data from the tagging studies the evidence of cognitive dissonance between indexers and taggers is discussed (section 7.7). The data for Studies C and D are referenced in Appendix 7 - Electronic Data Files. The data collected in Studies C and D as a consequence of investigation of both RQ2 enabled a finding to be made in regard to PQ1.

7.2 Participant demographics and experience

A total of 66 individuals participated in the research. There were initially 29 volunteers for Study C, but only 22 registered on the website. Of this group 18 completed the final online survey. There were 46 volunteers for Study D and 44 participated online. The 43 survey respondents included one participant who only viewed items on the website and did no tagging or commenting. The participation in studies C and D is summarised in Table 7.1.

Table 7.1 – Studies C and D: Overview

Study	Website Participants (n=66)	Survey respondents (n=61)
Study C	22	18
Study D	44	43

The following demographic information relates to the details provided in the 61 surveys that were completed. A protocol was adopted for coding survey responses[101] and is used to identify response data.

More than twice as many females as males participated (Table 7.2). By frequency distribution, the two largest cohorts were aged 21-30 (31.1%) and 41-50 (29.5%) with 80.3% of all participants in the age range 21-50 (Table 7.3). All but three spoke English as their first language (Q18).

[101] The survey responses are identified by the survey question number.

Table 7.2 - Studies C and D: Participant genders (Q16)

Answer	Responses	%
Male	18	29.5%
Female	43	70.5%
Total	**61**	**100.0%**

Table 7.3 – Studies C and D: Participant age ranges (Q17)

Answer	Responses	%
20 or younger	3	4.9%
21 to 30	19	31.1%
31 to 40	12	19.7%
41 to 50	18	29.5%
51 to 60	6	9.8%
61 or older	3	4.9%
Total	**61**	**100.0%**

The general level of education was high with 87% having a university degree or technical qualification. The range of occupations was narrow. Even in the Study C group which included non-students only 10 of the 18 respondents were not students or employed in some library or education-related areas.

Participants' rated their knowledge on a scale of 1 (strongly disagree) to 5 (strongly agree) in response to a series of statements (Table 7.4).

Table 7.4 – Studies C and D: Participants' Internet knowledge (Q14)

Statistic	I know how to use the Internet to find the things I am interested in	I know how to find photographs I am interested in online	I know how to do everything I want on Flickr	I know how to find the photographs I am interested in on Flickr	I know how to use social bookmarking sites, such as Delicious, Digg, or CiteULike
Mode	5	4	2	3	2

All participants considered themselves knowledgeable about using the Internet, both in general and in order to find photographs, with modes of 5 and 4 respectively. In comparison, responses to the other questions showed lower modes indicating less certainty about these areas. The questions about using Flickr and social bookmarking showed the lowest mode (2). The distribution was asymmetric for all statements and shifted to the left, except for about knowing how to use the Internet. One-fifth (12) of the respondents had used Picture Australia when searching for photographs. As most participants indicated they could find the online photographs they wanted, this

suggests that most use a search engine and not a specialised image site such as Picture Australia (now Trove).

The question on Flickr experience was not triggered in the original Study C survey. The supplementary questionnaire on this experience was answered by fewer participants than the original survey (13 out of 18). Only 9 of these responses were valid, as 2 respondents had not used Flickr and 2 responses were invalid and therefore discarded. In Study D fifteen respondents answered the question on Flickr experience. All Study D participants who used Flickr had been using it for less than a year and most (12) less than one month. The combined total of 24 responses, out of the original sample group of 61, is shown in Table 7.5.

Table 7.5 – Studies C and D: Participants' Flickr experience (Q3)

Answer	**Responses**	**%**
1 month or less	12	50.0%
Between 1 and 6 months	5	20.8%
Between 6 months and 1 year	1	4.2%
Between 1 and 2 years	1	4.2%
2 or more years	5	20.8%
Total	**24**	**100.0%**

Twenty (20) respondents indicated they tagged their personal photographs (Table 7.6). The taggers were fairly equally divided between those who seldom tagged and those who sometimes or always did. One respondent, identified as a regular tagger from other responses, did not answer this question. Two thirds of the respondents (40) indicated they had never tagged their own photographs.

Table 7.6 – Studies C and D: Participants' tagging of personal photographs (Q13)

Answer	**Responses**	**%**
Never	40	66.7%
	9	15.0%
	2	3.3%
	2	3.3%
Always	7	11.7%
Total	**60**	**100.0%**

One third of the respondents had tagged photographs by others (22 of 61). It is unclear whether some positive responses might have included the recent experience

of tagging on the research website. While the study participants were not experienced Flick users or taggers, all were knowledgeable Internet users.

The tagging research literature provides little information about tagger demographics and experience.[102] For the most part, where participant demographics are described, the research has involved academics or students (for example, Bar-Ilan et al., 2008; Golbeck et al., 2011; van Vliet & Hekman, 2012). The current study, albeit with a small contingent of taggers, is therefore comparable in terms of participant demographics.

7.3 Participant tagging - Studies C and D Flickr data set

Section 7.3 reports on the data collected through the online website activity relating to participants' tagging. The first part of the discussion deals with tagging subject levels (section 7.3.1). The second part of the discussion reports on the tagging by photograph (section 7.3.2). The evidence relating to tagging activity and potential activity effects follows in the next section (section 7.4).

The research design, discussed in Chapter 3, enabled data to be collected from participants' tags on a dataset of 33 titled and untitled photographs on the Flickr research website. Participants' tagging on the dataset of historic photographs, like the photo analysis carried out in studies A and B, provided data about what attributes are typically identified and classified. The data collected was part of the investigation of the research question:

RQ2 - How well do users' descriptions and current tagging represent different levels of subject content found in historic photographs?

The tagging provided evidence of how taggers represented the different levels of subject content found in historic photographs. The tags were analysed using the Panofsky/Shatford classification matrix (Table 7.7).[103] Terms were classified by the specific, generic or abstract level and then by the facets of "who?" (S1, G1, A1),

[102] See section 2.3.6, p. 42.

[103] Its use as the analytic model is discussed in section 3.4.5, p. 75.

"what?" (S2, G2, A2), "where?" (S3, G3, A3), and "when?" (S4, G4, A4) for each level.

Table 7.7 – Shatford/Panofsky matrix display for findings

	S = Specifics	G = Generics	A = Abstracts
Who?	S1	G1	A1
What?	S2	G2	A2
Where?	S3	G3	A3
When?	S4	G4	A4

7.3.1 Tagging subject levels - Studies C and D Flickr data set

The total number of tags used during the tagging on the research websites in the two studies was 1934. As shown in Figure 7.1, the overwhelming preference was for generic tags with specific and abstract tags used almost equally. Generics comprised 1167 or 60.3% of the total tags. Specific tags totalled 380 (19.62%) and slightly more, 387 (20.0%), were abstract tags.

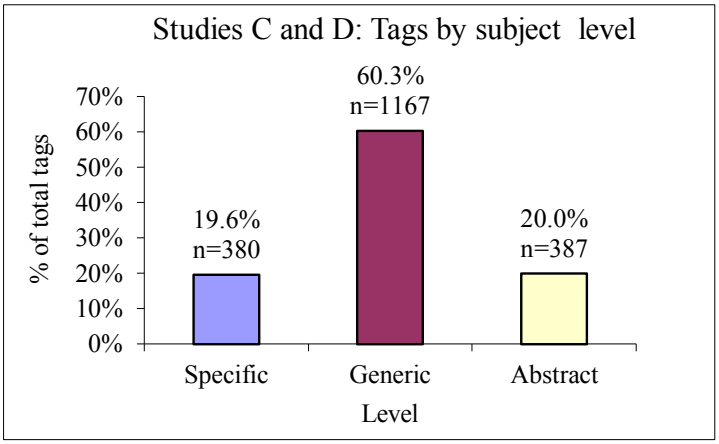


Figure 7.1 – Studies C and D: Tags (n=1934) by subject level

Tagging differed slightly between studies C and D. The most important variations were in the number of abstract tags (Figure 7.2). Abstracts totalled 56 or 8.6% of the tags in study C, and 331 or 25.9% in study D. The Study D taggers used abstract tags, primarily relating to the A2 facet, three times more frequently than the taggers in Study C. The research did not provide data which allowed for this difference in

the use of abstracts to be explained, but the use of abstracts in Study D was similar to the users in Study B and to taggers in Study E.[104]

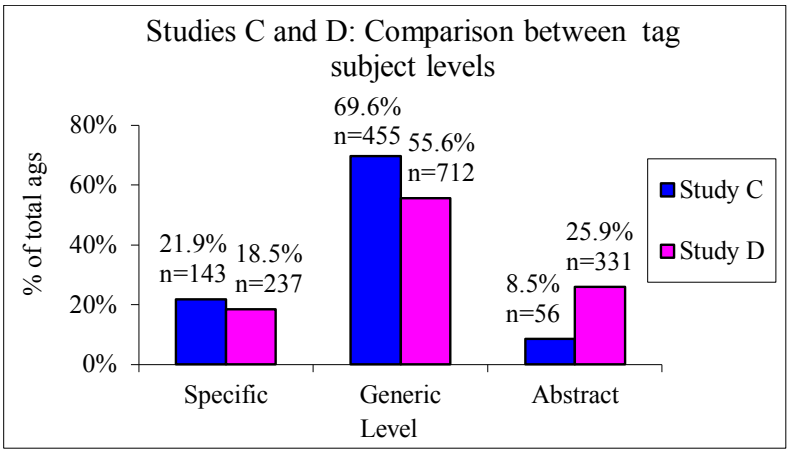


Figure 7.2 – Studies C and D: Comparison between tag subject levels n=1934)

The distribution of tags by subject facets is shown in Table 7.8. The facet G1, kind of person or thing, was the most frequently used facet with 686 tags, followed by the facets of emotion or abstraction (A2) and of the kind of event or action (G2) with 352 and 338 tags respectively. Together these three facets totalled 1376 tags, or 71% of all tags. The taggers appeared most interested in the facets relating to the "who?" (S1, G1, A1), with a total of 853 tags (44.1%). The "what?" facets (S2, G2, A2) comprised a further 721 tags (37.3%). The tags relating to the "where?" facets (S3, G3, A3) totalled 234 tags (12.1%), and the "when?" facets (S4, G4, A4) made up the lowest total of 126 tags (6.5%).

Table 7.8 – Studies C and D: Tags by subject facet (n=1934)

	Specifics	**Generics**	**Abstracts**	**Totals (%)**
Who?	162	686	5	853 (44.1%)
What?	31	338	352	721 (37.3%)
Where?	112	104	18	234 (12.1%)
When?	75	39	12	126 (6.5%

The distribution of tags by facet was similar in both groups (Figure 7.3), although there are distinct differences between facet percentages at S3, G1, and A2.

[104] See section 8.4.1, p. 209.

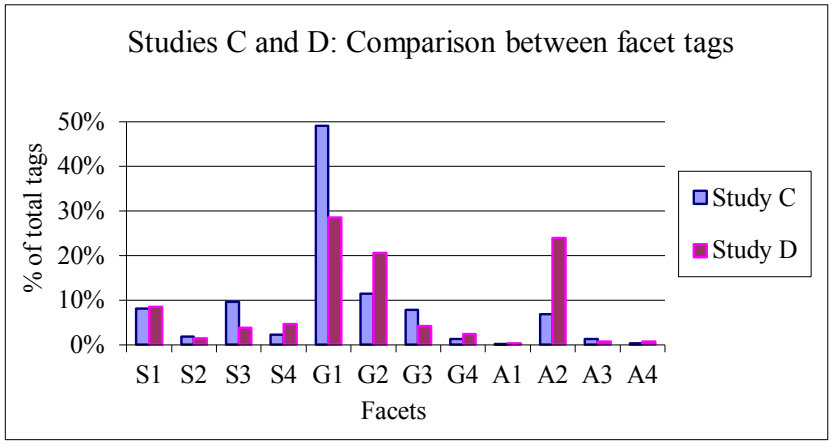


Figure 7.3 - Studies C and D: Comparison between facet tags (n=1934)

Analysis of the skewness with the data from the combined studies produced shows asymmetric distribution by subject facet across the aggregates of all three levels. The specifics skewness was positive (0.14) (*M*=95.00) and displayed a bimodal distribution with S2 and S4 less used. Generic subjects were three times more frequent (*M*=291.75) and displayed positive skewness (1.03), with G2, G3 and G4 facets less used. Abstract subjects displayed a positive skewness (1.99) (*M*=96.75), with A2 having the highest value.

From these descriptive statistics it can be inferred that the taggers:

1. Have a propensity for generics.
2. Have similar propensities to assign tags to specific and abstract levels.
3. Favour generic tags relating to the "who?" facet (G1).

These results were confirmed when an analysis of individual tagging was done (Table 7.9). This revealed that of the 66 participants, 52 were active taggers, each of whom had contributed 37 tags on average. The distribution of the individual's mean tags by subject facet (rounded to the nearest whole number) showed how uneven the distribution of their tagging was: half of all facets were tagged one time or less and one quarter of subject facets were not tagged.

Table 7.9– Studies C and D: Individual tagging means tags by subject facet

Studies C and D			
	Specifics	Generics	Abstracts
Who?	3	13	0
What?	1	7	7
Where?	2	2	0
When?	1	1	0

The tagging findings differ from earlier studies of user-assigned tags in Flickr by Yoon (2009) and Ransom and Rafferty (2011). Both of these studies found similar levels of generic tagging, but higher levels of specifics and lower numbers of abstracts. In Yoon's study generics were 52%, specifics 29%, and abstracts 6%. In Ransom and Rafferty's study the results for generics (59%) were the same as in this study, but they found a higher incidence of specifics (33%) and fewer abstracts (8%). The nature and significance of these findings are fully considered in the Discussion and conclusions, section 9.2.3.

7.3.2 Tagging by photograph

An aim in including untitled and titled photographs in the tagging task was to investigate whether accompanying metadata affected tagging. The effects of background information on image tagging has been discussed previously by Trant (2006) and Bar-Ilan et al (2010). Furthermore, the assumption that tagging can be influenced by other tagging is behind recommender system research (Garg & Weber, 2008; Hollink, 2006; Lindstaedt et al., 2009).

The analysis of the data for the 33 photographs on the research website, comprising 11 untitled and 22 identified by title and photographer, showed the mean tags for individual photographs in each group was very close (Table 7.10). The level facet tags on the untitled and titled photographs showed a striking similarity in the distribution of data points as shown in both the means and medians. The Standard Deviation (SD) was higher for the untitled photographs showing the more asymmetrical distribution of tagging over most facets for untitled photographs.

Table 7.10 – Studies D and D: Untitled and titled photograph facets

Untitled	**S1**	**S2**	**S3**	**S4**	**G1**	**G2**	**G3**	**G4**	**A1**	**A2**	**A3**	**A4**	**Total**
Tags	46	8	31	12	229	135	30	11	3	133	9	5	652
Mean	4.2	0.7	2.8	1.1	20.8	12.3	2.7	1.0	0.3	12.1	0.8	0.5	59.3
Median	3	0	0	1	22	10	3	1	0	16	1	0	
SD	5.2	1.7	5.6	1.1	9.2	6.9	2.1	1.3	0.9	8.4	1.0	0.7	
Skew	2.7	1.9	2.2	2.9	3.3	3.3	3.1	2.7	2.1	3.2	2.7	2.4	
Titled													
Tags	116	23	81	63	457	203	74	28	2	219	9	7	1282
Mean	5.3	1.0	3.7	2.9	20.8	9.2	3.4	1.3	0.1	10.0	0.4	0.3	58.3
Median	4.5	0	4	3	23.5	9	3.5	1	0	9.5	0	0	
SD	3.5	2.4	2.1	1.5	8.2	3.9	2.6	2.0	0.3	5.9	1.2	0.5	
Skew	0.4	3.0	-0.3	0.1	-0.4	1.0	0.2	2.9	3.1	1.3	2.9	0.8	

The graphical display of the mean number of tags for each facet shows the similarity in the distributions (Figure 7.4).

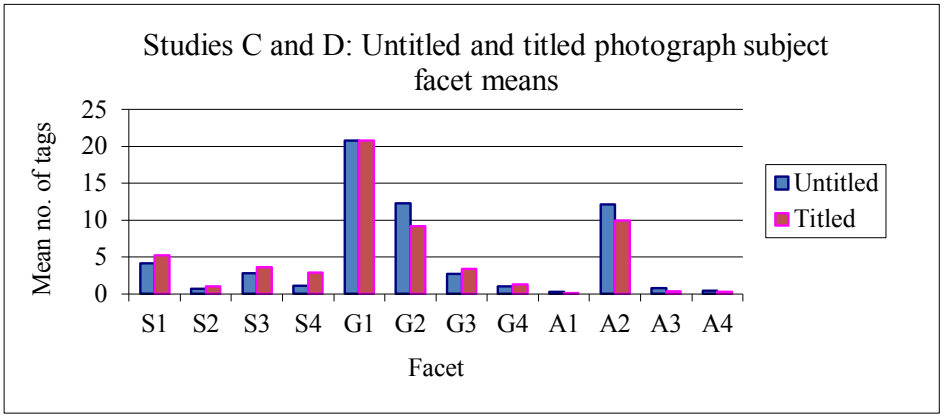


Figure 7.4 – Studies C and D: Untitled and titled photograph subject facet means

These results were further investigated by a Mann-Whitney U Independent Samples test (significance level α=0.05) to see if the frequency of tags across facets was the same for untitled and titled photographs. Only the tests for specifics showed statistically significant associations with titled photos having more S3 and S4 facets tagged than untitled (Table 7.11). The results for the other facets showed no statistically significant differences.

Table 7.11 - Mann-Whitney U test of untitled (n_1) and titled (n_2) specific facets (Studies C & D) (n_1=11, n_2=22)

Facet	*p*	Decision
S1	0.172	Retain the null hypothesis - No significant difference between untitled and titled photos
S2	0.647	Retain the null hypothesis - No significant difference between untitled and titled photos
S3	0.022	Reject the null hypothesis - Titled photos had more S3 facets tagged than untitled
S4	0.003	Reject the null hypothesis – Titled photos had more S4 facets tagged than untitled

The tagging of individual untitled and titled photographs revealed further details about facet tagging (Figure 7.5 and Figure 7.6). There was a greater variation between facet tagging at the level of individual untitled and titled photographs than suggested by the overall results for each group.

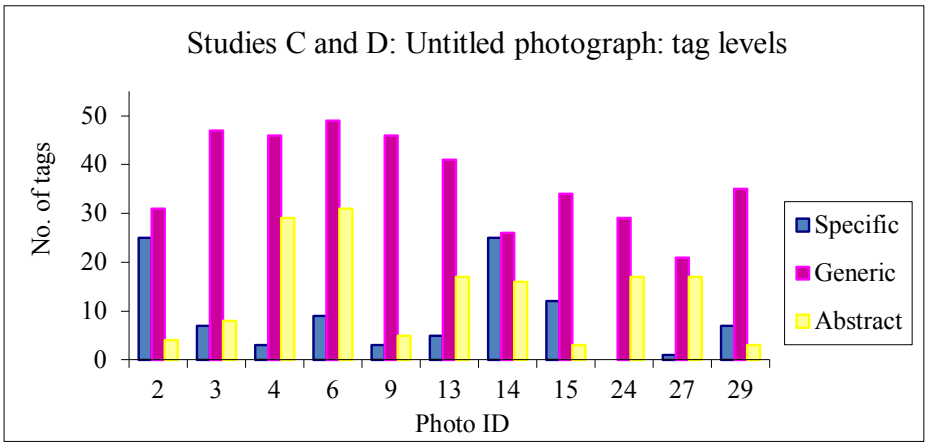


Figure 7.5 – Studies C and D: Untitled photograph tag levels

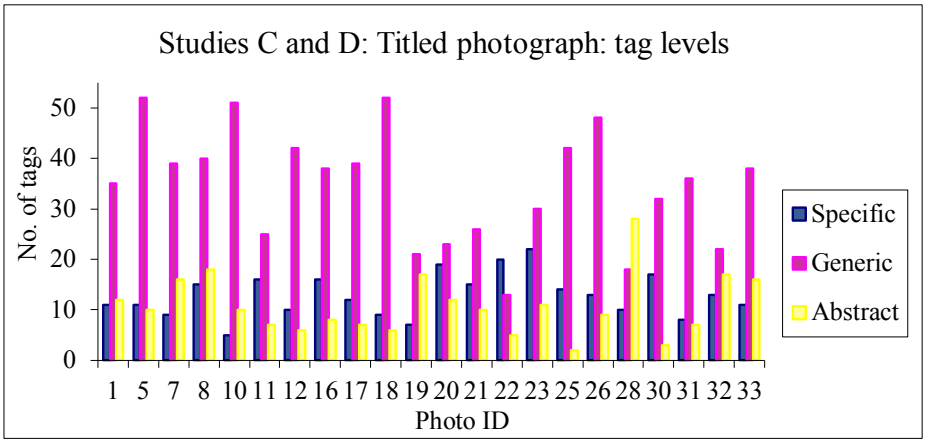


Figure 7.6 – Studies C and D: Titled photograph tag levels

The relatively higher number of generic and abstract tags on individual untitled works may have resulted from a lack of information which provides the "warrant" for more specific tagging. Where untitled photographs showed readily identifiable landmarks and events, or included internal information (Sydney Harbour, #2; signs, in #14 and #29; World War 1 image, #6), specifics were higher and this skewed the overall results. The mean specifics for untitled images suggested documentation effects were negligible, but if these outliers are ignored the overall distribution of specifics for untitled and titled photographs suggests available information may increase specific tagging. However, the sample size was too small to support a conclusion.

Four photographs elicited the greatest number of abstract tags: three untitled works related to domesticity (#4), war (#6), and protest (#14), and one titled work relating to homelessness (#28). All these themes might be expected to provoke a strong emotive response amongst viewers, which was expressed through abstract tags.

Analysing the individual photograph tags by the "who?", "what?", "where?" and "when?" facet percentages showed the greatest amount of tagging was for the "who?" and "what?" facets (Table 7.12). The "when?" facet was tagged the least.

Table 7.12 – Studies C and D: Facet percentages per photo

Studies C and D		
	Untitled	Titled
Who?	42.5%	46.1%
What?	39.1%	35.0%
Where?	10.9%	13.6%
When?	7.5%	5.3%

There were a limited number of "biographical" and perceptual tags.[105] The nine biographical tags related to the photograph's source. Nineteen taggers contributed 59 perceptual tags, with two taggers contributing almost half (13 and 11 respectively). These tags related mostly to the photo type (e.g. aerial, b/w). Three tags, two contributed by one tagger, related to colours.

The tagging of untitled and titled photographs was similar. Trant (2006) likewise reports that the same proportion of terms was applied to items with and without captions. However, these results contrast strongly with Bar-Ilan et al (2010) who found that tags increased significantly when a title was supplied. The significance of these results is discussed in section 9.2.3.

Finding 7.1. The findings show taggers' propensity for generics and similar propensities for specifics and abstracts.

Finding 7.2. The tagging of untitled and titled photographs showed strong similarities.

7.4 Overview of tagger participation and activity - Studies C and D Flickr data set

A goal of this research, in addition to investigating the data on tagging by subject level and by photograph which were discussed in the preceding sections, was to achieve a better understanding of tagger activity and interaction. The existing research literature has not reported on this aspect of tagging.

[105] 'Biographical' details include provenance or collecting institution. 'Perceptual' information relates to colour, position in a photograph (e.g. foreground, background), etc.

Fifty-two of the 66 participants were active taggers and they supplied 1934 tags (Figure 7.7).

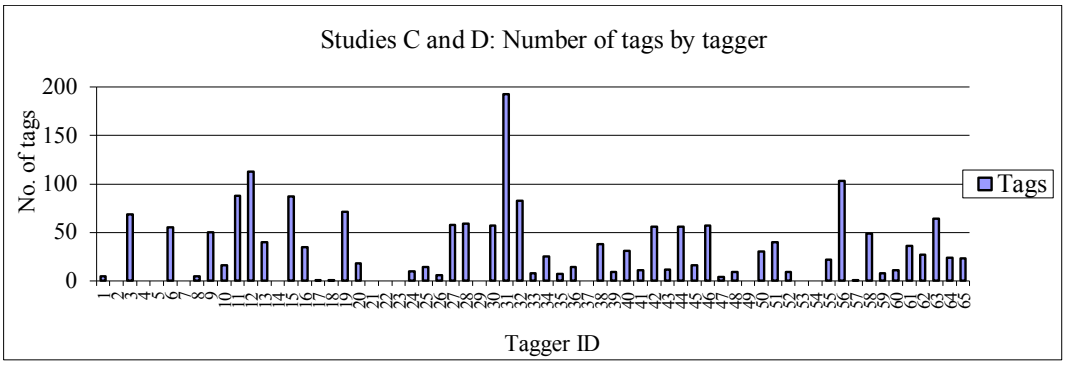


Figure 7.7 - Studies C and D: Number of tags by tagger

Seventeen were "power" taggers contributing 50 or more tags each for a total of 1319 (68.2%) of the total. One tagger contributed 193 tags (10.0%). Twenty-seven taggers tagged ten or fewer times. The link between early participation and the participant's rate of tagging was noticeable. Fourteen of the 17 "power" taggers were all active in the first four days. However, the most prolific tagger (228 tags and comments) went online on day 10.

An important finding for planning similar projects was that the majority of tagging activity (1453 tags or 75.1%) took place in the first ten days the research site was available (Figure 7.8).[106] At the end of two weeks activity had "plateaued" with about 90.0% of tagging; in the last week only about 1.0% of tagging occurred.

[106] The rate of tagging in both studies was similar, although Study C showed greater activity in the first week.

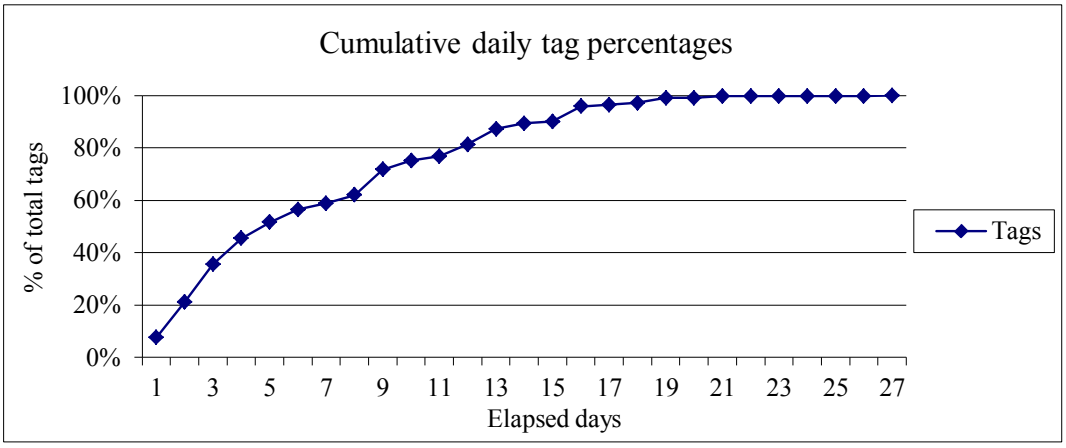


Figure 7.8 – Studies C and D: Cumulative combined daily tag totals

Overall percentages of subject tags varied most relative to each other in the first few days and then stabilised (Figure 7.9). During the first nine days of the study the number of specific tags decreased from 38.1% to 20.2% while the abstracts increased from 8.2% to 20.5%. While there may have been tagging interaction effects in early stages; subsequent tagging showed proportional percentages holding virtually constant from day ten onwards.

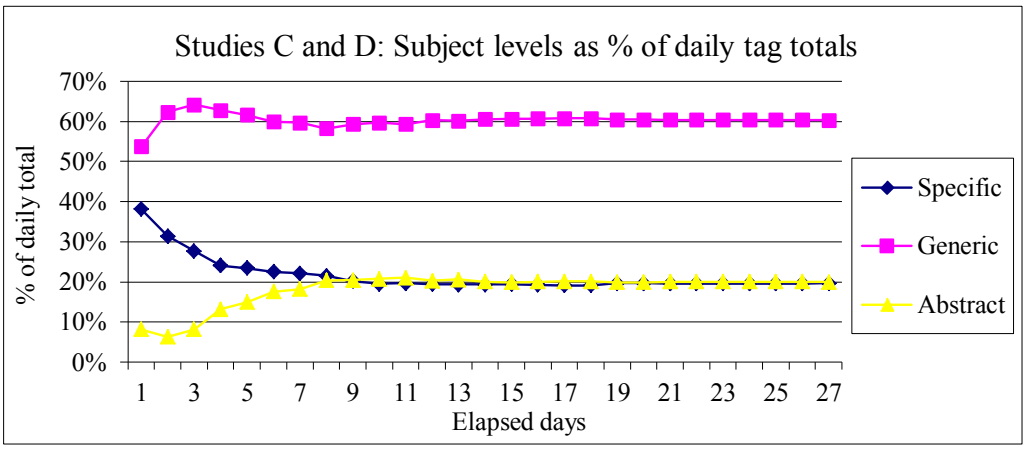


Figure 7.9 – Studies C and D: Subject levels as percentages of daily totals

There was not enough evidence to draw conclusions about interaction effects during the first week or so. Some of the survey responses[107] suggest that taggers considered existing tagging and this may have affected their tagging behaviour. Further testing and measurement are required to investigate interaction effects.

[107] See pp. 168-169.

Tagging was done in 87 out of a total of 96 active sessions with commenting done in the remainder. The research website data did not provide information about sessions where participants only viewed photographs. Hence there was no evidence of whether participants spent sessions only viewing photographs either prior to or after sessions when they did their tagging. Participants were active in one to four sessions; more than half (34) of the 66 participants did their tagging in one session. Sessional activity was similar in both Studies C and D.

Activity in Study C took place in one to three sessions. Eight of the 16 active participants did their tagging in one session, five in two sessions, and three in three sessions. The means for subject levels were specifics 5.3, generics 16.9 and abstracts 2.1 (Table 7.13).

Table 7.13 – Study C: Tagger activity during sessions

	Specific	**Generic**	**Abstract**
Mean	5.3	16.9	2.1
Median	4.0	7.0	2.0
SD	6.2	22.0	2.4

The relative percentages of subject level facet tags used by each tagger in sessions remained fairly consistent whether the tagger tagged in one or in more sessions (Figure 7.10).

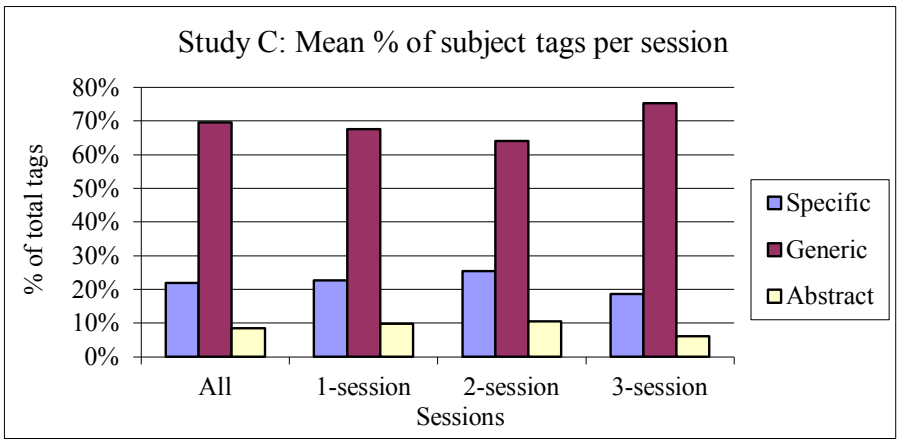


Figure 7.10 – Study C: mean percentage of subject tags per session

Activity in Study D varied from one to four sessions. Of the 43 active participants, 26 did all their tagging in one session, 11 in two sessions, three in three sessions, and three in four sessions. The means for subject levels were specifics 5.6, generics 16.5 and abstracts 7.7 (Table 7.14).

Table 7.14 - Study D: Tagger activity during sessions

	Specific	Generic	Abstract
Mean	5.6	16.5	7.7
Median	3	8	3
SD	8.6	22.9	11.0

The percentage of level tags each tagger used in Study D sessions was more variable across sessions (Figure 7.11). The greatest variations were apparent in the differing percentages of abstracts and the relative percentages of the subject level tags used by taggers active in four sessions.

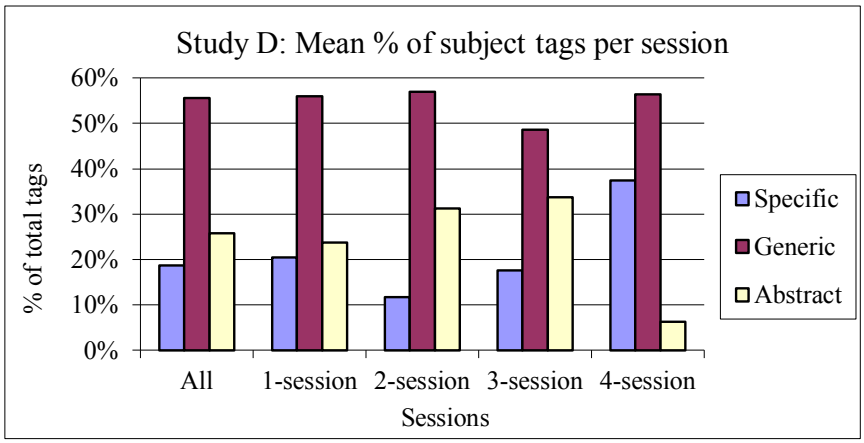


Figure 7.11 – Study D: mean percentage of subject tags per session

The data showed that individual tagger activity over sessions remained fairly consistent. This further suggests that tagger activity was not influenced by other tagging.

Tagging activity over time and effects of pre-existing tags on subsequent tagging are not well represented in the research oriented literature, which focuses on issues such as the effects of information or image type on tagging (Bar-Ilan et al., 2010; Golbeck et al., 2011; Trant, 2006). The current study findings showed that most tagging took place in the early phase of activity and that pre-existing tags appeared to have little

effect on later tagging. The evidence of "power" tagging supported the evidence from the Library of Congress project on Flickr where 40% of tags were provided by 10 taggers (Springer et al., 2008).

Finding 7.3. Overall tagging activity provided little evidence of interaction effects.

7.5 Commenting

The Flickr research website, in addition to the tagging data which have been discussed above, enabled data to be collected from participants' comments on the dataset of 33 titled and untitled photographs. Participants' comments, like the photo analysis carried out in studies A and B, provided further data about responses to different attributes.

Commenting varied significantly between studies C and D. It was a minor activity in Study C where only eight out of 22 taggers made 12 comments. In Study D, 31 out of 44 taggers made 573 comments. The students in Study D possibly commented extensively to demonstrate participation.

In Study C no tagger commented more than twice and most comments were made in the first few days. Of the seven photographs commented on, most received one comment. The exception was "Bottoms up" (#8), a humorous image of two naked men in a pub, which received five comments. Commenting generally did not add to the tagging information: only two comments provided additional information about dates. The comments were usually affective and often humorous. Two untitled images provoked extended comments. The first, an aerial view of the opening of Sydney Harbour Bridge (#2), elicited a discussion on built landmarks in relation to dating, and the second, a Frank Hurley WW1 photograph (#6), prompted a commentary on his working method.

In Study D individual tagger's comments ranged from one to thirty-five and all photographs were commented on. Each photograph, whether untitled or titled, received a median of 18 comments (Table 7.15).

Table 7.15 – Study D: Comments on untitled and titled photographs

Study D comments				
Untitled			**Titled**	
Mean	17.8		Mean	17.1
Median	18		Median	17.5
SD	3.2		SD	2.8

Comments with descriptions reflecting existing tags comprised 41.9% (240 of 573) of the total. Almost 8% (46) included subject concepts, mostly related to abstracts, which could be used to develop the descriptions provided by the tagging. The remaining comments (287) were affective (163) or humorous (110) remarks on the photographs. A minority (14) were descriptions or "questions" about the photographs.

The pattern of commenting activity reflected that of tagging (Figure 7.12). Half (51%) of commenting was done by day 6 and 94% by day 13.

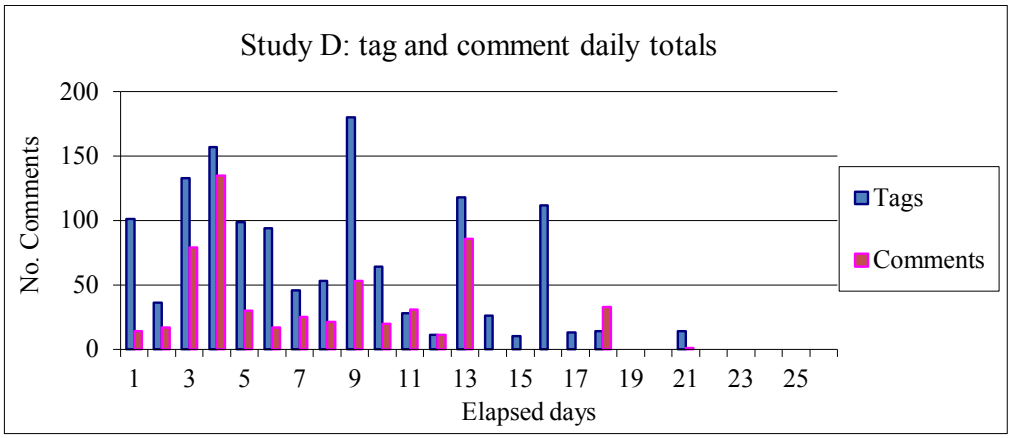


Figure 7.12 – Study D: tag and comment daily totals

Overall the comments were of generally limited value, an exception being the commenting on the Frank Hurley photograph, which provided useful information about this photographer's methods. The commenting on the research website contrasts with the Library of Congress Flickr project (Oyarce, 2012, p. 113; Springer et al., 2008; Stvilia & Jorgensen, 2010) where comments provided useful insight into the photographs. However, Chan (2008) distinguishes between two types of commenting: content commenting and social commenting. The first type relates to

taggers providing information about unknown details, such as the exact date or location, what he describes as "let me tell you about this" comments. The Library of Congress project comments which are referred to in the literature as providing valuable information are of this type. The second type of commenting Chan describes as "here I am" comments. These comprise such comments as "cute", affective or humorous remarks on a photograph. The majority of the commenting on the research website was of this type. While they do not add to the information, Chan makes the important point that they act as "social glue" which helps bind the community of taggers together.

Finding 7.4. The analysis showed that commenting added little overall value to the description of the photographs.

This section completes the reporting on the data collected through the online website activity relating to participants' tagging and commenting. The following sections discuss the data from the survey which was administered after the activity on the research website was finished.

7.6 Research findings from survey responses

The online survey, which was administered after the tagging on the research website was completed, explored taggers' perceptions of their own tagging and the usefulness of different subject levels. The participants' self-reported perceptions of tagging gathered through responses to the post-tagging survey provided useful, if less detailed information than the interviews, about how taggers decided on what tags to use. The survey text responses were analysed using content analysis software (QSR N6) and subjected to qualitative thematic analysis. The Likert and text responses revealed participants' perspectives on what constitutes a "subject" of historic photographs and of subject levels.[108]

[108] In the following sections the survey responses are identified by the study letter (SC/=Study C; SD/=Study D) and the survey question number (Q#-) followed by the individual response number, e.g. SD/Q2-7. The tabulated responses are identified by the question number (Q#) from the combined survey.

This section discusses the data collected through the online survey in four parts. The first part explores taggers' theoretical perspectives (section 7.6.1). The second part discusses taggers perceptions of subject levels (section 7.6.2) followed by a discussion of their reported usage (section 7.6.3). Finally, participants' interest in participating in this project and other projects is reported on (section 7.6.4).

7.6.1 Theoretical perspectives

Taggers' theoretical understanding of the "subject" and their approach to analysing subject content is explored in relation to several themes:

- theory and praxis (section 7.6.1.1),
- what is a "subject"? (section 7.6.1.2), and
- models and approaches (section 7.6.1.3).

7.6.1.1 Theory and praxis

Unsurprisingly, in a cohort that included library and information science students, some taggers mentioned the influence of the LIS tradition on their behaviour leading them to tag what "I thought would be most helpful, based on cataloguing conventions" (SC/Q2-9). One tagger noted how the techniques learned as a LIS student could be applied to tagging.

> I've just completed a library studies course, so I applied some of the techniques I've learned, giving consideration to how people search. Tagging is slightly different to traditional cataloguing and gives the cataloguer more freedom in the choice of language. (SC/Q2-7)

The student taggers' direct references to the LIS tradition is in contrast to the professional indexers in Study A who did not remark on this when discussing their indexing practice.[109]

Respondents who "often used the information provided to form tags" (SD/Q2-14) showed evidence for textual warrant. Only a couple of participants (SC/Q6-5 and SD/Q2-11) directly commented on using the title to help their tagging: "the title of

[109] See section 5.2.1.1, p. 98.

the photograph was helpful, especially if a date was given" (SD/Q2-11). This echoes comments by professional indexers in Study A.[110]

The Likert responses to questions about use of documentation and metadata, such as the title, support the notion that "warrant" is an important factor in determining what to tag (Table 7.16). This "warrant" included other taggers' tags and comments (Table 7.17). The modes for using all types of documentation were 4.

Table 7.16 – Studies C and D: Taggers use of supporting information (Q1)

Question	**Strongly Disagree 1**	**Disagree 2**	**Neutral 3**	**Agree 4**	**Strongly Agree 5**	**Responses**
I used the title to get ideas about what to tag	1	7	13	28	12	61
I felt that knowing the date or time period of the photograph helped me decide what to tag	2	4	9	36	10	61
I felt that other users' tags helped me think of tags	1	6	14	28	12	61

Table 7.17 – Studies C and D: Views on comments (Q12)

Question	**Strongly Disagree 1**	**Disagree 2**	**Neutral 3**	**Agree 4**	**Strongly Agree 5**	**Responses**
The comments made by other people were useful	0	5	18	30	8	61
The comments were more useful than the tags	5	13	30	10	3	61

While participants agreed that comments made by others were useful (mode=4), the data gathered during the research did not make it clear in what way comments helped. Interestingly participants were generally neutral (mode=3) about whether comments were more useful than tags.

While taggers considered it important to know about the photograph's "intent" (mode=4) knowing the photographer's identity did not appear to be an important factor (mode=2) (Table 7.18).

[110] See p. 100.

Table 7.18 – Studies C and D: The photograph and photographer (Q1)

Question	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5	Responses
I thought about why the photograph was taken in order to decide what to name or describe	7	14	11	20	9	61
I felt that knowing who the photographer was helped me decide what to tag	14	23	15	6	3	61

The importance of considering the photographer's intent was made clear by interviewees in both Studies A and B[111] and it is evident that this view was shared by the taggers.

More taggers responded or commented on their use of other tags. This was most clearly articulated by one respondent who described tagging as a "collaborative" effort.

> I look at what is already there first, and then how the photo affects me. If you read the comments before you tag, I think this would affect your tags as you get ideas and interpretations from others which you may not have been aware of by just looking at the picture. It becomes collaborative instead of singular. (SD/Q6-16)

Previous tagging might stimulate further tagging; "coming to a photograph after other users have already begun tagging does alter what I can or will add, and sometimes gave me ideas" (SC/Q2-3). Several taggers noted that they would look at the existing tags and consciously try to tag aspects that had not been mentioned (for example, SD/Q2-4, SD/Q2-10). Some taggers tried "to think of other similar words that could be used instead" (SD/Q2-18) or "used my tags to fill in any 'gaps'. I decided against repeating any of the obvious tags" (SD/Q2-32). For other taggers, existing tagging might have a chilling effect on their own tagging: "I found it very difficult to tag anything as most topics were taken" (SC/Q2-15).

These self-reports appear to contradict the findings of section 7.6.4 about the overall interaction effects. However, the tagging data showed (see Figure 7.9) that in the

[111] See section 5.2.1.2, pp. 102-103.

first days of tagging activity the subject level percentages varied relative to each other before stabilising. The self-reports suggest that a factor in this variation was taggers' conscious effort to tag new aspects of subject content.

Visual warrant clearly played a role. Viewing the photographs was cited as a catalyst for tagging (for example SC/Q6-10; SD/Q2-1; SD/Q2-19). Both visual and textual information contributed the "concrete information, such as things that can be viewed directly in a photograph or its title etc." (SC/Q6-5), and might be helpful in tagging. Only some users in Study B suggested the role of viewing a photograph in understanding its subjects.[112]

Some taggers mentioned using LIS cataloguing techniques. However, in contrast to the professional indexers,[113] the responses showed that their tagging involved an analysis at more than the pre-iconographic level defined by Panofsky.[114] Their tagging was developed using a variety of sources of information, ranging from the image metadata to other tags and comments, whereas professional indexers focussed on the LIS domain and its vocabularies. In this way taggers brought in not only their own perspectives but developed the meaning of the image through interpretation, a sense-making approach related to Peircean semiotics.[115] The taggers demonstrated an interest in the photographer's intent and the concrete objects shown in the photographs, but equally many taggers framed the "interior" meaning with exterior factors, such as their personal and affective responses. This suggests a more Derridean approach to the taggers' analysis. However, the survey responses did not provide enough information to determine how developed or sophisticated taggers' analytic style was.

7.6.1.2 What is a "subject"?

Taggers, like the interviewees,[116] indicated they considered the "subjects" or things in a photograph self-evident, and all that is needed is "to list or tag what is in the

[112] See p. 100.

[113] See section 5.4, p. 132.

[114] See section 2.2.5, p. 25.

[115] See section 5.4, p. 132.

[116] See section 5.2.1.2, p. 101.

photograph" (SC/Q6-7). As noted, taggers often stated their tags were triggered by just viewing the image. The visual and textual cues might be combined:

> I took my cues from the contents of the photographs and their titles. I tried to provide tags that would help users looking for specific things, such as photographs containing families, vacuum cleaners, Sydney Harbour etc. (SC/Q2-4)

Aside from identifying the "obvious" subjects taggers, like indexers, mentioned that they looked "at the main or most commonly known objects in the picture" (SD/Q6-17) and "first and foremost try to use words that best describe the feeling or theme of the photo" (SD/Q6-6). Only one participant described a concept similar to aboutness: "I looked primarily at what the image was about (e.g. subject)" (SC/Q2-11).

One participant suggested tagging might involve more than the process of simply looking at a photograph and listing items. This participant would "look at the photo, identify instant things in the photo then think about the meaning of it" (SC/Q2-16). Another indicated what was most important was to "try to tag the photo with abstract description as this is generally how I will search for others' photos" (SD/Q6-12).

Three participants explicitly mentioned considering the photographer's intent, or why the photograph had been taken, as an important factor in their tagging.

> I attempted to place myself in the photographer's shoes. Why was the photo taken and for whom was it taken? What purpose was the photo to serve? Was it recording an event or making a social comment? (SD/Q2-3)

In considering the photographer's intent one tagger was drawn into a deeper consideration about the meaning of the photograph.

> Generally used what the photograph was trying to describe rather than what the photograph was actually of, for example; in the photograph of the aboriginal workers sheering sheep I felt that the photographer was trying to send a message through about welfare reform in remote parts of the country. Whenever I tag photo's I try to think of the message or the story of what is going on, tagging a picture of a burnt down house with tags such as burnt down house is missing the point - I would prefer to tag such a photo with what the family concerned are going through. (SD/Q2-12)

The taggers' understanding of the photographer's intent was similar to the Study B users' interest in why a photograph had been taken.[117] It suggests a more complex and nuanced approach to understanding photographs than displayed by professional indexers.[118]

Some taggers, like the users in Study B,[119] might consider the perceived context of the photograph. This might involve the use of specific domain language.

> It depends on the nature of the photographs. For archival or historical images I tag any person or place I can identify reasonably accurately. For areas where I have specialist knowledge, I use technical terms. For images of people, I tend to tag about appearance. (SC/Q6-11)

The potential complexity of photographs was noted by another tagger, whose comments on "personal" and "impersonal" photographs echo the interviewees' distinction between "documentary" and other photographs.

> I use the event that the photo commemorates, or the people depicted in it. Personal photos are very different to impersonal images. (SC/Q6-8)

At least one respondent, like the users in Study B,[120] was aware that historic photographs may have more complex meanings as a result of their changing reception over time.

> Description of subject, emotion it may portray, statements made in the photo (e.g. changes in culture/women's role) as can be compared to today's thinking. (SD/Q6-25)

None of the respondents mentioned any difficulties in tagging, although for many participants their participation in the research had been their first time tagging on Flickr. Even novices appeared to have found tagging relatively straightforward.

[117] See section 5.2.1.2, p. 101.

[118] See Summary and Discussion, section 5.4, p. 132, for a detailed overview.

[119] See p. 101.

[120] See p. 101.

> I was commenting unaware of what 'tagging' was all about but saying this I used descriptive wording which could be defined as tagging. So my tagging was more accidental and words which could be used as tags would come from me trying to be as descriptive and interesting as I could in my comments. (SD/Q2-7)

Underpinning taggers' understanding of the "subject" appeared to be a belief in a consensual reading of images. This belief supports tagging approaches based on subject terms which might be used in personal searching/interests (discussed in section 7.6.1.3).

The survey responses showed a strong interest in the objective or factual subject content of images that was reflected in the tagging on the research website.[121] Taggers, also, were attentive to the contextual meanings of photographs. This might involve specialist or domain knowledge and understanding the context of creation and changing reception over time. These ways of understanding photographs contrast with the professional indexers' apparent belief in fixed meanings and reflect poststructuralist notions of knowing, such as discussed by Derrida and Foucault.[122]

7.6.1.3 Approaches

Taggers frequently responded that their tagging involved considering "key words that people might use to retrieve photos that best suit their needs" (SD/Q2-6). Almost one third responded to the two relevant survey questions by referring to user needs and using natural language, "words that most likely would yield the best result through a search engine such as Yahoo or Google" (SD/Q6-19). The emphasis on "user-centred" tagging is familiar from both the interviews with professional indexers[123] and the research literature.[124] Like users in Study B,[125] the taggers appeared to use their own search needs and interests as a frame of reference for tagging.

[121] See section 7.3.1, p. 152.

[122] Discussed in section 5.4, p. 132.

[123] See section 5.2.1.3, p. 104.

[124] See section 2.2.1, pp. 18-19.

[125] See p. 106.

In several cases taggers mentioned trying to put themselves in the role of the potential searcher: "this way I could imagine what about them [the photographs] was most prominent and hence, what aspects of the photographs I would be most likely to remember and use in my search" (SD/Q2-24). In more developed form, this approach constituted a series of steps, not apparently based on any sort of theoretical model but often reflecting personal search interests or areas of particular knowledge.

> I considered the terms someone searching for the image would use to find it. The tags were probably a reflection of the terms I would use in searching for the image. I also paid particular attention to images, or elements within images, of which I have a particular knowledge. For example, tagging the make and model of a car shown in one of the images. (SD/Q2-5)

The process involved could be fairly complex as one tagger described in detail.

> I tried to decide under what circumstances I might want to locate a photo like the one in front of me. For example, I might be looking for a picture of a particular breed of dog (and, if so, I might be interested in a photograph of one, next to a person, to give me an idea of relative size); or I might want to see what a box camera looks like. I then created a tag that would allow me to locate the photo for my theoretic need. I repeated this process, dreaming up multiple theoretic needs for each photo in front of me. Of course, I only included the tags that others had not already provided. There were also some photos that I could not provide appropriate tags for, even though I would have liked to, because I was not sure enough of the subject matter to allocate the "right" tag label (e.g. correct date/place from which shot was taken/name for subject). (SD/Q2-29)

A consideration of potential user needs affected how a tagger selected tag terms and included examining pre-existing tags to see if possible terms had already been used (SD/Q2-13). A couple of respondents indicated they would use terms which they thought they might use, or which they had used, in searching, such as "what came into my head quickly that I would think of searching for if I wanted that photo" (SC/Q2-1). The approach might be more personalised - "I used tags that were most meaningful to me" (SD/Q2-36) - and might depend on their response to the photograph or reflect the practice of arranging personal photographs in 'albums' (SD/Q2-23).

> I examined the photograph first for any objects that stood out - what was happening and the place also - then I looked at the photos from a more

> subjective view - did I think it was amusing or sad, etc., and then lastly looked at the list of tags that had already been added to see if I could think of anything new. There were several cases where I couldn't find anything to add on to the lists. (SD/Q2-37)

A number of taggers seemed to take a more personal, emotive response to subjects, which was not encountered with the interviewees in Studies A and B. This personal approach ranged from the purely subjective to a more complex series of steps which ranged from the personal to the objective.

> Usually I just comment on how the photograph makes me feel or I comment on my impression of the photo (SD/Q6-21)

> Usually, I look at the photo from an emotional view first - what was the photographer to capture and how does it make me feel and then if I feel that I'm not sure I'll look at it from a more objective view....I don't really tag photos much, though (SD/Q6-34)

Pre-existing tags and a lack of knowledge may account for why some participants did not tag. The experimental, research aspect of the tagging appears to have had a constraining effect on at least one non-tagger.

> I didn't tag or comment on the research website although I did visit and look. The website was open at a busy time for me. I felt I needed more time to tag well. I put a little more pressure on myself than I would have with ordinary tagging and comments. (SC/Q2-13)

As well, another commented some aspects might be "a little too 'tender' to tag (racist, segregation etc.)" (SC/Q2-15).

A consideration of user needs might lead to diametrically opposed decisions about what might be suitable for tagging. On one hand, one tagger was clear that "concrete" terms were helpful.

> I try to use tags that are 'obvious', not obscure in terms of helping people find particular photographic types and contents. I tend not to use abstract information for a tag, but concrete information, such as things that can be viewed directly in a photograph or its title etc. (SC/Q6-5)

On the other hand, influenced by personal practice, a tagger might focus on using the "abstract description as this is generally how I will search for others photos" (SD/Q6-12).

Evidence from the text responses was supported by the Likert scale responses (Table 7.19). Close to three quarters (73.7%) of participants confirmed they wanted their tagging to assist other users. Slightly more than one third (36.1%) of participants indicated that personal interests were important. The differences in the responses are shown in the modes of 4 and 2 respectively.

Table 7.19 – Studies C and D: General tagging (Q1)

Question	**Strongly Disagree 1**	**Disagree 2**	**Neutral 3**	**Agree 4**	**Strongly Agree 5**	**Responses**
I wanted my tags to help other users find the photograph	0	3	13	26	19	61
I named or described only the things that interested me	6	19	14	14	8	61

The taggers' survey responses reveal that they often approached tagging by considering what subjects they or another user would search for, and then they would try to tag using such terms. This suggests that taggers recognised, even if at a very basic level, the Foucauldian notion that individuals' constructions of meanings are based on domain discourses. The finding from the current research shows that taggers were clearly highly motivated to help other users. Tagger motivations have been investigated by some researchers and a few have suggested a motivation is to help others (Ames & Naaman, 2007; Marlow et al., 2006b), although this may decrease over time, at least for tagging personal photographs (Nov et al., 2010). This research suggests, that in the context of a project to tag historic photographs, taggers are much more motivated to help others than previous research suggests.

7.6.1.4 Summary of theoretical perspectives

An overview of the findings relating to taggers' theoretical understanding is shown in Table 7.20.

Table 7.20 – Studies C & D: Overview of taggers' theoretical understanding

Theme	**Findings**
Theory and praxis	LIS cataloguing influences Concept of warrant but meaning developed through various sources of information
What is a "subject"	Self-evident, objective subjects Shared understanding Importance of context of creation and changing reception
Approaches	Helping other users Potential user's frame of reference Interpretative Domain language

While taggers demonstrated a strong interest in the objective content of images, they attended to other meanings of photographs, as was seen with the users in Study B. Taggers' approaches to understanding photographs contrast with the professional indexers' traditional library approach and apparent belief in fixed meanings and reflect poststructuralist notions of knowing.[126]

The current research extends recent studies which have comprised tagging experiments with participants (Golbeck et al., 2011; Rorissa, 2010; van Vliet & Hekman, 2012), or investigations of existing Flickr tags (Ransom & Rafferty, 2011; Stvilia & Jorgensen, 2010; Yoon & Chung, 2011) and group characteristics (Cox et al., 2011), but which have not explored taggers' understanding of theoretical matters or perceptions of their own tagging approaches.

Finding 7.5. The analysis showed taggers had a strong interest in objective content but developed meaning based on various sources of information, including other tags. Taggers were motivated by an interest in helping others.

Participants' understanding of subject levels is dealt with in the following section.

[126] See Summary and Discussion, section 5.4, p. 132, for a detailed comparison between the different approaches of professional indexers and users in Studies A and B.

7.6.2 Subject Levels

Taggers perceptions and reported use of subject levels defined in the Shatford/Panofsky classification matrix (Table 7.21) were explored in the analysis of their text responses and Likert scale responses to survey questions.

Table 7.21 - Shatford/Panofsky subject level classification matrix

	Iconography (S=Specifics)	**Pre-Iconography (G=Generics)**	**Iconology (A=Abstracts)**
Who?	Individually named person, group, thing **(S1)**	Kind of person or thing **(G1)**	Mythical or fictitious being **(A1)**
What?	Individually named event, action **(S2)**	Kind of event, action, condition **(G2)**	Emotion or abstraction **(A2)**
Where?	Individually named geographical location **(S3)**	Kind of place: geographical, architectural **(G3)**	Place symbolised **(A3)**
When?	Linear time: date or period **(S4)**	Cyclical time: season, time of day **(G4)**	Emotion, abstraction symbolised by time **(A4)**

Sixty-one taggers answered questions about their tagging on the research website. Twenty-seven participants who said they tagged their own photographs and 22 who said they tagged photographs by others answered additional questions about these activities. Given the apparent lack of subject level knowledge or theory, the text references to subject levels were limited. The Likert scale responses were structured to provide evidence about how subject levels are understood and used.

The evidence for participants' understanding and perceptions of the different levels is explored below as follows:

- specifics (section 7.6.2.1),
- generics (section 7.6.2.2), and
- abstracts (section 7.6.2.3).

A summary of subject level understanding (section 7.6.1.4) is provided after these sections.

7.6.2.1 Specifics

As previously noted, participants considered many subjects "self-evident", like the professional indexers and users.[127] Typically these subjects were specifics:

> Who is in the photo, any event associated with it and the date it was taken. (SD/Q6-14)

The specific subjects were seen as "factual". As with the interviewees, the taggers appeared to consider that such subjects were objective and shared by other viewers.

> Tagging objects, scenes that I believed I knew about or with tags I thought was factual. (SC/Q2-5)

The assumption that other viewers shared the same perception of subjects came across clearly in another tagger's response.

> I try to use tags that are 'obvious', not obscure in terms of helping people find particular photographic types and contents. I tend not to use abstract information for a tag, but concrete information, such as things that can be viewed directly in a photograph or its title etc. (SC/Q6-5)

7.6.2.2 Generics

The participants' text responses contain virtually no references to generic subjects. Whether this reflects the difficulty in understanding what a generic subject is which was encountered in the interviews cannot be determined.[128] Only one response referred to using broader tags – "broad to specific tags" (SC/Q15-6).

> Technical info (app used, methods) then what it is (broad to specific tags). (SC/Q6-6)

[127] See section 5.2.2.1, p. 113.

[128] See section 5.2.2.2, p. 116.

7.6.2.3 Abstracts

There were more references to abstracts. Some participants expressed a preference for abstracts (SD/Q6-30), in contrast to the general ambivalence observed in the Study A and B interviews.[129] Others made it clear they would avoid them (SC/Q15-5). Taggers, unlike indexers, might be more likely to approach the image firstly at the abstract, or even affective or emotional, level.

> Usually, I look at the photo from an emotional view first - what was the photographer [trying] to capture and how does it make me feel and then if I feel that I'm not sure I'll look at it from a more objective view.... (SD/Q6-34)

> I first and foremost try to use words that best describe the feeling or theme of the photo. (SD/Q6-6)

Perhaps, a more typical approach was:

> Some obvious tags and then some more abstract. (SD/Q6-10)

It was not clear from the responses how participants understood abstracts. It is possible some of the responses might refer to general or generic tagging.

7.6.2.4 Summary of subject level understanding

Taggers' perceptions of subject levels are summarised in Table 7.22.

Table 7.22 – Studies C and D: Text responses about subject levels

Subject Level	**Findings**
Specifics	Self-evident or obvious things Factual
Generics	Virtually no reference
Abstracts	Unclear; may be affective

The few survey comments limit what can be inferred about participants' understanding of subject levels, but there are many instances where parallels can be drawn to the interview responses in Studies A and B. Comments about specifics reinforce the idea that these are considered "self-evident". Generics were scarcely

[129] See section 5.2.2.3, p. 118.

referred to. The interviews in the previous studies revealed participants' confusion and misunderstanding about what generics are,[130] and this might explain the absence of survey comments. Participants' understanding of abstracts was unclear, but for some taggers abstracts would appear primarily to be affective responses to images.

Finding 7.6. The analysis showed that taggers lack a clear understanding of subject levels.

7.6.3 Subject level usage

The information about theoretical perspectives and perceptions of subject levels provided by the survey comments reported in the previous sections was supplemented by the Likert scale responses to questions relating to self-reported subject level usage.

Participants' reporting of tagging subject levels on the research website all showed the same mode of 4 indicating agreement about using specific object/events, generics ("type of"), abstracts or locations to describe the photographs (Table 7.23). In contrast, the mode for the date or time statement was 2.

Table 7.23 – Studies C and D: Tagging subject levels on the research website (Q1)

Question	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5	Responses
I named the specific objects or events shown (e.g. Sydney Harbour Bridge)	1	7	7	31	15	61
I described the type of subject (e.g. bridge, portrait)	2	7	11	31	10	61
I described the general or abstract idea that you think the photograph is about (e.g. happiness)	5	16	7	24	9	61
I named places or locations (e.g. Sydney)	2	3	13	28	15	61
I gave the date or time period	4	19	17	13	8	61

The reported behaviour did not match the actual tagging observed on the website. The survey responses did not reflect the proportionally higher use of generics,

[130] See section 5.2.2.2, p. 116.

suggesting participants, like the users interviewed in Study B,[131] lack a clear understanding of generics and may be mixing generic with other subject level usage when they report their behaviour. Respondents also over-estimated their tagging of specifics and time-related tags.

Participants' responses about their personal tagging allowed some comparisons to be made with their tagging on the research website. Less than half of the participants tagged their own photographs (Table 7.24). These taggers showed a strong propensity for using personally meaningful tags (mode=4). The responses about personal tagging of subject levels were all equal or higher than the responses in relation to the research website. Subject level tag use for specifics, generics and abstracts all showed modes of 4. Interestingly, the modes for places or date were both 5, much higher than when reporting tagging on the website.

Table 7.24 – Studies C and D: Tagging subject levels when tagging personal photographs (Q9)

Question	**Strongly Disagree 1**	**Disagree 2**	**Neutral 3**	**Agree 4**	**Strongly Agree 5**	**Responses**
I use tags which may only be meaningful to me (e.g. my trip)	1	0	4	11	11	27
I name the specific objects or events shown (e.g. Sydney Harbour Bridge)	0	2	5	10	10	27
I describe the type of subject (e.g. bridge, portrait)	2	6	3	11	5	27
I describe the general or abstract idea that the photograph is about (e.g. happiness)	3	6	4	8	6	27
I name places or locations (e.g. Sydney)	0	2	4	10	11	27
I give the date or time period	3	3	6	5	10	27

Taggers responded that in tagging their own photographs they tagged subjects of personal interest and were not interested in other tags (Table 7.25). This is clearly reflected in the modes of 5 and 1 respectively. However, even in tagging their own photographs participants expressed interest in having their tagging assist other users as the mode of 5 indicates.

[131] See section 5.2.2.2, p. 116.

Table 7.25 – Studies C and D: Tagging personal photographs (Q9)

Question	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5	Responses
I name or describe only the things I am interested in	2	4	3	7	11	27
I look at other people's tags for ideas for tags to use on my photographs	8	6	5	6	2	27
I try to use tags that I think will help other people find my photographs	6	4	6	4	7	27

The responses indicate that personal tagging behaviour may differ from tagging other photographs. This evidence suggests that studies of Flickr personal tagging[132] may not provide accurate predictors of tagging carried out for other purposes. This is a topic for further research to investigate.

The response data points about the usefulness of subject levels for searching (Table 7.26) resembled those reported for website tagging. The responses about use of specific object/events or locations and generics ("type of") and abstracts were similar with modes of 4. The mode for date or time was 3.

Table 7.26 – Studies C and D: Usefulness of levels when searching for photographs (Q8)

Question	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5	Responses
Tags make it easy to find photographs of specific objects or events I am interested in	0	2	7	36	16	61
Tags relating to general subjects (e.g. portraits) are too broad to be useful in finding photographs I am interested in	2	8	14	28	9	61
More tags for abstract subjects or ideas would make it easier to find the photographs I am interested in	1	6	17	27	10	61
Location tags make it easier to find photographs I am interested in	1	5	15	30	10	61
Date or time period tags are of little help in finding photographs I am interested in	7	17	19	13	5	61

[132] These studies are reported on pp. 43-44.

Participants' ratings of the usefulness of different sources of information – tags, titles, and comments – in searching for photographs showed tags rated highly with a mode of 4 (Table 7.27). There is some ambiguity in this finding as respondents also judged the photographs retrieved might not always be relevant (mode=2). Words in the title or in all the combined textual information were considered equally useful (mode=3), but the responses to the statement about all text sources showed a greater number agreed or strongly agreed with this statement.

Table 7.27 – Studies C and D: Comparative usefulness of various information types for searching (Q8)

Question	**Strongly Disagree 1**	**Disagree 2**	**Neutral 3**	**Agree 4**	**Strongly Agree 5**	**Responses**
Tags make finding photographs easier	0	2	8	33	18	61
Searching by tags always retrieves photographs whose subject matter matches the tag description	7	23	18	11	2	61
Words in titles are more useful than tags for finding photographs I am interested in	0	7	29	16	9	61
Words used in comments are useful for finding photographs I am interested in	0	14	27	19	1	61
Searching on all the text (title, comments, etc.) is a better way than searching on tags to find a photograph I am interested in	1	8	23	18	11	61

In summary, the survey responses show a consistency between how participants perceive the usefulness of tagging different subject level tags on the research website and what subject levels they consider useful when searching. The research findings have shown that taggers are motivated to help other users,[133] which is consistent with previous research (Ames & Naaman, 2007; Marlow et al., 2006b). These responses suggest that participants consciously tagged the subjects they felt would be most helpful based on their own experience searching, or a perceived search usefulness.

Importantly, the responses about the usefulness of subject levels for searching and for personal photographs can help explain the subject level percentage differences

[133] See section 7.6.1.3, p. 173.

between Flickr personal tags and search terms found by Ransom and Rafferty's (2011) and shown in Table 2.3.[134] However, the participants' perceptions of the usefulness of subject levels do not appear to closely match the actual tag and search term usage reported by Ransom and Rafferty, suggesting that further research in this area is necessary.

It is possible the results from the current study might not be typical of tagging in other contexts. Enser (2008) suggests the differences in the results of various studies may be explained by the different domains in which the studies have been carried out. Ransom and Rafferty (2011) agree that domain factors should be taken into account.

Finding 7.7. Tagging subject levels on the website reflected taggers' perceptions of the usefulness of subject levels in searching.

7.6.4 Project Participation

An important aspect of the research was to investigate the potential for institutions to set up sites where taggers could assist in describing images. The survey included questions specifically intended to gather information relevant to this aim.

Nearly all participants (88.5%) agreed the photographs were interesting (mode=4) (Table 7.28). More critically 70.5% indicated they would be interested in tagging other similar photographs. Only a small number indicated they would not be interested (9.8%). Interestingly the mode for participating in a future project (4) was higher than that for doing more tagging in future (3). The motivation for tagging to help others is evident.

[134] See p. 45.

Table 7.28 – Studies C and D: Project participation (Q12)

Question	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5	Responses
I found the photographs on the research website interesting	0	0	7	39	15	61
I would be interested in tagging more photographs like these	0	7	11	34	9	61
I am likely to do more tagging in future because of participating in this project	1	9	25	18	8	61

Participants generally felt that involvement in the project had made them more knowledgeable and thoughtful about tagging and likely to change their future tagging (Table 7.29). The modes for all the questions relating to the "personal effects" of participating in the project were 4.

Table 7.29 – Studies C and D: Personal effects (Q12)

Question	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5	Responses
Participating in this project has made me more knowledgeable about tagging	0	6	12	30	13	61
Participating in this project will change how I tag in future	0	12	15	28	6	61
Participating in this project made me understand more about how other people tag	0	5	10	38	8	61
Participating in the project has made me think differently about tagging	0	9	13	27	12	61

The survey responses about project participation, and the findings relating to tagger motivations,[135] are positive for institutions wanting to work with taggers. Previous online Flickr projects have relied on spontaneous participation (Chan, 2008; Springer et al., 2008). However, van Vliet and Hekman (2012) report that participation in a

[135] See section 7.6.1.3, p. 173.

similar project was not spontaneous but needed recruitment. The need for institutions to actively recruit and work with taggers has been highlighted by Holley (2010).

Participants' responses suggested that being involved in the tagging project would affect their future tagging; but the research did not investigate any long-term effects.

Finding 7.8. The positive response to project participation supports findings that helping others is an important motivation for taggers.

This section completes the reporting on the data collected through the online surveys. The following sections discuss the evidence from the tagging studies and from the study with professional indexers in order to complete the investigation into PQ1.

7.7 The evidence of cognitive dissonance between indexers and taggers

"Cognitive dissonance", as used in the context of this research, is intended to convey the conflict between how indexers' and users' appear to think about and interpret images. What was the evidence of cognitive dissonance between professional indexers and taggers?

Overall tagging of subject levels in Studies C and D contrasted strongly with that of indexers in Study A (Figure 7.13).

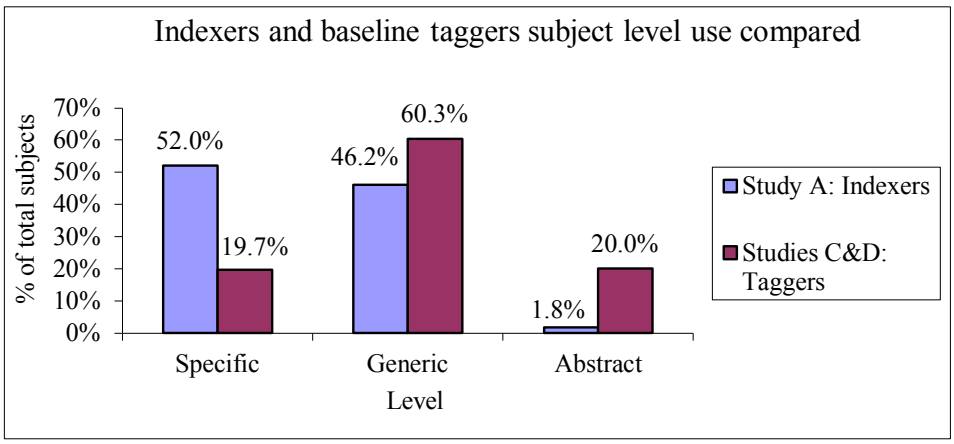


Figure 7.13 – Studies A, C and D: Indexers and baseline taggers subject level use compared

The data were further explored using a Mann-Whitney U Independent Samples test (significance level α=0.05) to see if the frequency of terms across facets (Table 7.30) was the same for individual taggers and indexers.

Table 7.30 – Shatford/Panofsky subject facets

	S = Specifics	**G = Generics**	**A = Abstracts**
Who?	S1	G1	A1
What?	S2	G2	A2
Where?	S3	G3	A3
When?	S4	G4	A4

The test (Table 7.31) showed that there are statistically significant associations between the number of S2 and S4 facet terms and whether a person is a tagger or an indexer. Examination of the data showed that a tagger is likely to use more S2 facets than indexers but less likely to use the S4 facet. The results for both the S1 and S3 facets showed no significant differences.

Table 7.31 - Mann-Whitney U test of indexer (n_1) and tagger (n_2) specific facets (Studies A, C & D) (n_1=28, n_2=52)

Facet	p[136]	Decision
S1	0.288	Retain the null hypothesis - No significant difference between taggers and indexers
S2	0.017	Reject the null hypothesis - Taggers use more S2 facets than indexers
S3	0.368	Retain the null hypothesis - No significant difference between taggers and indexers
S4	0.007	Reject the null hypothesis - Taggers use less S4 facets than indexers

The test results for generics (Table 7.32) showed that there are statistically significant associations between all the generic facets and whether a person is a tagger or an indexer. Examination of the data showed that a tagger is more likely than an indexer to use each of the generic facets.

Table 7.32 - Mann-Whitney U test of indexer (n_1) and tagger (n_2) Generic facets (Studies A, C & D) (n_1=28, n_2=52)

Facet	p	Decision
G1	0.000	Reject the null hypothesis - Taggers use more G1 facets than indexers
G2	0.000	Reject the null hypothesis - Taggers use more G2 facets than indexers
G3	0.000	Reject the null hypothesis - Taggers use more G3 facets than indexers
G4	0.000	Reject the null hypothesis - Taggers use more G4 facets than indexers

The Mann-Whitney U test also showed statistically significant associations between the number of abstract facets used and whether a person is a tagger or indexer (Table 7.33). The data showed taggers' clear propensities to use the A2, A3 and A4 facets, relative to indexers. There were no significant differences for the A1 facet which was only tagged five times.

[136] In SPSS, p values < 0.0005 are rounded in output to p = 0.000. The reader should note that this, and subsequent, instances of p = 0.000 are rounded, rather than actual values.

Table 7.33 - Mann-Whitney U test of indexer (n_1) and tagger (n_2) Abstract facets (Studies A, C & D) (n_1=28, n_2=52)

Facet	*p*	Decision
A1	0.092	Retain the null hypothesis - No significant difference between taggers and indexers
A2	0.000	Reject the null hypothesis - Taggers use more A2 facets than indexers
A3	0.002	Reject the null hypothesis - Taggers use more A3 facets than indexers
A4	0.014	Reject the null hypothesis - Taggers use more A4 facets than indexers

A summary table of differences observed between the mean subject terms/tags used per photograph by indexers and taggers using the Shatford/Panofsky classification matrix is shown as Table 7.34. Indexers used subject headings related to the specific facets of "who?", "where?" and "when?" (S1, S3, S4) and the generic "who?" (G1). They used no abstract subjects. On average, overall indexers provided subject terms for only one third (4) of the total facets (12). The baseline taggers provided tags for three quarters (9) of the facets; only some abstract facets were rarely represented. Taggers also consistently used more tags per facet.

Table 7.34 – Studies A and C & D: Mean subject level terms/tags per photograph

Indexers (Study A)			
	Specifics	Generics	Abstracts
Who?	1	3	0
What?	0	0	0
Where?	2	0	0
When?	1	0	0

Taggers – Baseline Studies (C and D)			
	Specifics	Generics	Abstracts
Who?	3	13	0
What?	1	7	7
Where?	2	2	0
When?	1	1	0

Furthermore, the survey comments and responses[137] revealed taggers have a more complex approach to understanding and interpreting images than the professional indexers.[138] While taggers were interested in objective subject content, they were interested in more than the pre-iconographic subject matter that indexers focus on. They developed their interpretations through a variety of sources of information, including their personal and affective reactions to the images. These ways of understanding photographs contrast with the professional indexers' apparent belief in

[137] Reported in section 7.6, p. 166.

[138] Discussed in section 5.4, p. 132.

fixed meanings and reflect more poststructuralist, Derridean notions of knowing. The more complex and nuanced approach of the taggers is similar to that displayed by the users of Study B.[139]

Moreover, while both taggers and professional indexers demonstrated a concern to tag or index for users, the taggers showed a greater interest in using domain terms or "natural language" from their own specialist knowledge or terms they expected users would employ. This recalls users' similar approaches in Study B.[140] While neither taggers nor professional indexers employed any sort of domain analysis, the taggers' use of sources of information, such as other tags, suggests a greater recognition of variant constructions of meanings than the professional indexers' exclusive use of LIS vocabularies.

These differences provided evidence of cognitive dissonance between indexers and taggers in how they appear to think about and interpret images, which was first explored in the summary and discussion of studies A and B (see section 5.4). The review of the literature identified a gap in understanding how professional indexers and users attribute subjects to historic photographs. The finding of cognitive dissonance is important in advancing our understanding. The nature and significance of these findings are fully considered in the discussion and conclusions, section 9.2.5.

Finding 7.9. The contrasting styles of professional indexers and taggers in their approaches to images showed cognitive dissonance between how they read and attribute subjects to historic photographs.

[139] See section 5.4, p. 137.

[140] See p. 137.

7.8 Summary and discussion

The baseline tagging studies C and D completed the "problem-oriented" phase designed to investigate the principle research question.

Taggers showed a strong tendency to generics with equal inclination to specifics and abstracts.[141] These findings differ from those of earlier studies of user-assigned tags in Flickr. Both Yoon (2009) and Ransom and Rafferty (2011) found similar levels of generic tagging but higher levels of specifics and lower numbers of abstracts.

The tagging of untitled and titled photographs was similar, suggesting that accompanying metadata had little influence on tagging. These results are similar to Trant (2006) but differ from Bar-Ilan et al (2010) who found that accompanying titles significantly increased tagging. The tagging activity suggested that pre-existing tags also have little effect on subsequent tagging. Most tagging took place in the early phase of activity and a few "power" taggers contributed most of the tags. The evidence of "power" tagging was reported from the Library of Congress project on Flickr (Springer et al., 2008). However, in contrast to the previous Library of Congress project commenting added little value.

The evidence from the surveys showed taggers had a strong interest in objective content, but developed meaning based on various sources of information, including other tags. Taggers were motivated by an interest in helping others and consciously tried to tag with terms which they thought would be useful in searching.[142]

The contrast between tagging and indexing attribution of subjects as classified by the Shatford/Panofsky matrix (Table 7.34) demonstrated different approaches to attributing the subjects of historic photographs. Where indexers showed a propensity for objective subjects and avoided abstracts, taggers demonstrated a much greater interest in a variety of subject level content, including abstract facets.

[141] See section 7.3.1, p. 152.

[142] See p. 176.

The differences in indexing and tagging combined with the evidence of the indexer interviews[143] and the tagger survey responses[144] showed cognitive dissonance between how indexers and taggers read and attribute subjects to historic photographs. Taggers' more poststructuralist, Derridean approaches to understanding photographs contrast with the professional indexers' traditional library approach and apparent belief in fixed meanings. Similarly, taggers' greater recognition of variant constructions of meanings and interest in using terms they expect other users might employ contrasts with the professional indexers' exclusive use of LIS vocabularies.

The current research findings have shown that taggers are motivated to help other users,[145] and suggest tagging was based on experience searching, or perceived search usefulness of a chosen tag. The self-reported tagging behaviour corroborates Ransom and Rafferty's (2011) findings based on tagging personal photographs on Flickr. The positive responses about project participation[146] suggest taggers would be motivated to work with institutions on similar projects.

The findings about taggers' understanding of theoretical matters or perceptions of their own tagging extends recent studies which have comprised tagging experiments with participants (Golbeck et al., 2011; Rorissa, 2010; van Vliet & Hekman, 2012), or investigations of existing Flickr tags (Ransom & Rafferty, 2011; Stvilia & Jorgensen, 2010; Yoon & Chung, 2011) and Flickr group characteristics (Cox et al., 2011).

Table 7.35 – Studies C and D Summary of Findings

Finding 7.1. The findings show taggers' propensity for generics and similar propensities for specifics and abstracts.
Finding 7.2. The tagging of untitled and titled photographs showed a strong correlation.

[143] Summarised in section 5.4, p. 132.

[144] Reported and discussed in section 7.6, p. 164.

[145] See section 7.6.1.3, p. 173.

[146] See section 7.6.4, p. 185.

Finding 7.3. Overall tagging activity provided little evidence of interaction effects.

Finding 7.4. The analysis showed that commenting added little overall value to the description of the subject levels contained in the photographs.

Finding 7.5. The analysis showed taggers had a strong interest in objective content but developed meaning based on various sources of information, including other tags. Taggers were motivated by an interest in helping others.

Finding 7.6. The analysis showed that taggers lack a clear understanding of subject levels.

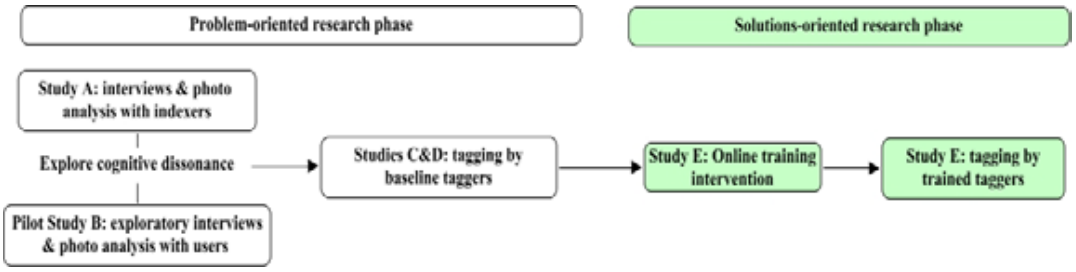
Finding 7.7. Tagging subject levels on the website reflected taggers' perceptions of the usefulness of subject levels in searching.

Finding 7.8. The positive response to project participation supports findings that helping others is an important motivation for taggers.

Finding 7.9. The contrasting styles of professional indexers and taggers in their approaches to images showed cognitive dissonance between how they read and attribute subjects to historic photographs.

Cognitive dissonance should not be viewed negatively, but as a potential source of richness. The finding that indexers and taggers read and attribute subjects to historic photographs differently offers the possibility that user indexing (i.e. tagging) can significantly enhance the subject description currently provided by professional indexing and extend the representation of subject content of historic photographs. As resources for professional indexing decline and there are fewer indexers, transformation of the nature and role of professional indexing seems inevitable. The solutions-oriented study, Study E, described in the next chapter, explored one way to transform professional indexing by synergistic cooperation with taggers.

8 DATA ANALYSIS & INTERPRETATION: THE TRAINING INTERVENTION STUDY E



8.1 Introduction

Study E, the final study, formed the "solutions-oriented" stage which investigated one way in which the role professional indexing might be transformed by a synergistic cooperation with taggers. Study E was designed to investigate the principal research question:

PQ2 - How can indexers and users work together to enhance subject content representation of historic photographs?

This principal question has two related research questions:

RQ3 - How does training affect user annotation for representing the subject content in historic photographs and the resulting folksonomies? *RQ4 - How should tagging be supported to achieve better representation of subject content found in historic photographs?*

Study E investigated how training by a professional indexer (the researcher) might encourage taggers to develop further interpretations of the subject content of historic photographs. The researcher adopted as a working hypothesis that training in the Shatford/Panofsky matrix would lead to the annotation of additional concepts and support better representation of subject content found in historic photographs. Such training might provide the basis of a co-operative working relationship between taggers and indexers which is both transformative in terms of the nature and role of

professional indexers and how taggers respond to the challenge of tagging visual images.

The research design[147] for Study E comprised three phases. First was an investigation of prior knowledge and an online training "course". Secondly, participants tagged and commented on the dataset of 33 titled and untitled photographs on the Flickr research website. Finally, a post-tagging survey was carried out. The pre- and post-training surveys provided information about participants' understanding and perceptions of tagging.

This chapter presents the data relating to the training in Study E. The participant demographics and experience are presented in section 8.2. The data collected through the pre-training survey and online training, the website activity and the survey are then analysed under four broad headings:

- participants' pre- and post-training knowledge (section 8.3);
- participants' tagging (section 8.4) and commenting (section 8.6) on the dataset of historic photographs during their participation on the online website;
- tagging activity and potential activity effects (section 8.5); and
- participants' self-reported perceptions of tagging in survey responses (section 8.7).

After the presentation of the data from Study E, the data from Study E are compared with the data from baseline tagging Studies C and D to investigate the evidence for any training effects (section 8.8). The data for Study E are referenced in Appendix 7 - Electronic Data Files. The data collected in Study E as a consequence of investigation of both RQ3 and RQ4 enabled findings to be made in regard to these questions and PQ2.

[147] See section 3.3.2, p. 69.

8.2 Participant demographics and experience

A protocol was adopted for coding survey responses.[148] A total of 28 individuals participated in Study E. The study involved a series of components and all participants completed the pre-survey, the training and post-training survey, and the final survey (Table 8.1). Five of the participants did not tag, and two of this group only viewed items on the website and neither tagged nor commented.

Table 8.1 – Study E – Overview

Participants	Pre-survey (PS) completed	Post- training survey (TS) completed	Final survey (FS) completed
28	28	28	28

The following demographic information from the survey responses describes the Study respondents. More than ninety per cent of participants were female (Table 8.2).

Table 8.2 – Study E: Participant genders (PS/Q 4)

Answer	Response	%
Male	2	7.1%
Female	26	92.9%
Total	**28**	**100.0%**

By frequency distribution, the largest cohort was aged 31-40 (35.7%), with 82.2% of all participants in the age range 21-50 (Table 8.3).

Table 8.3 – Study E: Participant age ranges (PS/Q5)

Answer	Response	%
20 or younger	2	7.1%
21 to 30	5	17.9%
31 to 40	10	35.7%
41 to 50	8	28.6%
51 to 60	2	7.1%
61 or older	1	3.6%
Total	**28**	**100.0%**

[148] The survey responses are identified by the survey identifier followed by a slash and the question number. The survey identifiers are: Pre-training Survey=PS; Post-training Survey=TS; Final Survey FS.

The general level of education was high. Twenty four (24) had a tertiary qualification with 17 having a bachelor or higher degree. The range of occupations was narrow. Only 4 of the 26 participants who responded were not students or employed in some library or education-related area.

The tagger demographics in Study E therefore were similar to the baseline tagging studies and, like these, comparable to participants' used in some previous studies.[149]

8.3 Self-reported pre- and post-training learning: Tools and subject levels

The training stage investigated the research question:

RQ3 - How does training affect user annotation for representing the subject content in historic photographs and the resulting folksonomies?

The training aim was different to previous studies. Participants in previous studies have been asked to provide tags to enable retrieval (Bar-Ilan et al., 2010), to sort and label images in groups (Rorissa, 2008), or been provided with information about social tagging and test procedures (Golbeck et al., 2011) or with a template or structured form with attributes/fields to complete (Bar-Ilan et al., 2008; Jorgensen, 1996). In this research the aim was to train participants in analysing subject content using a tool, the Shatford Panofsky classification matrix, specifically designed for image classification and indexing.

The training (see Appendix 4 - Study E: Qualtrics Online Training) was intended to stimulate participants to think about different subject levels and what the photographs are "of" and "about" when tagging. After training effects on tagging were also measured.

[149] See section 7.2, p. 148ff., p. 151.

8.3.1 Participants' prior learning: Internet, Flickr and tagging

Participants' rated their knowledge on a scale of 1 (strongly disagree) to 5 (strongly agree) in response to a series of statements about their Internet knowledge (Table 8.4). All participants rated themselves relatively knowledgeable users of the Internet, and more than 70.0% felt they knew how to find photographs online. They were considerably less confident about using Flickr, although half seemed comfortable about using it to find photographs. Participants considered themselves less knowledgeable about social bookmarking sites, with slightly less than half reporting they knew how to use social bookmarking. The modes for the three statements relating to using the Internet or finding photos on the Internet or Flickr were all 4. Participants were considerably less confident about using Flickr or social bookmarking sites. The modes for the data in response to these statements were both 2.

Table 8.4 – Study E: Participants' Internet knowledge (FS/Q9)

Statistic	I know how to use the Internet to find the things I am interested in	I know how to find photographs I am interested in online	I know how to do everything I want on Flickr	I know how to find the photographs I am interested in on Flickr	I know how to use social bookmarking sites, such as Delicious, Digg, or CiteULike
Mode	4	4	2	4	2

Only six of the respondents used Picture Australia (now Trove) when searching for photographs. As most participants indicated they could find the photographs they wanted online, this suggests that they used an Internet search engine and not a specialised search site for images.

Flickr involvement (FS/Q7) was low. Nineteen (70%) of the 27 respondents had never tagged on Flickr, four (15%) only rarely and four (15%) more frequently. Only three respondents appeared to be fairly regular Flickr taggers. As in the previous baseline tagging studies the question about how long participants had used Flickr was not triggered during the online survey. Given the very low Flickr tagging, a supplementary questionnaire for this follow-up question was not administered.

Twenty participants indicated in the preliminary survey that they did not tag their own photographs and eight said that they did. In the final survey 13 participants responded that they tagged their own photographs. Other survey information suggests five respondents had started tagging their photographs as a result of participating in the research project. The responses from the preliminary survey are more relevant as an indication of participants' pre-existing knowledge. One quarter of the participants (7 of 28) had commented on photographs by others. It is unclear from responses whether some of the positive responses might have included their recent experience of tagging on the research website.

The participants in Study E therefore were similar to those in the baseline studies in being knowledgeable Internet users, but not experienced taggers.

Additionally, prior and post learning of the Panofsky/Shatford classification matrix (Table 8.5) was measured.

Table 8.5 – Shatford/Panofsky matrix display for findings

	S=Specifics	**G=Generics**	**A=Abstracts**
Who?	S1	G1	A1
What?	S2	G2	A2
Where?	S3	G3	A3
When?	S4	G4	A4

8.3.2 Participants' prior and post training knowledge of Shatford/Panofsky

None of the 28 participants had heard of the Shatford/Panofsky matrix before the training (PS/Q11). Nor did any, as measured by a five-point Likert scale, express strong agreement about understanding any of the subject levels (Table 8.6). Around half were not confident in their understanding specific and generic subject levels (53.5% and 50.0% respectively). Almost two-thirds (64.2%) were unsure about abstract subjects. The mode for generic subject level understanding was the highest at 4. The modes for specific and abstract subject levels were 2 and 1 respectively.

Table 8.6 – Study E: Pre-training understanding of subject levels (PS/Q2)

Pre-training (Q2)	**Strongly Disagree 1**	**Disagree-2**	**Neutral 3**	**Agree 4**	**Strongly Agree 5**	**Responses**
I know what specific subject tags are	6	9	4	9	0	28
I know what generic subject tags are	7	7	5	9	0	28
I know what abstract subject tags are	9	9	6	4	0	28

Following training 26 (92.9%) of the 28 participants felt they understood and could use the Shatford/Panofsky matrix (TS/Q5). Furthermore, participants' responses about their understanding of subject levels (TS/Q1) showed a dramatic shift in confidence (Table 8.7). Respondents now agreed or strongly agreed they understood specifics and generics. Participants were more positive about abstracts, but two participants remained unsure and three neutral. The mode for responses on all subject levels was 4.

Table 8.7 – Study E: Post-training understanding of subject levels (TS/Q1)

Post-training (Q1)	**Strongly Disagree 1**	**Disagree-2**	**Neutral 3**	**Agree 4**	**Strongly Agree 5**	**Responses**
I know what specific subject tags are	0	0	0	16	12	28
I know what generic subject tags are	0	0	0	20	8	28
I know what abstract subject tags are	1	1	3	20	3	28

The reported change in understanding subject levels before and after training revealed a significant shift when responses were analysed with a Wilcoxon signed-rank test (Table 8.8).

Table 8.8 – Study E: Pre- and post-training understanding of subject levels – hypothesis test summary

Hypothesis	**No. of signed ranks**	**z**	***p***
Participants' report a more positive understanding of specific subject levels after training	24	-4.28	<0.001
Participants' report a more positive understanding of generic subject levels after training	22	-4.10	<0.001
Participants' report a more positive understanding of abstract subject levels after training	23	-4.19	<0.001

The **z**-ratio results for the responses about all subject levels revealed significant shifts. After the training *all* participants indicated significantly more positive attitudes to understanding subject levels.

While participants *self-reported* that they understood subject levels better after training, this did not translate into significant differences in how they classified the 29 terms used in the before and after training surveys (Table 8.9). The modes changed for only four terms ("1950s home life", "1890s", "1950", and "sheep shearing"), of which three were date related. The results were tested with a chi-square test of independence based on the pre- and post-training modes. The hypothesis that training resulted in significantly different subject level choices was rejected (χ^2=1.333, df=28, p =1.000).

The training also did not produce greater inter-participant consistency in classifying terms. The differences in classifying individual terms remained similar in both the pre- and post-training results, instead of decreasing as might be expected.

Table 8.9 – Study E: Pre-and post-training subject level modes (PS/Q12 and TS/Q10)

(specifics=1; generics=2; abstracts=3; don't know=4)

Terms	Pre-training mode					Post-training mode				
	1	**2**	**3**	**4**	**Mode**	**1**	**2**	**3**	**4**	**Mode**
Hope	1	1	25	1	**3**	0	0	28	0	**3**
Sydney	24	4	0	0	**1**	25	3	0	0	**1**
Crime	1	25	2	0	**2**	1	24	3	0	**2**
Gender roles	2	14	12	0	**2**	4	16	7	1	**2**
Gough Whitlam	28	0	0	0	**1**	28	0	0	0	**1**
1950s home life	14	10	4	0	**1**	8	17	3	0	**2**
1890s	9	17	2	0	**2**	15	13	0	0	**1**
Christmas	9	16	3	0	**2**	7	20	0	1	**2**
Coolgardie	22	3	1	2	**1**	26	2	0	0	**1**
Frank Hurley	25	1	1	1	**1**	27	0	0	1	**1**
Starbucks	22	2	3	1	**1**	22	5	1	0	**1**
Sydney 2000 Olympics	25	2	1	0	**1**	26	1	0	1	**1**
New South Wales	15	11	1	1	**1**	18	9	0	1	**1**
Sports	1	26	1	0	**2**	2	25	0	1	**2**
1950	10	16	2	0	**2**	21	6	0	1	**1**
War	2	24	2	0	**2**	1	26	0	1	**2**
Weddings	2	23	3	0	**2**	2	25	0	1	**2**
World War 1	20	8	0	0	**1**	23	4	0	1	**1**
Ned Kelly	27	0	1	0	**1**	26	1	0	1	**1**
The Bush	3	18	7	0	**2**	0	19	8	1	**2**
Sheep shearing	15	11	2	0	**1**	9	18	0	1	**2**
Sun tanning	10	13	4	1	**2**	8	18	1	1	**2**
Camels	20	7	1	0	**1**	15	12	0	1	**1**
Windy	0	7	21	0	**3**	0	12	14	2	**3**
Political rally	11	14	2	1	**2**	2	25	0	1	**2**
Sydney Mardi Gras	25	1	2	0	**1**	23	4	0	1	**1**
Racism	2	15	11	0	**2**	0	18	9	1	**2**
Cyclone Tracy	25	2	1	0	**1**	26	1	0	1	**1**
Portraits	2	19	6	1	**2**	0	22	4	2	**2**

The modes for the "who?", "what?", "where?", and "when?" subject facets differed for only two terms, "Christmas" and "The Bush", after training (Table 8.10). A chi-square test of independence based on the pre- and post-training modes was used to test the hypothesis that significant differences in facet choices existed. However, the null hypothesis could not be rejected, demonstrating no significant difference in pre- and post- training behaviour (χ^2=0.665, df=28, p =1.000).

The inter-participant consistency for subject facets after training is shown in Table 8.10.

Table 8.10 – Study E: Pre-and post-training facet modes (PS/Q13 and TS/Q8)

(who=1; what=2; where=3; when=4; don't know=5)

Terms	Pre-training mode						Post-training mode					
	1	**2**	**3**	**4**	**5**	**Mode**	**1**	**2**	**3**	**4**	**5**	**Mode**
Hope	0	20	2	0	6	**2**	1	24	0	3	0	**2**
Sydney	0	3	25	0	0	**3**	1	1	26	0	0	**3**
Crime	2	22	1	0	3	**2**	1	27	0	0	0	**2**
Gender roles	7	16	0	4	1	**2**	1	25	0	0	2	**2**
Gough Whitlam	27	0	0	1	0	**1**	28	0	0	0	0	**1**
1950s home life	0	7	2	18	1	**4**	1	12	1	14	0	**4**
1890s	0	0	1	27	0	**4**	2	1	0	25	0	**4**
Christmas	0	20	2	6	0	**2**	0	11	0	17	0	**4**
Coolgardie	1	3	21	1	2	**3**	3	1	23	0	1	**3**
Frank Hurley	27	0	0	0	1	**1**	28	0	0	0	0	**1**
Starbucks	4	17	5	0	2	**2**	6	15	7	0	0	**2**
Sydney 2000 Olympics	1	14	4	8	1	**2**	2	16	5	5	0	**2**
New South Wales	0	3	25	0	0	**3**	2	1	25	0	0	**3**
Sports	0	28	0	0	0	**2**	1	27	0	0	0	**2**
1950	0	0	3	25	0	**4**	0	1	2	25	0	**4**
War	0	24	0	2	2	**2**	0	27	0	1	0	**2**
Weddings	5	18	1	1	3	**2**	0	26	1	1	0	**2**
World War 1	0	14	2	10	2	**2**	2	15	2	9	0	**2**
Ned Kelly	28	0	0	0	0	**1**	28	0	0	0	0	**1**
The Bush	0	13	13	0	2	**2 (3)***	1	12	14	1	0	**3**
Sheep shearing	0	24	0	3	1	**2**	0	28	0	0	0	**2**
Sun tanning	0	24	1	1	2	**2**	0	28	0	0	0	**2**
Camels	5	21	2	0	0	**2**	11	17	0	0	0	**2**
Windy	0	18	2	0	8	**2**	0	22	1	2	3	**2**
Political rally	0	21	5	0	2	**2**	0	27	1	0	0	**2**
Sydney Mardi Gras	2	12	9	3	2	**2**	2	22	2	1	1	**2**
Racism	2	22	2	0	2	**2**	0	25	1	1	1	**2**
Cyclone Tracy	0	19	3	6	0	**2**	2	22	2	2	0	**2**
Portraits	10	14	0	0	4	**2**	10	15	0	2	1	**2**

* Multiple modes

Did training stimulate greater inter-participant consistency in classification? The inconsistency in participants' assignment of terms to categories after training was similar to Jorgensen's (1996) experience after training students on an indexing template. The difficulties participants experienced assigning terms to the facets of "who?", "what?", "where?", and "when?" suggest that, as in the previous research, more training may be required than was provided.

8.3.3 Participant tagging before and after training: Results from authentic tagging exercise (Sydney Harbour Bridge)

In contrast to the exercises in classifying terms, practical tagging exercises provide a more authentic setting in which to test for effects. This section reports results from

testing with a specimen historic photograph, *First cars and trains across Sydney Harbour Bridge, March 1932* by photographer Sam Hood (Figure 8.1), which provided important evidence of differences in the volume of subject levels and facets used before and after training.

Figure 8.1 – Study E: Effect testing in an authentic context

The total number of tags used with this image by the 28 participants before training was 163, after training the number increased to 421, a 258% increase relative to before training (Table 8.11). The mean for specifics increased from 20.3 to 42, or 2.1 times. Generics increased from a mean of 17.0 to 45.0, or 2.6 times. The largest change was in the mean abstracts which increased from 3.5 to 18.3, or 5.2 times. The specifics skewness remained the same (-1.7) before and after training. The positive skewness for generics increased from 1.2 to 1.8, indicating the greater preponderance of G1 tags relative to other generic facet values after training. The greatest change was in the abstracts skewness which changed from 1.6 to a near normal distribution 0.1, with A2, A3 and A4 facets all increasing after the training.

Table 8.11 – Study E: Pre- and post-training tag distribution by subject facets (PS/Q10 and TS/Q4)

	S1	S2	S3	S4	G1	G2	G3	G4	A1	A2	A3	A4	Total
Before	26	6	22	27	42	15	0	11	2	8	1	3	163
After	53	21	49	45	109	23	33	15	3	34	10	26	421

Before			
	Specifics	Generics	Abstracts
Mean	20.3	17.0	3.5
Median	24.0	13.0	2.5
SD	9.7	17.8	3.1

After			
	Specifics	Generics	Abstracts
Mean	42.0	45.0	18.3
Median	47.0	28.0	18.0
SD	14.4	43.3	14.2

The data were further explored using a Mann-Whitney U Independent Samples test (significance level α=0.05) to see if the frequency of terms across facets was the same for individual taggers before and after training.

The test showed statistically significant associations between the number of specific tags before and after training (Table 8.12). The data showed that taggers are likely to use more specific facets after training.

Table 8.12 - Study E: Mann-Whitney U test of specific facets before and after training

Facet	p[150]	Decision
S1	0.000	Reject the null hypothesis - Taggers use more facets after training
S2	0.008	Reject the null hypothesis - Taggers use more facets after training
S3	0.002	Reject the null hypothesis - Taggers use more facets after training
S4	0.004	Reject the null hypothesis - Taggers use more facets after training

The test results for generics showed statistically significant associations between the G1 and G3 facets before and after training (Table 8.13). Examination of the data showed that a tagger is more likely to use G1 and G3 facets after training, but there were no significant differences in the G2 and G4 facets.

[150] In SPSS, p values < 0.0005 are rounded in output to p = 0.000. The reader should note that this, and subsequent, instances of p = 0.000 are rounded, rather than actual values.

Table 8.13 - Study E: Mann-Whitney U test of generic facets before and after training

Facet	*p*	Decision
G1	0.000	Reject the null hypothesis - Taggers use more facets after training
G2	0.403	Retain the null hypothesis - No significant difference between taggers before and after training
G3	0.000	Reject the null hypothesis - Taggers use more facets after training
G4	0.396	Retain the null hypothesis - No significant difference between taggers before and after training

The Mann-Whitney U test showed statistically significant associations between the number of all abstract facets, except the A1, before and after training (Table 8.14). The data showed taggers' clear propensities to use the A2, A3 and A4 facets after training. There were no significant differences for the A1 facet.

Table 8.14 - Study E: Mann-Whitney U test of abstract facets before and after training

Facet	*p*	Decision
A1	0.642	Retain the null hypothesis - No significant difference between taggers before and after training
A2	0.000	Reject the null hypothesis - Taggers use more facets after training
A3	0.006	Reject the null hypothesis - Taggers use more facets after training
A4	0.000	Reject the null hypothesis - Taggers use more facets after training

Differences in individual tagging rates before and after training were revealed (Table 8.15). Before training each participant used a mean of 5.8 tags; after training the mean increased to 15. The mean rates after training increased 2.1 times for specifics, 2.4 times for generics and 5.1 times for abstracts.

Table 8.15 – Study E: Pre- and post-training subject level tagging rates (PS/Q10 and TS/Q4)

Before training (n=163)			
	Specifics	Generics	Abstracts
Mean	2.9	2.4	0.5
Median	3	3	0
SD	1.6	1.9	1.7

After training (n=421)			
	Specifics	Generics	Abstracts
Mean	6.0	6.4	2.6
Median	5	5	2
SD	2.2	4.0	2.8

After training, the tagging of the subject facets, as classified by the Shatford/Panofsky classification matrix, also changed (Table 8.16). Subject facet tagging doubled from a before training mean of 5, to a post-training mean of 10 of the 12 subject facets. Only the abstract "who?" and "where?" facets were not represented in the post-training tagging. The absence of any tags for these facets may have resulted from the choice of sample photograph for the exercise.

Table 8.16 – Study E: Pre- and post-training individual tagging means by subject facet

Before training (n=163)			
	Specifics	Generics	Abstracts
Who?	1	2	0
What?	0	1	0
Where?	1	0	0
When?	1	0	0

After training (n=421)			
	Specifics	Generics	Abstracts
Who?	2	4	0
What?	1	1	1
Where?	2	1	0
When?	2	1	1

In summary, the results indicated the training changed individual participant's tagging. While the more "theoretical" classification activity produced little change, actual tagging behaviour showed significant changes with increases in tagging behaviour across almost all subject facets.

Finding 8.1. The results showed that training on the Shatford/Panofsky classification increased the volume of tags used by taggers, an effect observed over most facets.

In previous tagging studies (Bar-Ilan et al., 2008; Golbeck et al., 2011) training largely related to the test procedures and not image content analysis. The training on Jorgensen's (1996) image description template,[151] while covering a wider range of image attributes and different content categories, allows for limited comparison. In terms of practical image analysis, the Shatford/Panofsky classification matrix appears to have been used by taggers and assisted them in tagging the photographs more effectively than the template used by participants in Jorgensen's describing experiment.

[151] Discussed in section 2.2.5, p. 25.

Before training, the individual tagging means by subject facets showed an uneven distribution comparable to the tagging results reported in the baseline tagging studies C and D where half of all facets were not tagged.[152] After training, in contrast, individual tagging by subject facets showed a more even distribution with nearly all facets represented.

Would these findings be sustained over a data set of images? The next phase of Study E extended the investigation begun in section 8.3.2 to an authentic data set of historic photographs comprising 33 titled and untitled images.

8.4 Participant tagging after training: Results from authentic tagging exercise - Study E Flickr data set

The first part of reporting deals with tagging subject levels and subject facets (section 8.4.1). The second part of the discussion reports on the tagging by photograph (section 8.4.2). The evidence relating to tagging activity and potential activity effects follows in the next section (section 8.5).

8.4.1 Tagging subject levels - Study E Flickr data set

The total number of tags used by the 28 taggers was 1711. A key difference was that the active trained taggers contributed an average of 74 tags, double the 37 tags of the baseline group. As shown in Figure 8.2, the overwhelming preference was for generic tags (1000 or 58.4%) and then abstract tags (440 or 25.7%). Specific tags were used the least (271 or 15.8%).

[152] See pp. 153-154.

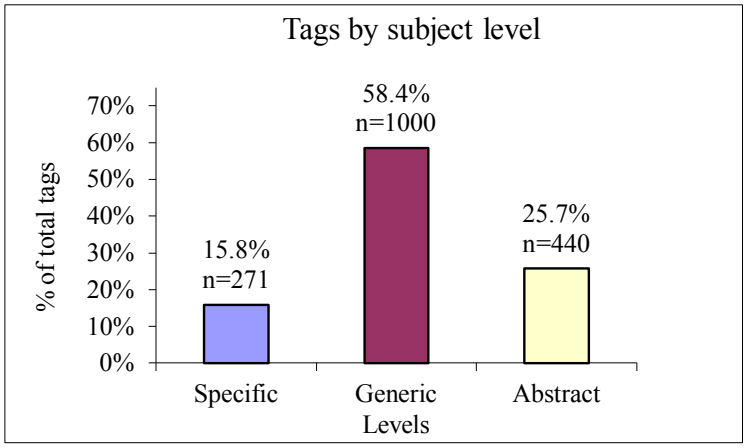


Figure 8.2 – Study E: Tags (n=1711) by subject level

The distribution of tags by subject facets is shown in (Table 8.17). The kind of person or thing (G1) was the most frequently used facet (475), followed by the facets of emotion or abstraction (A2) (350) and of the kind of event or action (G2) (299). Together these three facets made up 1124 (65.7%) of all tags. Taggers appeared most interested in the facets relating to the "what?" (672 tags or 39.3%) and the "who?" (578 tags or 33.8%). The tags relating to the "where?" totalled 283 (16.5%) and the "when?" made up the remainder (178 or 10.4%).

Table 8.17 – Study E: Tags by subject facet (n=1711)

	Specifics	**Generics**	**Abstracts**	**Totals (%)**
Who?	83	475	20	578 (33.8%)
What?	23	299	350	672 (39.3%)
Where?	104	153	26	283 (16.5%)
When?	61	73	44	178 (10.4%)

Analysis of the skewness with the data shows asymmetric distribution by subject facet across the aggregates of all three levels. The specifics skewness was negative (-0.62) (*M*=67.75) and displayed a bimodal distribution with S2 and S4 less used. Generic subjects were three and a half times more frequent (*M*=250.00) and displayed positive skewness (0.61), with G2, G3 and G4 facets less used. Abstract subjects displayed a positive skewness (1.99) (*M*=110.00), with A2 having the highest value.

From these descriptive statistics it can be inferred that taggers in such an authentic setting, in aggregate terms, display:

1. A strong propensity for generics.
2. Greater propensity to assign tags to abstract facets compared with specifics.
3. Strong propensity for the "who?" generic facet (G1).
4. Strong propensity for generic and abstract tags relating to the "what?" facets (G2, A2) and, to a much lesser extent, the specific and generic "where?" facets (S3, G3).

Compared with Studies C and D, the overall distribution of tags by **subject level** in Study E showed small differences in terms of the aggregate number of tags used (Figure 8.3). The greatest difference was a 5.7% increase in total abstracts.

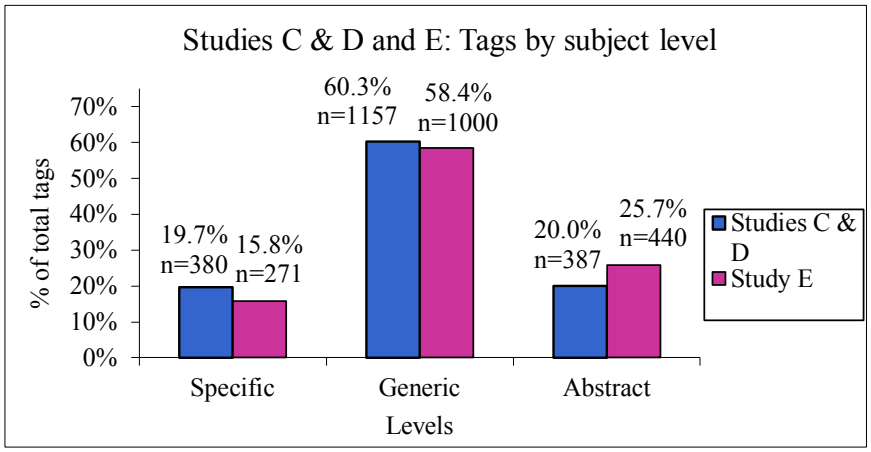


Figure 8.3 – Studies C & D and E: Comparison of tag subject levels

The apparent similarity in tagging behaviour between the two sets of studies also was reflected in subject facets used, as shown in Figure 8.4, and in the analysis of skewness for both Study E and Studies C and D.[153]

[153] The analysis of the skewness for Studies C and D is reported on p. 154.

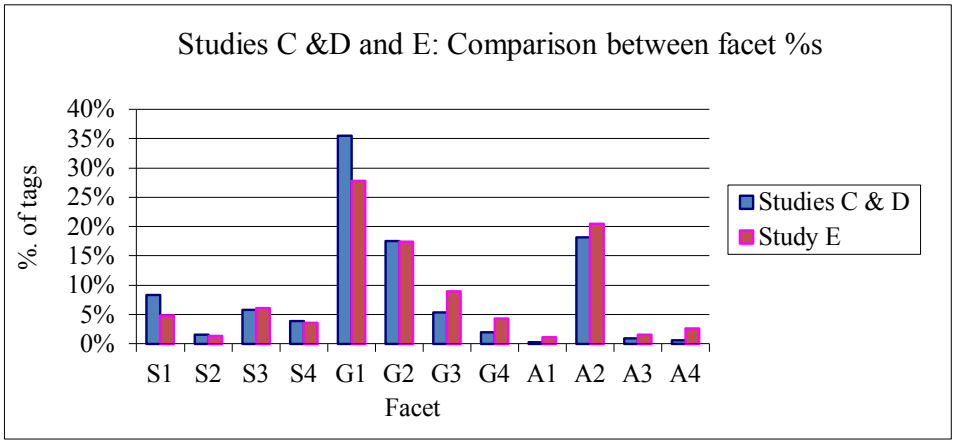


Figure 8.4 – Studies C & D and E: Comparison between facet percentages

A sequence of chi-square tests of independence were used with the subject level facet totals for Study E and combined Studies C and D. The aim of the tests was to determine if the volume difference (count per facet type) seen between the various studies were significant. Chi-square tests were also carried out separately on Study E and each of the two baseline studies. The results of all tests were significant. The hypothesis that training would result in **no** significant differences in the volume of facet tagging between the studies was rejected. Results are shown in (Table 8.18).

Table 8.18 – Studies C &D and E: training hypothesis test summary

Null Hypothesis	**$\chi 2$**	**df**	***p***	**Result**
Training does not change the rate of facet tagging between baseline Studies C and D and Study E	104.288	11	0.000	Reject the null hypothesis
Training does not change the rate of facet tagging between Study C and Study E	179.022	11	0.000	Reject the null hypothesis
Training does not change the rate of facet tagging between Study D and Study E	87.609	11	0.000	Reject the null hypothesis

Clearer differences were apparent when the "who?", "what?", "where?", and "when?" facets across subject levels were compared (Table 8.19). Study E showed a decrease in tagging the "who?" facets and increases in tagging the "where?" and "when?" facets in comparison to the baseline studies. Tagging of the "what?" facet showed a slight increase.

Table 8.19 – Studies C &D and E: Comparison between facet percentages

	Studies C and D	**Study E**
Who?	44.1%	33.8%
What?	37.3%	39.3%
Where?	12.1%	16.5%
When?	6.5%	10.4%

In Study E the 23 active taggers contributed on average 74.4 tags across all facets, compared with an average of 37.2 tags contributed by the 52 active taggers in Studies C and D. If the volume of subject facet tagging increased, was this effect observable in the behaviour of individual taggers and if so, which subject facets displayed significant difference when compared with studies C&D? The data were further explored using a Mann-Whitney U Independent Samples test (significance level α=0.05) to see if the frequency of terms across facets was the same in baseline Studies C and D and Study E.

The test (Table 8.20) showed that there were no statistically significant differences for specifics.

Table 8.20 - Mann-Whitney U test of baseline tagger (n_1) and trained tagger (n_2) specific facets (Studies C & D and E) (n_1=52, n_2=23)

Facet	*p*	Decision
S1	0.611	Retain the null hypothesis - No significant difference between baseline and trained taggers
S2	0.403	Retain the null hypothesis - No significant difference between baseline and trained taggers
S3	0.338	Retain the null hypothesis - No significant difference between baseline and trained taggers
S4	0.867	Retain the null hypothesis - No significant difference between baseline and trained taggers

The test results for generics (Table 8.21) showed that there are statistically significant associations between three of the generic facets and whether a person is untrained or trained. Examination of the data showed that a trained tagger is more likely than an untrained tagger to use generic facets G2, G3, and G4.

Table 8.21 - Mann-Whitney U test of baseline tagger (n_1) and trained tagger (n_2) generic facets (Studies C & D and E) (n_1=52, n_2=23)

Facet	*p*	Decision
G1	0.382	Retain the null hypothesis - No significant difference between baseline and trained taggers
G2	0.031	Reject the null hypothesis - Trained taggers use more G2 facets than untrained taggers
G3	0.006	Reject the null hypothesis - Trained taggers use more G3 facets than untrained taggers
G4	0.014	Reject the null hypothesis - Trained taggers use more G4 facets than untrained taggers

The Mann-Whitney U test showed statistically significant associations between the number of abstract facets, except for the A3 facet, and whether a tagger is untrained or trained (Table 8.22). The data showed trained taggers' clear propensities to use the A1, A2 and A4 facets, relative to untrained taggers. There were no differences for the A3 facet, but the test result was not statistically significant.

Table 8.22 - Mann-Whitney U test of baseline tagger (n_1) and trained tagger (n_2) abstract facets (Studies C & D and E) (n_1=52, n_2=23)

Facet	*p*	Decision
A1	0.000	Reject the null hypothesis - Trained taggers use more A1 facets than untrained taggers
A2	0.001	Reject the null hypothesis - Trained taggers use more A2 facets than untrained taggers
A3	0.460	Retain the null hypothesis - No significant difference between baseline and trained taggers
A4	0.000	Reject the null hypothesis - Trained taggers use more A4 facets than untrained taggers

In summary, testing demonstrated that the observed increase in tagging activity in the Study E cohort was significant with subject facets G2, G3, G4, A1, A2 and A4. *These results suggest that the training sensitised participants in Study E to analysing images by the aspects of "who?", "what?", "where?" and "when?" leading to an increase in tagging activity with these facets relative to studies C&D.*

How does this result compare with similar peer-reviewed published research? The tagging by the trained taggers differs more than the baseline taggers from those of earlier studies of user-assigned tags in Flickr by Yoon (2009) and Ransom and

Rafferty (2011). While the level of generics remains fairly similar (58.4% to 52% and 59% respectively), differences between the attribution of specifics and abstracts were more pronounced. In previous studies specifics were 29% and 33% respectively; for the trained taggers' specifics were only about half or 15.8%. Similarly, abstracts previously were 6% and 8% but they more than double to 15.8% for trained taggers. The nature and significance of these findings are fully considered in the Discussion and conclusions, section 9.3.3.

Finding 8.2. Data analysis showed that training resulted in differences in the total tags used for subject facets and across the "who?", "what?", "where?" and "when?" dimensions of the generic and abstract subjects.

Finding 8.3. These results were shown to be significant in terms of the behaviour of individual taggers.

8.4.2 Tagging by photograph

The 33 images on the research website comprised the same dataset of 11 untitled and 22 titled photographs used in the preceding baseline tagging Studies C and D.

The overall distribution of subject facet tags between the untitled and titled photographs is remarkably similar as shown by the mean, median and standard deviation (Table 8.23). The results suggested that taggers approach both untitled and titled photographs the same way.

Table 8.23 – Study E: Untitled and titled photograph facets

Untitled	**S1**	**S2**	**S3**	**S4**	**G1**	**G2**	**G3**	**G4**	**A1**	**A2**	**A3**	**A4**	**Total**
Mean	2.1	0.8	3.0	1.0	15.1	9.5	4.5	2.6	0.5	10.5	0.7	1.2	51.7
Median	1	0	1	1	16	9	3	2	0	12	0	1	
SD	3.3	1.5	4.8	1.0	7.5	4.6	3.3	1.8	0.7	6.1	1.0	1.2	
Skew	2.4	2.7	2.3	0.7	0.3	0.4	1.9	0.5	0.9	-0.4	1.4	0.5	
Titled													
Mean	2.7	0.6	3.2	2.3	14.0	8.8	4.7	2.1	0.6	10.6	0.8	1.4	51.9
Median	2.0	0.0	4.0	2.0	13.0	7.5	3.5	2.0	0.0	10.0	0.0	1.0	
SD	2.5	1.1	1.6	1.4	6.4	4.7	3.8	2.3	1.4	6.1	1.3	1.1	
Skew	1.56	2.02	-0.56	1.70	0.32	0.69	0.64	2.94	3.21	0.64	1.79	0.73	

Moreover, the similarity of the distributions across facets was evident (Figure 8.5).

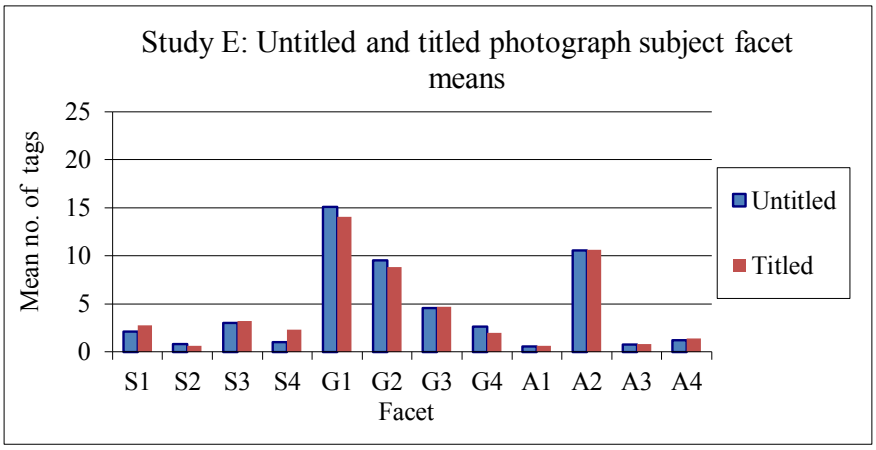


Figure 8.5 – Study E: Untitled and titled photograph subject facet means

These results were further investigated by a Mann-Whitney U Independent Samples test (significance level α=0.05) to see if the frequency of tags across facets was the same for untitled and titled photographs. Only the tests for specifics showed statistically significant associations with titled photos having more S4 facets tagged than untitled (Table 8.24). The results for the other facets showed no statistically significant differences.

Table 8.24 - Mann-Whitney U test of untitled (n_1) and titled (n_2) specific facets (Studies C & D) (n_1=11, n_2=22)

Facet	*p*	Decision
S1	0.112	Retain the null hypothesis - No significant difference between untitled and titled photos
S2	0.693	Retain the null hypothesis - No significant difference between untitled and titled photos
S3	0.095	Retain the null hypothesis - No significant difference between untitled and titled photos
S4	0.005	Reject the null hypothesis – Titled photos had more S4 facets tagged than untitled

A greater variation in tagging between individual untitled and titled photographs was apparent when comparing the data points representing the total tagging for each facet (Figure 8.6, Figure 8.7).

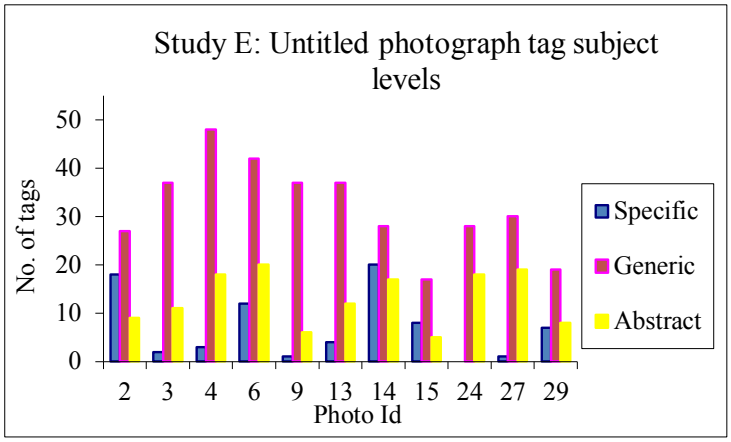


Figure 8.6 – Study E: Untitled photograph tag subject levels

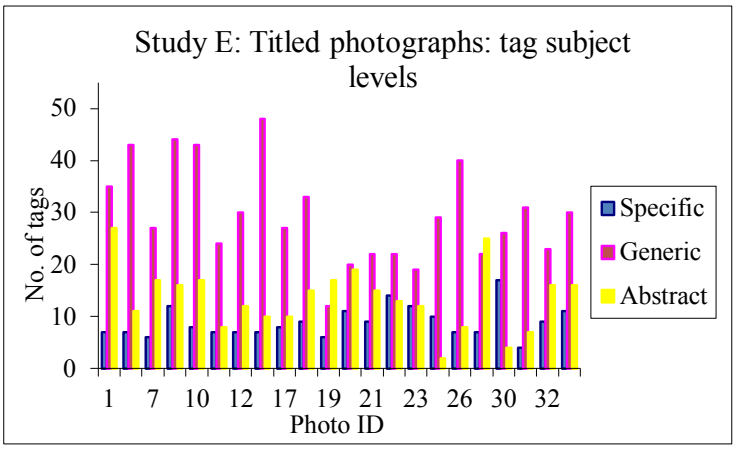


Figure 8.7 – Study E: Titled photograph tag subject levels

The number of specific tags was generally low. The exceptions, as in the baseline tagging studies, were for untitled photographs showing readily identifiable landmarks and events, or including internal information (e.g. Sydney Harbour, #2; a WWI scene, #6; signs, #14 and #29).

As observed previously in the data analysis, a greater number of abstract tags were used on untitled and titled photographs than in the baseline studies. The higher volume of tags for abstracts suggests that training sensitised participants to these subject facets, amplifying and not diminishing this important aspect of folksonomic indexing.

Clear differences can be seen when comparing the tagging percentages across the "who?", "what?", "where?" and "when?" facets (Table 8.25). These showed that after training there was a shift in the distribution of facets. The tagging of the "who?" aspect declined sharply and the "where?" and "when?" aspect tagging increased. This confirmed that the that Study E taggers, whose overall tagging was shown in the previous section to have been sensitised to analysing images by the "who?", "what?", "where?" and "when?" facets, were equally sensitive to these aspects at the level of the individual photograph.

Table 8.25 – Studies C & D and E: Comparison between facet percentages per photo

	Studies C and D		**Study E**	
	Untitled	Titled	Untitled	Titled
Who?	42.5%	46.1%	34.3%	33.5%
What?	39.1%	35.0%	40.4%	38.7%
Where?	10.9%	13.6%	16.0%	16.8%
When?	7.5%	5.3%	9.3%	10.9%

There were a limited number of "biographical" and perceptual tags.[154] The biographical tags (3) related to the source of the photograph. There were 21 perceptual tags contributed by 10 taggers, two of whom contributed almost half (5 and 6 respectively). These tags related mostly to the photo type – aerial, b/w, sepia – and four tags related to colours in the image (red, blue, black, and monochrome). Two of the colour tags were contributed by one tagger.

As in the baseline studies, the tagging of untitled and titled photographs was similar. This result supports the earlier finding by Trant (2006) that captions do not appear to influence the volume of tagging and contradict Bar-Ilan et al's (2010) finding that tags increased significantly when a title was supplied.

<u>Finding 8.4.</u> Data analysis showed that training produced a significantly higher volume of tagging per photograph and the tagging of all subject facets.

The data collected through the online website activity relating to tagging activity and potential activity effects follows in the next section.

[154] 'Biographical' information relates to details such as provenance or collecting institution. 'Perceptual' information relates to colour, position in a photograph (e.g. foreground, background), etc.

8.5 Overview of tagger participation and activity - Study E Flickr data set

The training study provided evidence, further to the baseline tagging studies,[155] of tagger activity and interaction to illuminate this aspect of tagging. Of the 28 trained participants only 23 were active taggers, responsible for 1711 tags in all (Figure 8.8).

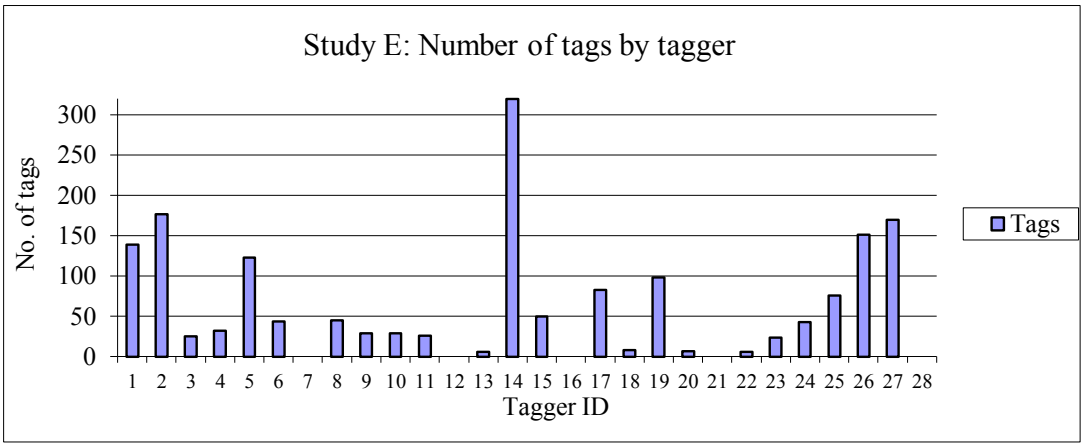


Figure 8.8 - Study E: Number of tags by tagger

Ten participants were "power" taggers contributing 50 or more tags each for a total of 1387 tags (81.0%). One particular tagger contributed 320 tags (18.7%). Nine tagged ten or less times.

The link between when a participant first went onto the research website and her/his rate of tagging was clearly demonstrated. All but one of the ten "power" taggers were actively tagging in the first three days. None of the taggers who went online in the first week contributed fewer than 20 tags. Of the "power" taggers only one was not initially active but went online on day 19 of the study.

The majority of tagging (1259 tags or 73.6%) occurred in the first ten days the research site was available (Figure 8.9). This result is very close to that observed in

[155] See section 7.4, p. 159.

Studies C and D,[156] however, the ongoing rate of tagging was relatively higher than in the baseline studies, with 6.5% of tags contributed in the final week.

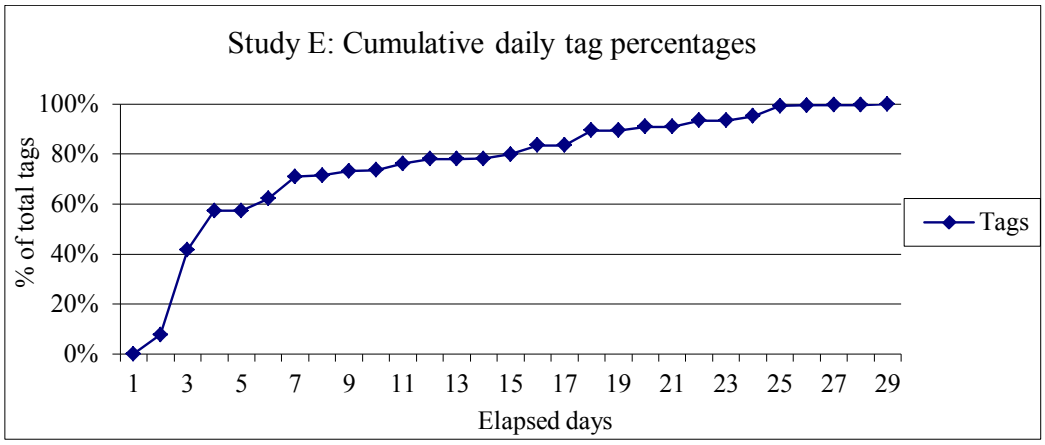


Figure 8.9 – Study E: Cumulative daily tag totals

The relative percentages of the total tags for each subject level varied most in the first six days of active tagging in Study E (Figure 8.10; note: no tagging was done on day 1). Subsequently there was a gradual decrease in the overall percentage of specifics 26.2% to 15.8% and a corresponding increase in abstracts which rose from 12.2% to 25.7% during the same period. Generic tags showed the smallest change (4.2%) between an initial high of 62.6% and a final total of 58.4%.

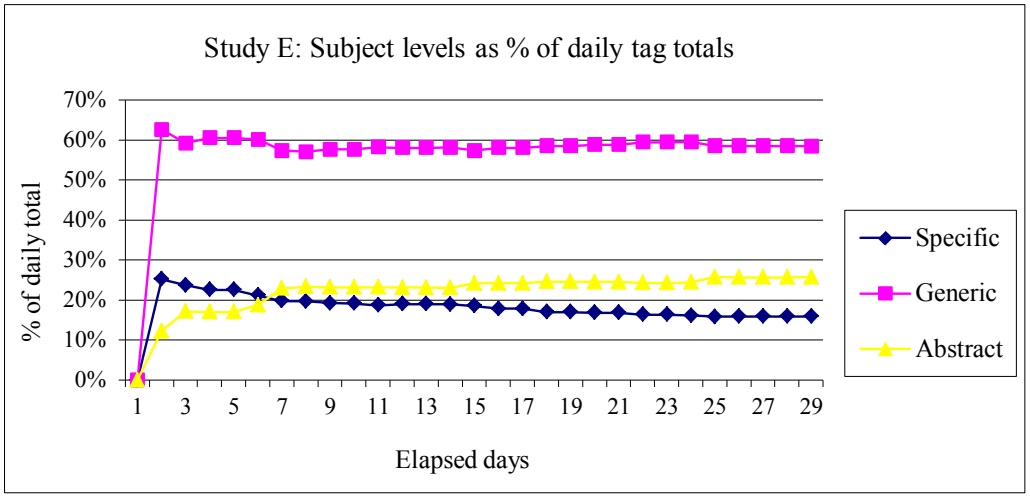


Figure 8.10 – Study E: Subject levels as percentages of daily totals

[156] See Figure 7.8, p. 161.

In both Study E and the baseline tagging Studies C and D[157] the initial variation between the overall percentages of subject tags relative to one another was greatest in the first few days. However, in Study E abstracts trended noticeably higher than specifics, whereas in the previous baseline studies the percentage of both subject levels was almost identical (20.5% and 20.2% respectively). As in the previous baseline studies, the survey responses[158] suggest that existing tagging may have affected subsequent tagging behaviour. Further testing and measurement are required to investigate interaction effects.

Tagging was done in 47 of 48 active sessions. The research website data did not provide information about sessions where participants only viewed. Participant activity varied from one to eight sessions. Eleven of the 28 participants did all their tagging in one session, six in two, and four in three. Two taggers were active in more than three sessions (five and eight respectively). The subject level means were: specifics 5.6, generics 20.8 and abstracts 9.2 (Table 8.26).

Table 8.26 – Study E: Tagger activity during sessions

	Specific	**Generic**	**Abstract**
Mean	5.6	20.8	9.2
Median	1	11.5	4.5
SD	14.4	28.4	13.8

The mean frequency of tags for each level varied considerably across the different session groups (Figure 8.11). Taggers active in one or two sessions used the most abstract tags and the fewest specifics. The taggers who were active in more sessions tended to contribute proportionally more specific than abstract tags.

[157] See Figure 7.9, p. 161.

[158] See section 8.7, p. 223.

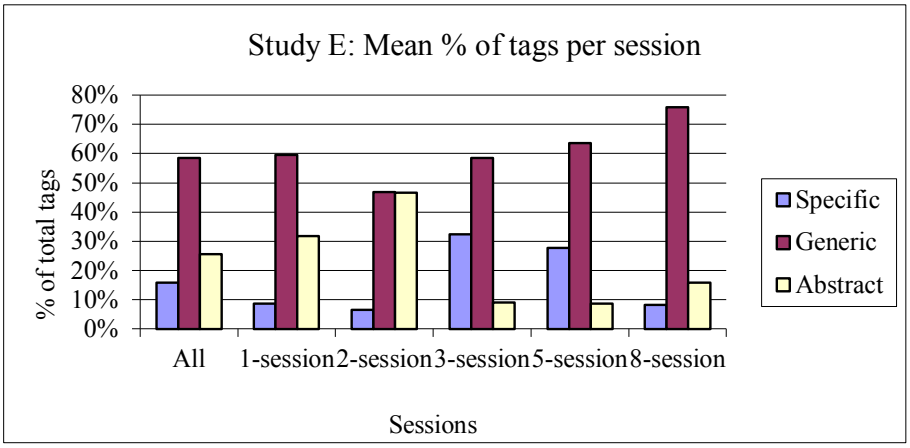


Figure 8.11 – Study E: mean percentage of subject tags per session

The subject level means observed in the one- and two-session tagging were significantly different from the distributions seen in the baseline studies C and D (Table 8.27).

Table 8.27 – Study E: 1- and 2-session means compared

1-session	**Specific**	**Generic**	**Abstract**	**Total Tags**
Study C	5.3	16.9	2.1	24.2
Study D	3.6	9.8	4.2	17.5
Study E	4.5	31.4	16.7	52.6
2-session				
Study C	4.1	10.3	1.7	16.1
Study D	2.8	13.4	7.4	23.5
Study E	2.1	14.8	14.8	31.7

The taggers in Study E tagged at a much higher rate in these sessions than in the previous baseline studies. They also used more abstract tags and proportionally fewer specifics than taggers in the previous studies.

The tagging by the trained taggers, like that in the baseline studies, showed that most tagging took place in the early phase of activity and pre-existing tags appeared to have little effect on subsequent tagging. Similarly, the study with the trained taggers provided more evidence of "power" tagging, supporting the findings from the Library of Congress project on Flickr (Springer et al., 2008).

Finding 8.5. Data analysis of tagging activity in sessions showed that training resulted in significantly higher tagging rates in each tagging session with increased abstract tagging.

8.6 Commenting

The remainder of the data collected through the online website activity related to participants' commenting. In Study E, unlike in Studies C and D,[159] commenting was not a significant activity. Of the 24 comments made by five taggers, 16 were made by one person. Commenting was sporadic and occurred over the study period. Most of the commenting was on the first sixteen photographs shown on the website display (see Study E website referenced in Appendix 7 - Electronic Data Files).

The comments generally did not add to the descriptions provided by the tagging. The comments provided by the most frequent commentator tended to be affective or epigrammatic in nature.

This section completes the reporting on the data collected through the online website activity relating to participants' tagging and commenting. The following sections discuss the data from the survey which was administered after the activity on the research website was finished.

8.7 Research findings from survey responses - Tagger perceptions of tagging with Shatford/Panofsky

The online survey, which was administered after the tagging on the research website was completed, explored taggers' perceptions of their own tagging and the usefulness of different subject levels. The participants' self-reported perceptions of tagging gathered through responses to the post-tagging survey provided useful, if less detailed information than the interviews conducted in Studies A and B, about how taggers decided on what tags to use. The survey text responses were analysed using content analysis software (QSR N6) and subjected to qualitative thematic

[159] See section 7.5, p. 164.

analysis. The Likert and text responses revealed participants' perspectives on what constitutes a "subject" of historic photographs and of subject levels.[160]

This section discusses the data collected through the online survey in four parts. The first part explores taggers' theoretical perspectives (section 8.7.1). The second part discusses taggers perceptions of subject levels (section 8.7.2) followed by a discussion of their reported usage (section 8.7.3). Finally, participants' interest in participating in this project and other projects is reported on (section 8.7.4).

8.7.1 Theoretical perspectives and identifying subjects

Taggers' theoretical understanding of the "subject" and their approach to analysing subject content is explored in relation to several themes:

- theory and praxis (section 8.7.1.1),
- what is a "subject"? (section 8.7.1.2), and
- models and approaches (section 8.7.1.3).

Prior to training, several respondents commented on their lack of knowledge about tagging (PS/Q9-2, PS/Q9-6, and PS/Q9-9). Only one of the ten respondents who gave fuller responses mentioned doing any tagging (PS/Q9-5). None of these responses suggested any participant had considered subject levels or facets.

After training, most of the 14 who provided fuller responses noted that the training was interesting or educational. Six participants mentioned that tagging was still confusing (e.g. TS/Q3-7 and TS/Q3-10), difficult (e.g. TS/Q3-5) or that tags could "go either way" (TS/Q3-6).

None of the 23 respondents to the two questions about deciding what tags to use (FS/Q10 and FS/Q15), which related respectively to tagging on the research website

[160] In the following sections the survey responses are identified by the survey identifier (Pre-training Survey=PS; Post-training Survey=TS; Final Survey=FS) followed by a slash and the survey question number (Q#-) followed by the individual response number, e.g. TS/Q3-7. The tabulated responses are identified by the survey identifier and the question number (Q#).

and in general, mentioned any confusion or difficulty, although two respondents admitted to still being confused or puzzled by tagging when responding to the final further comments question (FS/Q18-1 and FS/Q18-9).

8.7.1.1 Theory and praxis

There was, as in the previous baseline studies,[161] evidence for textual warrant. In the pre-training survey one participant commented "I can understand captions but don't really get tagging" (PS/Q9-2 and PS/Q9-12). In the final survey a number of taggers commented on using the title as an inspiration (e.g. FS/Q10-2).

The Likert responses to questions about the use of other documentation or metadata, such as the title, supported the notion that "warrant" was a significant factor in determining what tags would be suitable (Table 8.28). The mode for using all types of supporting documentation was 4. These modes were the same as reported in the baseline tagging studies.

Table 8.28 – Study E: Taggers use of supporting information (FS/Q14)

Question	Strongly Disagree 1	Disagree-2	Neutral 3	Agree 4	Strongly Agree 5	Responses
I used the title to get ideas about what to tag	1	1	2	15	9	28
I felt that knowing the date or time period of the photograph helped me decide what to tag	1	1	5	11	10	28
I felt that other users' tags helped me think of tags	1	6	4	15	2	28

Participants in Study E were more neutral than the baseline taggers[162] about the value of comments made by others (Table 8.29). Furthermore all, except one, of the Study E participants were neutral or disagreed that comments are more useful than tags in contrast to the baseline taggers where almost as many agreed with this statement as disagreed.

[161] Reported in section 7.6.1.1, p. 167.

[162] See Table 7.17, p. 168.

Table 8.29 – Study E: Views on comments (FS/Q17)

Question	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5	Responses
The comments made by other people were useful	0	4	11	11	2	28
The comments were more useful than the tags	1	12	14	1	0	28

The importance of the photograph's "intent" (mode=4) was again evident (Table 8.30). This was consistent with the fuller text responses. Knowing about the photographer was a lesser factor (mode=3), but higher than the baseline tagging studies mode of 2.

Table 8.30 – Study E: The photograph and photographer (FS/Q14)

Question	Strongly Disagree 1	Disagree - 2	Neutral 3	Agree 4	Strongly Agree 5	Responses
I thought about why the photograph was taken in order to decide what to name or describe	1	7	7	12	1	28
I felt that knowing who the photographer was helped me decide what to tag	3	8	10	4	3	28

Seven respondents, who commented on deciding what to tag, referred to using other people's tagging. Their own tagging was "building on other tags" (FS/Q10-6) or to "add new content" (FS/Q10/17). Four respondents were less positive: the tags "that I would have used were taken" (FS/Q10-7) or existing tags made it "hard" or "distracting" to tag (FS/Q10-15 and FS/Q10-19).

These responses about using other tags, like those in Studies C and D,[163] may help to explain the variations in the observed cumulative subject level tagging (see Figure 8.10). However, as noted previously, this research did not provide sufficient data on interaction effects to draw any conclusions.

The Shatford/Panofsky training matrix was specifically mentioned in the final survey by five participants, who used it as a tagging aid (FS/Q10-9, FS/Q10-10, FS/Q10-12,

[163] See p. 168.

FS/Q10-13, and FS/Q10-18). The matrix "was very helpful for distinguishing the differences between specifics, generics and abstracts" (FS/Q3-9). Several used the matrix as a "crib-sheet" (e.g. FS/Q10-10 and FS/Q10-12), an approach that had been used in the training exercises as well (TS/Q3-4).

The Study E survey responses, like those of the baseline taggers, showed that tagging involved a variety of sources of information. Importantly, the trained taggers were now able to use the Shatford/Panofsky classification matrix as a formal tool for analysing different levels of subject content in the photographs. Critically, as discussed in section 8.4.1, introduction of this classificatory tool did not diminish tagger propensity to use abstract facets. As a consequence of training, taggers had not become professional indexers with an objectivist orientation.

8.7.1.2 What is a "subject"?

Taggers in Study E, like those in the baseline studies,[164] suggested they considered the subjects or things in a photograph "the obvious tags, such as names, locations, time, season, era" (FS/Q10-20). Several taggers referred to tagging based on the "mood" (FS/Q10-1), or emotion and feeling (e.g. FS/Q10-5 and FS/Q10-8), evoked by an image. Despite the training on the Panofsky/Shatford classification the participants provided little elaboration about what they thought defined a "subject". One mentioned using "the 'Who', 'What', 'Where' and 'When' principle" (FS/Q10-18). Most participants who referred to the Shatford/Panofsky classification matrix saw it as a tool, or guide, to help their practical tagging. All the respondents apparently did not find deciding what subjects to tag difficult. The difficulties they referred to related to finding tags which others had not already used.

The trained taggers provided fewer comments in their survey responses about subjects than the taggers in the baseline studies.[165] The extent to which they shared the perceptions of the baseline taggers cannot be determined on such limited evidence.

[164] See section 7.6.1.2, pp. 170-171.

[165] Compare baseline taggers comments in section 7.6, p. 166.

8.7.1.3 Approaches

The Study E taggers, unlike those in the baseline studies,[166] made fewer references to tagging for users. Five taggers mentioned tagging with potential searching in mind (FS/Q15-13, FS/Q15-14, FS/Q15-17, FS/Q15-18, and FS/Q15-22). However, the Likert responses about the relative importance of tagging subjects of personal interest (mode=2) and tagging to help other users (mode=4) supported a user-needs approach by taggers (Table 8.31). Three quarters of the participants confirmed that they wanted to assist other users.

Table 8.31 – Study E: General tagging (FS/Q14)

Question	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5	Responses
I named or described only the things that interested me	1	11	8	6	2	28
I wanted my tags to help other users find the photograph	1	1	5	14	7	28

The most frequent responses (10 out of 23) related to considering existing tags. These could provide ideas for further tagging (e.g. FS/Q10-3) or, when they provided coverage of the more obvious subject matter, could provide an impetus for more creative thinking and tagging (FS/Q10-4). Taggers might find that the existing tagging made it more difficult, or even impossible, to think of new tags, and so might be inhibited from contributing (e.g. FS/Q10-7). At one extreme, a tagger might prefer to tag without the "distraction" of other tags because "you don't really want to read what someone else puts on their image; usually the image itself is worth more that the writing that accompanies it" (FS/Q10-19). Only one respondent commented on the quality of other tagging and wondered

> at the value of some tags which had already been added - did they actually help or were people simply coming up with things so they could include some of their own tags. (FS/Q10-15)

Six respondents specifically mentioned using the training or the Shatford/Panofsky matrix in considering what to tag. These respondents typically provided the most

[166] See section 7.6.1.3, p. 173.

detailed responses about how they approached their tagging. In one case a tagger described the steps involved.

> I used the grid provided as a guide. I started by adding tags associated with the title, i.e. the named subject, date, place, photographer. Then I extrapolated from those things to add more general tags (state, country, decade etc.). After that I looked at the contents of the photograph and added tags for what I saw in the photograph (children, women, bridges etc.). I also looked at tags other people had added and added plural tags for and singular nouns, as I thought people would be more likely to search for the plural. Finally I looked at the photograph and tried to think of abstract tags I could add to describe the feel or theme of the photo. (FS/Q10-12)

The trained taggers provided fewer comments about helping others than the baseline taggers and more about considering existing tags. This change in attention suggests that the trained taggers might have been more interested in meaning which arises in interpretation, as described in Peircean semiotics.[167] However, the evidence is insufficient to draw any conclusion. Importantly, there is clear evidence that at least some of the taggers now employed the Shatford/Panofsky classification matrix as a formal tool in helping them analyse image subject content.

8.7.1.4 Summary of theoretical perspectives

An overview of the findings relating to taggers' theoretical understanding is summarised in Table 8.32.

Table 8.32 – Study E: Overview of taggers' theoretical understanding

Topics	**Findings**
Theory and praxis	Concept of warrant but meaning developed through various sources of information Shatford/Panofsky matrix used
What is a "subject"	Self-evident, objective subjects Shatford/Panofsky matrix used
Approaches	Helping other users Viewer's frame of reference Interpretative Developing meaning through other tags Application of training

[167] See section 5.4, p. 132.

The trained taggers, like the baseline taggers, continued to develop meaning from various sources of information, especially other tags. However, many of the trained taggers now used the Shatford /Panofsky classification matrix as a formal tool in their analysis of the subject content of the images.

An important finding from survey data on theoretical understanding and training is that:

Finding 8.6. Training resulted in all participants reporting understanding the Shatford/Panofsky classification and in several participants using the matrix in their tagging.

Participants' understanding of subject levels is dealt with in the following section.

8.7.2 Subject Levels

Taggers' perceptions and reported use of subject levels as defined in the Shatford/Panofsky classification matrix (Table 8.33) were explored through the analysis of their text and Likert scale responses to survey questions.

Table 8.33 - Subject level classification matrix

	Iconography (S=Specifics)	**Pre-Iconography (G=Generics)**	**Iconology (A=Abstracts)**
Who?	Individually named person, group, thing **(S1)**	Kind of person or thing **(G1)**	Mythical or fictitious being **(A1)**
What?	Individually named event, action **(S2)**	Kind of event, action, condition **(G2)**	Emotion or abstraction **(A2)**
Where?	Individually named geographical location **(S3)**	Kind of place: geographical, architectural **(G3)**	Place symbolised **(A3)**
When?	Linear time: date or period **(S4)**	Cyclical time: season, time of day **(G4)**	Emotion, abstraction symbolised by time **(A4)**

In the final survey, all 28 taggers answered questions about their tagging on the website. Twenty-three taggers' responded to survey questions about how they decided what to tag. Thirteen, who said they tagged their own photographs, answered an additional question about their personal tagging.

The text responses suggest that taggers, as a result of the training, were more aware of subject facets than the participants in the baseline studies. Ten mentioned tagging a variety of subject facets. The training effect was explained by one respondent.

> The Shatford/Panofsky matrix was a great way to organise my thoughts: I felt that if I could produce a couple of responses to each category the tagging was reasonably done - very different from the preliminary exercise you gave us, where my "tags" were fairly random stream-of-consciousness ideas, and I wasn't really sure where to stop! (FS/Q10-13)

The evidence for participants' understanding and perceptions of the different levels is explored below as follows:

- specifics (section 8.7.2.1),
- generics (section 8.7.2.2), and
- abstracts (section 8.7.2.3).

A summary of subject level understanding (section 8.7.1.4) is provided after these sections.

8.7.2.1 Specifics

As noted, participants considered many subjects "self-evident". Typically these were specifics which "were (of course) obvious" (FS/Q10-13). However, a trained tagger, unlike the baseline taggers, now might refer to considering all the specific facets.

> Start with the specifics - who, what where, when. (FS/Q15-14)

Implicit in the taggers' comments was the assumption that specific subject matter was objective, and would be shared by other viewers. Specifics were comparatively more "obvious" than abstracts:

> I thought about the obvious things and made sure that all those obvious things I could see were tagged and then looked at the less obvious/abstract things. (FS/Q15-11)

8.7.2.2 Generics

The comments relating to generics generally were references to using the Shatford/Panofsky matrix. Generics could still challenge taggers who might have the "most difficulty with the 'generics' angle" (FS/Q10-13).

8.7.2.3 Abstracts

There were more references to abstract tags. Some participants might initially approach the photograph at the abstract, or even at an affective, level.

> General mood or what I think the photograph is trying [to e]licit. (FS/Q15-1)

When the Shatford/Panofsky matrix was used, the tagger might develop the abstracts as the final step in exploring the different subject levels (FS/Q10-12).[168]

8.7.2.4 Summary of subject level understanding

Taggers' perceptions of subject levels are summarised in Table 8.34.

Table 8.34 – Study E: Text responses about subject levels

Subject Level	**Findings**
Specifics	Self-evident or obvious things Factual
Generics	Use of matrix concepts; may be problematic
Abstracts	Use of matrix concepts; may be affective

The trained taggers, in comparison to the baseline taggers,[169] showed an understanding of the subject levels as classified by the Shatford/Panofsky matrix. A clear difference was the use of the matrix by some taggers as a way to organise the analysis of subject content.

8.7.3 Subject level usage

The information about theoretical perspectives and perceptions of subject levels provided by the survey comments reported in the previous sections was

[168] The steps are quoted above in full on p. 229.

[169] See section 7.6.2.4, p. 180.

supplemented by the Likert scale responses to questions relating to self-reported subject level usage.

Participants reported about their tagging on the research website (Table 8.35). The modes for responses about using specific object/events, generics ("type of"), abstracts or locations to describe the photographs were 4 as in the baseline tagging studies.[170] The mode for date, or time, was also 4 whereas it was 2 in the previous studies.

Table 8.35 – Study E: Tagging subject levels on the research website (FS/Q14)

Question	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5	Responses
I named the specific objects or events shown (e.g. Sydney Harbour Bridge)	1	0	2	14	11	28
I described the type of subject (e.g. bridge, portrait)	1	1	1	19	6	28
I described the general or abstract idea that you think the photograph is about (e.g. happiness)	1	3	4	17	3	28
I named places or locations (e.g. Sydney)	1	0	2	14	11	28
I gave the date or time period	1	1	2	14	10	28

The reported behaviour, like in the baseline studies, did not match the actual tagging by subject level observed on the website. The survey responses suggest that participants over-estimate their tagging at different levels, especially for the specific and time-related tags.

As in the baseline studies,[171] participants' responses about their personal tagging allowed some comparisons to be made with their tagging on the research website. Less than half the participants (13 of 28) reported tagging their own photographs (Table 8.36). Here the focus on personally meaningful tagging was reflected in the mode of 4 for responses. The views about subject levels for personal tagging matched those in relation to tagging on the research website, with the exception of

[170] See section 7.6.3, p. 181.

[171] See pp. 182-183.

generics (mode=2). For personal photographs, it is likely that items are likely to be known and specifically identified.

Table 8.36 – Study E: Tagging subject levels when tagging personal photographs (FS/Q11)

Question	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5	Responses
I use tags which may only be meaningful to me (e.g. my trip)	0	3	2	6	2	13
I name the specific objects or events shown (e.g. Sydney Harbour Bridge)	0	4	1	7	1	13
I describe the type of subject (e.g. bridge, portrait)	1	5	3	3	1	13
I describe the general or abstract idea that the photograph is about (e.g. happiness)	1	0	1	8	3	13
I name places or locations (e.g. Sydney)	1	3	1	5	3	13
I give the date or time period	0	3	2	6	2	13

Unsurprisingly, taggers responded that in tagging their own photographs they tagged subjects of personal interest and were less interested in other tags (Table 8.37). This was clearly reflected in the respective modes of 4 and 2, compared to modes of 5 and 1 in the baseline studies.[172] However, even when tagging their own photographs, participants were interested in assisting other users as the mode (4) indicates. The baseline taggers appeared more interested in helping others (mode=5).

Table 8.37 –Study E: Tagging personal photographs (FS/Q11)

Question	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5	Responses
I name or describe only the things I am interested in	1	1	3	7	1	13
I look at other people's tags for ideas for tags to use on my photographs	1	5	3	4	0	13
I try to use tags that I think will help other people find my photographs	1	0	3	7	2	13

[172] See p. 182.

When reporting on the usefulness of tags for searching, participants seemed less positive overall about subject levels (Table 8.38). The modes for specifics, generics and location tags were all 4. The modes for abstracts and date, or time tags, were both 3. The modes for the responses in the baseline studies were the same except for the mode for abstracts which was 4.[173]

Table 8.38 – Study E: Usefulness of subject levels when searching for photographs (FS/Q16)

Question	**Strongly Disagree 1**	**Disagree 2**	**Neutral 3**	**Agree 4**	**Strongly Agree 5**	**Responses**
Tags make it easy to find photographs of specific objects or events	0	1	2	18	7	28
Tags relating to general subjects (e.g. portraits) are too broad to be useful in finding photographs	0	6	8	13	1	28
More tags for abstract subjects or ideas would make it easier to find the photographs	0	2	13	10	3	28
Location tags make it easier to find photographs	0	1	6	18	3	28
Date or time period tags are of little help in finding photographs	2	8	10	6	2	28

When comparing the usefulness of different sources of information – tags, titles, and comments – in searching for photographs, participants agreed that tags make searching easier (mode=4), although the photographs retrieved might not always be relevant (mode=3) (Table 8.39). The consensus was that tags were more helpful than other sources of information about which respondents were generally neutral (modes=3). These results are similar to those from the baseline studies.[174]

[173] See p. 183.

[174] See p. 184.

Table 8.39 – Study E: Comparative usefulness of various information types for searching (FS/Q16)

Question	**Strongly Disagree 1**	**Disagree 2**	**Neutral 3**	**Agree 4**	**Strongly Agree 5**	**Responses**
Tags make finding photographs easier	0	1	3	13	11	28
Searching by tags always retrieves photographs whose subject matter matches the tag description	2	10	12	4	0	28
Words in titles are more useful than tags for finding photographs I am interested in	0	5	17	5	1	28
Words used in comments are useful for finding photographs I am interested in	1	5	12	10	0	28
Searching on all the text (title, comments, etc.) is a better way than searching on tags to find a photograph I am interested in	0	5	18	4	1	28

The survey responses show the same consistency in how participants perceived the usefulness of different subject level tags on the research website and when searching as seen in the baseline studies.[175] Similarly, the research findings support previous research (Ames & Naaman, 2007; Marlow et al., 2006b) showing that taggers are motivated to help other users.

The Study E responses about the usefulness of subject levels for searching and for personal photographs are similar to those in the baseline studies. This consistency reinforces the need for further research to explain the subject level percentage differences between Flickr personal tags and search terms found by Ransom and Rafferty (2011) and the perceptions of the usefulness of subject levels revealed in this research.

The trained taggers, like the baseline taggers, rated tags highly when searching for photographs. However, both the trained taggers and the baseline taggers were more ambivalent about the relevance of photographs retrieved by tags (modes of 3 and 2 respectively).

[175] See section 7.6.3, pp. 184-185.

As was noted in the baseline studies,[176] it is possible the results from the current study might not be typical of tagging in other contexts or domains.

Finding 8.7. Following training, participants reported tagging on the research website that was different from their previous personal tagging. The usefulness of tagging for searching was rated much higher than other sources of information.

8.7.4 Project Participation

The final information gathered in the online survey related to participants' interest in participating in this project and other projects. Participants in Study E were slightly more positive about project participation compared with participants in the baseline studies. Twenty-six agreed that the research project photographs were interesting (Table 8.40). Twenty-two (78.5%) indicated they would be interested in tagging similar photographs. All, except one, agreed or were neutral about doing more tagging in future. The modes for all responses were 4.

Table 8.40 – Study E: Project participation (FS/Q17)

Question	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5	Responses
I found the photographs on the research website interesting	0	0	2	20	6	28
I would be interested in tagging more photographs like these	0	0	6	20	2	28
I am likely to do more tagging in future because of participating in this project	0	1	6	16	5	28

Participants felt that project participation made them more knowledgeable and likely to change their future tagging (modes=5) (Table 8.41). Participants felt participating had made them think differently about tagging and better able to understand how other people tag (modes=4). Overall, participants were more positive about the "personal effects" than the baseline taggers.

[176] See p. 185.

Table 8.41 – Study E: Personal effects (FS/Q17)

Question	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5	Responses
Participating in this project has made me more knowledgeable about tagging	0	0	1	10	17	28
Participating in this project will change how I tag in future	0	0	4	11	13	28
Participating in this project made me understand more about how other people tag	0	0	1	17	10	28
Participating in the project has made me think differently about tagging	0	0	2	14	12	28

The trained taggers, like those in the baseline studies,[177] were positive about participating in future tagging projects. Even more than the baseline taggers, they reported that participation had made them more knowledgeable and more likely to tag in future (modes of 5 versus 4).

Finding 8.8. The positive response to project participation suggests that similar online tagging projects could find sufficient motivated participants to succeed.

8.8 Summary and Discussion

Study E was the "solutions-oriented" stage designed to investigate the principle research question. The evidence showed that training in a classificatory tool for visual images affected how taggers tag the subject content of historic photographs.

A key difference was that the active trained taggers contributed an average of 74 tags, double the 37 tags of the baseline group. While the individual volume of tagging showed a clear difference, the effect of the training on subject level facet tagging was not so clearly demonstrated in the facet totals for baseline Studies C and D and Study E (Figure 8.12).

[177] See section 7.6.4, p. 185.

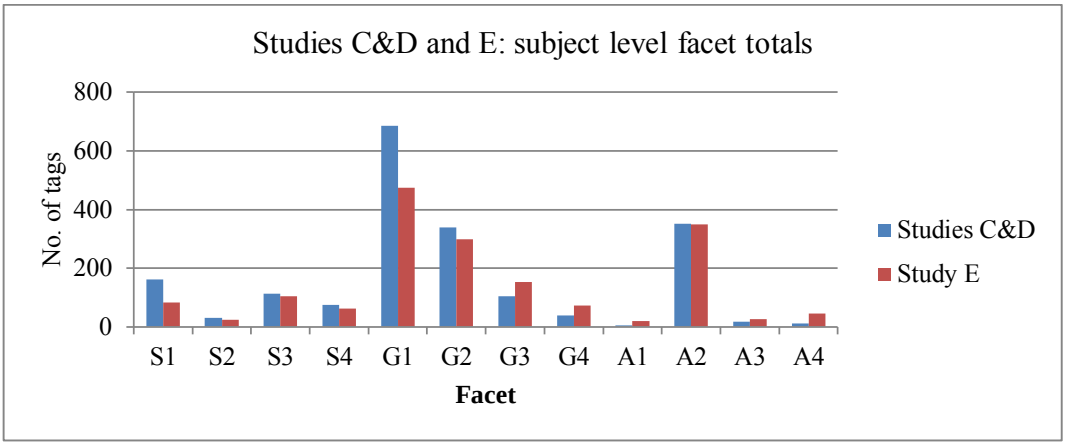


Figure 8.12 – Studies C & D and E: subject level facet totals

The data were explored using a Mann-Whitney U Independent Samples test (significance level α=0.05) to see if the frequency of terms across facets was the same in baseline Studies C and D and Study E. The testing demonstrated that the observed increase in tagging activity in the Study E cohort was significant with subject facets G2, G3, G4, A1, A2 and A4.

When facet usage was mapped to the Shatford/Panofsky matrix, Study E taggers were revealed to tag facets more frequently than baseline taggers (Table 8.42). The Study E taggers consistently used a higher number of tags across all specific and generic facets and tagged each of the abstract facets. The doubling of tags and their distribution across all facets would provide greater access to a fuller range of photographic subject content than either current indexing or baseline tagging. These findings differ even more from those of earlier studies of user-assigned tags in Flickr by Yoon (2009) and Ransom and Rafferty.[178]

Table 8.42 – Studies C & D and E: Comparison between tagger facet means

Baseline Studies C and D			
	Specifics	Generics	Abstracts
Who?	3	13	0
What?	1	7	7
Where?	2	2	0
When?	1	1	0

Study E			
	Specifics	Generics	Abstracts
Who?	4	21	1
What?	1	13	15
Where?	5	7	1
When?	3	3	2

[178] See pp. 214-215.

Further clear differences were demonstrated when comparing tagging untitled and titled photographs across facets. The tagging results supported the view that participants were more sensitive to tagging all subject level facets and the "who?", "what?", "where?" and "when?" aspects following training. As well, trained taggers reported greater confidence about tagging subject levels and reported differences in their own tagging behaviour after training. However, as in the baseline studies, the proportion of tags across untitled and titled photographs was similar to results reported previously by Trant (2006) but unlike Bar-Ilan et al's (2010) finding that tags increased significantly when a title was supplied.

Other evidence from the trained tagger study corroborated the findings in the baseline studies. The greatest amount of tagging occurred in the first two weeks and a few "power" taggers contributed most of the tags, as also reported in the Library of Congress Flickr project (Springer et al., 2008). Contrary to participants' survey responses that they considered others' tags and comments, tagging activity did not provide clear evidence of this happening.

The survey responses[179] provided evidence that the trained taggers, like the baseline taggers, continued to develop meaning from various sources of information, especially other tags. The analysis was carried out at all the levels defined by Panofsky.[180] Both groups of taggers developed image-meaning through interpretation, a sense-making approach related to Peircean semiotics,[181] but there was clear evidence that at least some of the trained taggers now employed the Shatford/Panofsky classification matrix as a formal tool in helping them to analyse image subject content. The findings provide new insight into taggers' understanding of theory and perceptions of their own tagging, an area that has not been explored in recent tagging experiments with participants (Golbeck et al., 2011; Rorissa, 2010; van Vliet & Hekman, 2012) or investigations of Flickr group characteristics (Cox et al., 2011).

[179] See section 8.7, p. 223.

[180] See section 2.2.5, p. 25.

[181] See section 5.4, p. 132.

The current study shows that administration of a training program based on Shatford/Panofsky has the effect of increasing tag volumes across levels and facets Only a few studies have incorporated tagger training and in these (Bar-Ilan et al., 2010; Golbeck et al., 2011) the training related to the test procedures and not image content analysis. The significance of how this increase in tags affects subject content representation is fully considered in the Discussions and Conclusions, section 9.3.

Importantly, for institutions interested in carrying out similar projects, the trained taggers, like those in the baseline studies, were positive about participating in future tagging projects.

Table 8.43 – Study E Findings

Finding 8.1. The results showed that training on the Shatford/Panofsky classification increased the volume of tags used by taggers, an effect observed over most facets.
Finding 8.2. Data analysis showed that training resulted in differences in the total tags used for subject facets and across the "who?", "what?", "where?" and "when?" dimensions of the generic and abstract subjects.
Finding 8.3. These results were shown to be significant in terms of the behaviour of individual taggers.
Finding 8.4. Data analysis showed that training produced a significantly higher volume of tagging per photograph and the tagging of all subject facets.
Finding 8.5. The results showed that the training resulted in significantly higher tagging rates in each tagging session with increased abstract tagging.
Finding 8.6. Training resulted in all participants reporting understanding the Shatford/Panofsky classification and a several participants using the matrix in their tagging.
Finding 8.7. Following training, participants reported tagging on the research

website that was different from their previous personal tagging. The usefulness of tagging for searching was rated much higher than other sources of information.

<u>Finding 8.8.</u> The positive response to project participation suggests that similar online tagging projects could find sufficient motivated participants to succeed

9 DISCUSSIONS AND CONCLUSIONS

9.1 Introduction

This study had two principal objectives. Firstly it aimed to investigate the evidence of cognitive dissonance[182] between indexers and users in the way they attribute subjects to historic photographs. Secondly the study aimed to explore how indexers and users might work together to enhance image subject description and to facilitate better intellectual access and retrieval.

The principal research questions were:

PQ1 - What is the evidence of difference between indexers and users in the way they attribute subjects to historic photographs?

PQ2 - How can indexers and users work together to enhance subject content representation of historic photographs?

It is worth briefly recounting the reasons for the study. Despite the growing interest in social tagging to enhance the metadata on historic photographs to make them more accessible,[183] there has been no domain investigation of how well indexing currently represents subject content.[184] The first stage of the research investigated how professional indexers and taggers identify the subject content of historic photographs and revealed cognitive dissonance, a conflict between how each group appears to think about and interpret images, arising from their approaches. The second stage investigated how training might affect tagging behaviour. The intervention trained taggers in the use of a classification tool that was developed specifically to aid the work of image indexing (the Shatford/Panofsky matrix). The problem of how indexers and taggers might work co-operatively is a significant one.

[182] The term, as used in the context of this research, is intended to convey the conflict between how indexers' and users' appear to think about and interpret images. See section 5.4, p. 132, and section 7.7, p. 187, for discussions of cognitive dissonance findings.

[183] See section 2.3.5, p. 40.

[184] See section 2.4, p. 49.

With contraction and/or stagnation in institutional programs that employ professional indexers, whether the efforts of taggers can be more effectively harnessed is an important question for the future of historic image collections.

The initial phase of this research began with an investigation of how professional indexers respond to the challenge of representing subject content in historic photographs. The literature has remarkably little to say about how indexers analyse and choose subjects to represent the content of historic photographs despite the centrality of these issues to intellectual access, a shortcoming which McRae (2000) identified more than a decade ago. Researchers have compared social tagging descriptors to existing index terms (Rorissa, 2010; van Vliet & Hekman, 2012) or to controlled indexing vocabularies (Jorgensen, 1995; Stvilia & Jorgensen, 2010) but, critically, there has not been an analysis of how fully indexing done by professional indexers represents the range of subject content found in historic photographs. These issues were encapsulated by the photographs of the Lusitania in the introduction;[185] none of the index terms reflect the subject content of the inscription, which is probably for many users the most important aspect of their interest in the images. To what extent do indexers represent the subject content of an historic photograph? This research has investigated this gap in the literature and explored indexers' perceptions of indexing and their practice.

Further research explored the idea of dissonance between professional indexers and taggers. Dissonance, the idea that indexers and users attribute the subject matter of historic photographs differently, is inspired by the wider literature on folksonomy. What is the evidence of dissonance? Researchers have explored social tagging, but the literature is largely silent about comparing professional indexers' and taggers' descriptions of subject content. This research has used formal tools such as the Shatford/Panofsky classification to make a comparative analysis. As well, the interviews provided insight into the frames and assumptions that underpin the observed differences in the attribution of subjects.[186] The study breaks new ground in both the application of a classificatory tool to analyse the attribution of subjects

[185] See Introduction, p. 1.

[186] See section 5.4, p. 132.

and to explore differences in how these subjects are attributed by professionals and taggers.

Finally, while there has been considerable research on social tagging,[187] researchers have not investigated how indexers and taggers might work together. The problem is significant both in terms of diminishing institutional resources and of accessibility. In regard to the latter, supporting tagging to create a richer corpus of subject descriptors, coupled with the methods and techniques of auto extraction, will provide the basis of greater accessibility.

This chapter:

- describes the contribution to knowledge made by the research and places key findings in the context of other work;
- describes limitations of the study; and
- proposes directions for future research.

9.1.1 Contribution to knowledge

In summary, subject to its limitations, the research has contributed to knowledge by:

- demonstrating that current professional indexing represents only a limited portion of the subject level content of historic photographs. This is important for the practical understanding of how indexing provides access to the subject content of historic photographs. Previous studies (such as Ransom & Rafferty, 2011; Rorissa, 2010; van Vliet & Hekman, 2012) have compared indexing to tags used on general Flickr images or more diverse museum collections. This study contributes new understanding about indexing specifically in relation to historic photographs;
- analysing how professional indexers apply indexing theory and guidelines[188] in practice and how such application is shaped by text-based

[187] See section 2.3.6, p. 42.

[188] The theory and guidelines are discussed in sections 2.2.2, p. 21, and 2.2.5, p. 25.

library tradition. The process model describes observed indexing behaviour and assists with further development of professional indexing practice;

- revealing cognitive dissonance between professional indexers and taggers in the way they attribute subjects to historic images.[189] The indexers' positivist approach and assumptions of straightforward meanings of photographs contrast with poststructuralist, Derridean analysis found with some users. This is the first study to explore the gap between indexers' and users' approaches, recognising any gap is critical for collecting institutions seeking to improve the effectiveness of local indexing for intellectual access;
- establishing, subject to further confirmatory research, that training can be a practical method for collecting institutions to work with taggers to enhance representation of subject content in historic photographs. This extends previous work in the areas of art history and museum collections (Golbeck et al., 2011; Trant, 2006; van Vliet & Hekman, 2012) and historic photographs (Stvilia & Jorgensen, 2010).

These contributions are discussed in sections 9.2 and 9.3, beginning with a synopsis of findings and conclusions for the principal and related research questions that motivated this study. Limitations of the research are discussed in section 9.4.

9.2 PQ1 - Indexing and tagging: the evidence for cognitive dissonance

The following principal question framed the investigation of differences between users and indexers attribution of subjects to historic images:

PQ1 - What is the evidence of difference between indexers and users in the way they attribute subjects to historic photographs?

[189] Discussed in sections 5.4, p. 132, and 7.7, p. 187.

The results of the investigations to the two related research questions are reported below.

9.2.1 RQ1 - How well does current indexing practice represent the different levels of subject content found in historic photographs?

Study A explored subject attribution by a group of purposefully selected professional indexers working in national through to small local studies collections.[190]

The professional indexers carried out their image analysis essentially at the pre-iconographic level defined by Panofsky,[191] where subject description relates to everyday objects and events, and largely ignored the second and third, iconographic and iconological, levels of meaning which address the "aboutness" and symbolic meanings. This approach resulted in a demonstrated propensity for specific and generic subjects and an almost complete avoidance of abstracts.[192] Subject headings were almost all objective with 98.2% relating to specifics or generics. When facet usage was mapped to the Shatford/Panofsky classification,[193] half (6) of all facets, and typically all the abstract facets, were not represented. Commonly only one-third (4) of facets were indexed. Hence Finding 4.1,[194] namely that:

The findings show indexers' propensity for specifics and their rejection of abstracts for subject representation. The result is consistent with an objectivist construction of the task of indexing.

Discussion:

The research literature supports the key findings. The propensity for specific and generic subjects in indexing historic photographs is similar to Rorissa's (2010) results comparing Flickr tags to index terms which showed indexers' tendencies

[190] See section 3.3.1.1, p. 63, for a discussion of the modus operandi for the selection of study participants.

[191] See section 2.2.5, p. 25.

[192] The findings of the twenty-eight (28) photo analyses were reported in section 4.3.1, p. 85.

[193] See table Table 4.10, p. 89.

[194] See section 4.3.1, p. 89.

toward concrete subjects and almost complete avoidance of abstracts. Similarly, in Angel's (2012) tagging experiment with library, archive and museum professionals, library professionals' tags concentrated on pre-iconographic description.

The evidence from the indexers' photo analysis, subject to its limitations, is that professional indexing is only representing a portion of the subject content of historic photographs. Their image analysis is essentially pre-iconographic levels defined by Panofsky,[195] where subject description relates to everyday objects and events and no specialist knowledge is required. Panofsky's second and third levels of meaning, the iconographic and iconological, which deal with the "aboutness" or symbolic meaning of images, are typically not addressed.

The interview findings show that professional indexers' approach pre-disposes them to index objective subject content. The result is a gap in representing the subject content of historic photographs, the implications of which will be discussed in section 9.2.5.

Towards a model of the professional indexing process

The literature on image indexing[196] has addressed theoretical issues and provided guidelines, but studies of actual indexing have been notably lacking. Understanding the current indexing process can help explain observed outcomes and inform future development.

The categories and themes developed from the analysis of the data[197] gathered in the interviews (section 5.3.1) and in the photo analysis sessions (section 5.3.2) provided evidence of professional indexers' perceptions and understanding of indexing, subjects and subject levels, which were validated by observation during the photo

[195] Discussed in section 2.3.5, p. 40.

[196] See sections 2.2.2, p. 21, and 2.2.5, p. 25.

[197] The content analysis and data analysis process are described in section 3.4.7, p. 76. The data analysis is illustrated in Appendix 6 - Themes from the Content Analysis and a Detailed Example of the Process of Data Analysis.

analysis sessions. These provided evidence for the development of a general workflow model of the indexing process[198] (Figure 9.1).

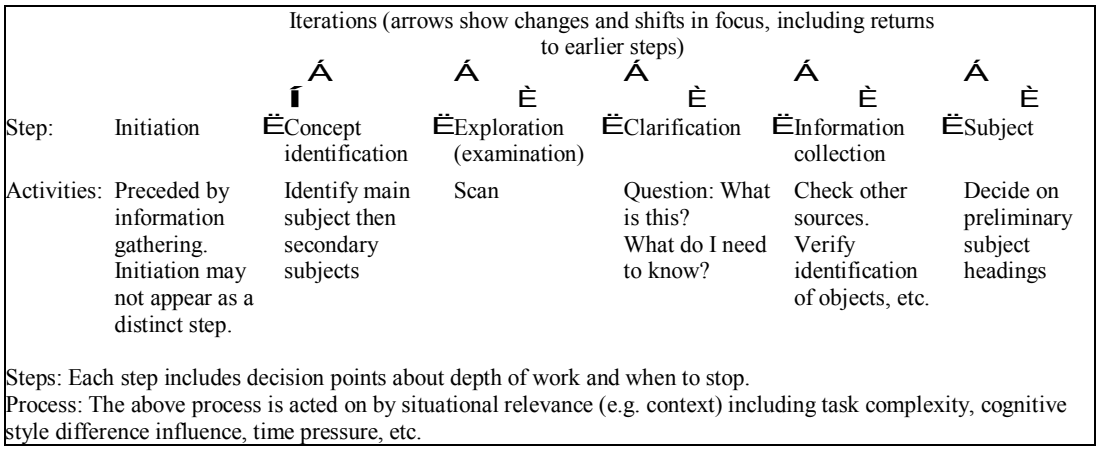


Figure 9.1 – Workflow model for the professional indexing process

The research findings[199] also support the view that indexing rules and guidelines[200] either directly or indirectly shape indexers' attitudes towards the indexing task. Indexers routinely emphasised indexing objectively and cautioned against any subjective interpretation. Abstracts, in particular, were seen to require a level of interpretation which indexers considered best left to users.[201] These findings help explain the observed indexing behaviour in relation to the representation of different subject levels.

In the indexing process, indexers focus on the individual photograph and concentrate on identifying and representing its specific subjects. Indexers examine accompanying documentation and may consult texts to help identify or verify these subjects. While indexers say they consider user needs, the evidence implies they are more oriented to their professional practice and domain perspectives and there is no evidence of any sort of user domain analysis.[202]

[198] See section 5.3.3, p. 129.

[199] See section 5.2, p. 97.

[200] See section 2.2.2, p. 21.

[201] See section 5.2.2.3, p. 118.

[202] See further discussion in section 9.2.5, p. 256.

The model of the image indexing process can be compared to Sauperl's (2002; 2004) hypothetical model for text indexing based on her study of 12 cataloguers.[203] The stages of analysis follow a similar progression. The eleven indexers showed a similar awareness of potentially different meanings but in practice generally considered the "objective" nature of historic photographs, which they considered congruent to user meanings. Given the grounding of current image indexing in the LIS textual tradition, it is not surprising to find that indexers and cataloguers shared similar sources of inspiration,[204] although indexers appeared much less knowledgeable about institutional practice.[205] Indexers too relied on textual warrant supplied in accompanying documentation or text information, such as signs, captured in the photographs.[206] Where cataloguers contain the potential problem of unlimited semiosis[207] by reference to existing cataloguing, indexers limit subject representation by concentrating on the objective subject content of historic photographs.

9.2.2 Conclusions: RQ1 - How well does current indexing practice represent the different levels of subject content found in historic photographs?

It is concluded, subject to acknowledged limitations,[208] that professional indexing represents only a small portion of the subject matter of historic photographs. The current indexing paradigm is based on traditional LIS textual cataloguing. Historically, this approach may have been sufficient when access to collections was only through onsite catalogues where professional staff were available to help users find images. Today, when collections are accessible online, users must rely on indexing with all of its imperfections. Intellectual access requires a greater range of subject descriptions than professional indexing currently provides.[209]

[203] See section 2.4, p. 50.

[204] The sources are: the document, the cataloguer's experience, the cataloguing practice of the institution, the catalogues of other libraries, the subject headings list, and reference sources.

[205] See section 5.2.1, p. 98.

[206] See section 5.3.1, p. 122.

[207] Discussed in section 2.3.1, p. 35.

[208] See section 9.4, p. 263.

[209] See Introduction.

The research evidence does not suggest indexers consider theoretical perspectives.[210] Professional indexers approach historic photographs as documents and objectively render subjects. They do not appear to take into account other ways of knowing and prominent theories, such as semiotics and discourse theory, which have been applied to visual interpretation.[211] Surprisingly, most indexers appeared unaware of basic image indexing theory presented in standard LIS texts, such as the *Thesaurus for graphic materials I: subject terms (TGM I)* (1995), or even of institutional policy and guidelines. There was no evidence that indexers have clearly formulated concepts of the subject levels and facets as defined in the Shatford/Panofsky classification matrix.[212] Training appears ad hoc, essentially derived from LIS text-based cataloguing and precepts, and no indexer indicated any sort of visual training. Improved training has the potential to improve considerably the state of current indexing. The Shatford/Panofsky classification could provide a framework and methodology for analysing and indexing historic photographs.[213] This classification tool, in contrast to Jorgensen's framework which has been used unsuccessfully as the basis of an indexing template (Jorgensen, 1996), clearly defines and distinguishes subject levels and facets and was used with good results in the training conducted in this research.

9.2.3 RQ2 - How well do users' descriptions and current tagging represent different levels of subject content found in historic photographs?

Studies B to D investigated this question. Understanding how users represent subject content is important because these concepts are likely to underpin search terms (Saracevic, 2007a, 2007b; Trant, 2009).

The exploratory interviews and historic photo analyses assessed responses by a small group of users in the pilot (Study B[214]). This study informed the subsequent baseline

[210] See section 5.2.1, p. 98.

[211] See section 5.4, p. 132.

[212] See section 5.2.2, p. 112.

[213] A similar recommendation has been suggested in previous research by Conduit and Rafferty (2007).

[214] Reported in Chapters 4 and 5.

studies (C and D[215]) with taggers. The 66 taggers participating in these latter studies demonstrated their propensity for generics (60.3% of total tags) with equal inclinations to specifics (19.6%) and abstracts (20.0%).[216] The distribution of tags supported the hypothesis that the taggers were interested in a relatively broad range of subject level description, a finding supported by the evidence from the user interviews.[217] Furthermore, when facet usage was mapped to the Shatford/Panofsky classification,[218] three quarters (9) of all facets were tagged and only three (3) abstract facets were not. The survey responses[219] supported the view that taggers are interested in all subject levels and most subject facets of image interpretation.

The analysis of the data for the 11 untitled photographs and 22 identified by title and photographer showed similar tag means (59.3 for untitled and 58.3 for titled). [220] The individual facet means were also similar although two facets (abstracts A1 and A4) typically were not tagged on most photographs. The data were further explored to see if the frequency of terms across facets was the same for both groups.[221] The analysis revealed statistically significant differences only for the distribution of S3 and S4 facets. However, further research is needed to investigate how the presence or absence of any sources of information, including metadata such as titles, affects facet tagging.

The greatest amount of tagger activity took place in the initial period the research website was available. As seen in other crowdsourcing projects (several major projects are summarised in Holley, 2010), a few taggers contributed the majority of tags. Evidence of "power" tagging was also seen in the Library of Congress Flickr project (Springer et al., 2008). There was no clear evidence that existing user contributed tags or comments influenced subsequent taggers, despite participants agreeing that it did in their questionnaire responses.

[215] Reported in Chapter 7.

[216] See section 7.3.1, p. 152.

[217] See Table 5.2, p. 111, and Table 5.4, p. 120.

[218] See Table 7.9, p. 155.

[219] See section 7.6, p. 166.

[220] See section 7.3.2, p. 155.

[221] See pp. 156-157.

The current research also extends recent studies which have comprised tagging experiments with participants (Golbeck et al., 2011; Rorissa, 2010; van Vliet & Hekman, 2012), or investigations of existing Flickr tags (Ransom & Rafferty, 2011; Stvilia & Jorgensen, 2010; Yoon & Chung, 2011) and group characteristics (Cox et al., 2011) but which have not explored taggers' understanding of theoretical matters or perceptions of their own tagging approaches. The research findings from the survey responses[222] revealed that taggers, while interested in the objective content of images, attended to other meanings of photographs.

In summary, the baseline tagging studies demonstrated taggers are interested in all levels of subject content in historic photographs. How documentary information accompanying photographs or other tags might influence taggers requires further research.

Discussion:

This study showed that taggers were interested in all levels of subject content, but how should this finding be interpreted in terms of the existing research literature? User studies and subsequent tagging studies[223] have provided useful information about what subject content users are interested in and tag. However, the degree to which findings of various aspects of image tagging investigations (Bar-Ilan et al., 2008; Hollink et al., 2004; Ransom & Rafferty, 2011; Rorissa, 2010; Springer et al., 2008; Yoon, 2009) apply to historic photographs is unexplored. The findings of this research differ from those of Ransom and Rafferty[224] in key areas. The distribution of tags by both subject levels and facets were different from those found by the previous researchers. This research found factor increases for abstract tags of more than two times and for "what?" facet tags of almost three times. Further research is needed to determine whether these results are due to differences in the photographs being tagged.

[222] Summarised in section 7.6.1.4, p. 176.

[223] See sections 2.3.4, p. 39, and 2.3.6, p. 42.

[224] See section 2.3.6, Table 2.3 and Table 2.4, p. 45.

The similarity in the tagging for both untitled and titled photographs supports Trant's (2006) findings that the same proportion of terms was applied to items with and without captions. However, Bar-Ilan et al (2010) have found that tags increased significantly when a title was supplied. Further research on the influence of metadata on tagging is needed to confirm metadata effects.

Unfortunately, researchers exploring tagging in art history and museum collections (Golbeck et al., 2011; Trant, 2006; van Vliet & Hekman, 2012) and historic photographs (Stvilia & Jorgensen, 2010) have not considered how user tagging compares with indexing. Only one of these studies (Golbeck et al., 2011) used the Shatford/Panofsky matrix, thus limiting their usefulness for understanding comparative analysis of subject levels. Angel (2012) has conducted a limited experiment exploring differences between tagging by library, archives and museum professionals which revealed all these professionals' descriptions of the photographs were largely pre-iconographic. The current study breaks new ground in a sparsely represented area of investigation.

Studies on information retrieval based on institutional and Flickr users likewise have not reflected on the issue of representing full image subject content, i.e. the problem of categorisation. Rather, from the pioneering study of institutional users by Armitage and Enser (1997) to contemporary investigations of Flickr by Chung and Yoon (2009), Ransom and Rafferty (2011) and Kim (2011), investigators address indexing or tagging and their fitness for information retrieval, but they do not question if these terms adequately express subject content. Earlier studies noted that users became "trained" in how to express their needs to produce successful results (Enser, 1993, p. 27) and comments[225] from Study B users suggest that limitations in current indexing has resulted in this user adaptation continuing.

The assumption that user-supplied tags are potentially good resources for access is queried by Chung and Yoon (2009) who point to statistical results showing significant differences in the categorical distributions between the Flickr user tags and search queries. This challenges the view that tagging can improve information

[225] E.g. section 5.2.2.1, p. 116.

retrieval. The baseline tagging studies demonstrated that taggers provided a wide range of subject representation for historic photographs as measured by the Shatford/Panofsky classification. While encouraging, no study of user queries was performed to determine whether Chung and Yoon's (2009) conclusions apply to the tagging of historical images. This represents an opportunity for further research.

A few researchers have suggested taggers are motivated to help others (Ames & Naaman, 2007; Marlow et al., 2006a), although for tagging personal photographs this may decrease over time (Nov et al., 2010). This research shows that, at least in the context of a project to tag historic photographs, the motivation to help others is strong.[226] Previous online Flickr projects have relied on spontaneous participation (Chan, 2008; Springer et al., 2008; Stvilia & Jorgensen, 2010). However, van Vliet and Hekman (2012) report that participation in a similar project was not spontaneous but needed recruitment. The need for institutions to actively recruit and work with taggers has been highlighted by Holley (2010) and the research evidence suggests such recruitment could provide well-motivated taggers.

9.2.4 Conclusion: RQ2 - How well do users' descriptions and current tagging represent different levels of subject content found in historic photographs?

The tagging evidence demonstrated that taggers are interested in a wider range of subject matter and in higher levels of interpretation than professional indexers. Typically tagging represented three quarters of all the Shatford/Panofsky subject facets and these results are consistent with the broader literature on user description and tagging.[227]

The baseline studies did not suggest taggers are aware of theoretical issues.[228] There was no evidence that taggers have clearly formulated concepts of subject levels.[229] However, users demonstrated a more sophisticated approach to understanding and

[226] See section 7.6.4, p. 185.

[227] See sections 2.3.4, p. 39, and 2.3.5, p. 40.

[228] See section 7.6, p. 166.

[229] See section 7.6.2, p. 178.

interpreting images than the professional indexers. Users were aware that photographs had multiple meanings, shaped and re-shaped in encounters with each viewer, and lacked "fixed" meanings.

9.2.5 Conclusion: PQ1 - What is the evidence of difference between indexers and users in the way they attribute subjects to historic photographs?

In summary, the findings from RQ1 and RQ2 provide clear evidence of cognitive dissonance between taggers and indexers in attributing the subjects of historic photographs.[230] The indexers (Study A) demonstrated a propensity for specific and generic subjects and almost complete avoidance of abstracts in contrast with the baseline taggers (Studies C and D) who had a propensity for generics and equal inclination to specifics and abstracts.

The data were explored to see if the frequency of terms across facets was the same.[231] This analysis revealed statistically significant differences for the distribution of facets S2, S4, all generics, A2, A3 and A4 facets and whether a person is a tagger or an indexer. The data showed taggers' clear propensities to use all these facets, except the S4, more relative to indexers. The S4 facet was used more by indexers.

The different approaches to representing subject facets was underlined when comparing the terms/tags used on each photograph as classified by the Shatford/Panofsky classification matrix.[232] Indexers provided subject terms for only one third (4) of the total facets (12). Baseline taggers provided tags for three quarters (9) of the facets; only abstract facets were rarely represented. Furthermore, taggers consistently used more tags per facet.

The evidence from the subject attributions supports the conclusion of cognitive dissonance in how indexers and users approach the subject content of historic photographs. This conclusion of dissonance is also supported by the evidence from

[230] See sections 5.4, p. 132, and 7.7, p. 187.

[231] See pp. 188-190.

[232] Table 7.34, p. 190.

the interviews.[233] The professional indexers self-reported approaches to subject attribution are shaped by the positivist traditions of library cataloguing practice[234] and do not take into account other ways of knowing, such as visual warrant, and prominent theories, such as semiotics and discourse theory. In sign theory the meaning of a sign is not contained within it, but arises in its interpretation and the role of the interpreter must be accounted for. Mai's exploration of indexing is founded on Peircean semiotics[235] but there was no evidence that these ideas influenced any of the professional indexers. Furthermore, while claiming a strong interest in indexing for user needs, indexers did not appear to employ any sort of domain analysis, as suggested by Hjorland and other researchers.[236] They approached subjects from the perspective of the LIS domain and its vocabularies, an approach lacking reflexivity and disregarding the Foucauldian notion that individuals' constructions of meanings are bound to existing discursive networks. Texts, including photographs, have no absolute, but only socially constructed, meanings. The professional indexers' apparent belief in stable and unitary meanings contrasts with poststructuralist theory.

Users demonstrated a more complex and nuanced approach to understanding and interpreting images. While not explicitly referring to any particular theory or critical approach, they commented on how different factors affect understanding photographic meanings. They viewed photographs as actively functioning in a variety of discursive contexts and performed more poststructuralist, Derridean analyses which recognise that meaning rests on shifting and arbitrary systems of relationships and that there is no way to assure correspondence between an image and its meaning. Users were aware of the potential for image warrant and this clearly played a role as a catalyst for tagging. Both visual and textual information contributed to their understanding a photograph's subjects.

The contrasting styles of professional indexers and users in their approaches to images points to a cognitive dissonance between how they read and attribute subjects

[233] Summarised in section 5.4, p. 132.

[234] See Table 5.2, p. 111, and Table 5.4, p. 120.

[235] See section 2.4, p. 49.

[236] See section 2.3.3, p. 37.

to historic photographs. The baseline tagging studies (C and D) provided a reference group for the subsequent solutions-oriented stage.

9.3 PQ2 - How can indexers and users work together to enhance subject content representation of historic photographs?

The second or solutions-oriented phase of the investigation addressed the second principal research question:

PQ2 - How can indexers and users work together to enhance subject content representation of historic photographs?

The results of the investigations to the two related research questions are reported below.

9.3.1 RQ3 - How does training affect user annotation for representing the subject content in historic photographs and the resulting folksonomies?

The hypothesis that training in a classificatory tool for visual images would support taggers in developing further interpretations of the subject content in historic photographs was tested in Study E. The aim was to train taggers in the Shatford/Panofsky classification matrix and to investigate the use of this formal tool on subject facet tagging and in the annotation of additional concepts.

The 28 taggers in Study E received online training for the Shatford/Panofsky matrix. The training stimulated participants to think about different subject levels and what the photographs are "of" and "about" when tagging. The pre- and post-training analyses[237] revealed that the online training enhanced reported understanding of subject levels and influenced their tagging. After the training exercise, tagging on the exercise photograph increased from a pre-training tag mean of 5.8 to 15.0 per tagger and the subject level means were the subject of factor increases of the order 2.1 times for specifics, 2.4 times for generics and 5.1 times for abstracts.[238] When classified by

[237] Reported in section 8.3, p. 198.

[238] See p. 207.

the Shatford/Panofsky matrix, subject level facet tagging doubled from 5 to 10 facets.[239]

The relation between the subject level facet tagging of the exercise photograph before and after training was explored to see if the frequency of terms across facets was the same.[240] The analysis revealed statistically significant differences between pre- and post-training outcomes for the distribution of facets for all specifics, G1, G2, and all abstracts, except A1. The data showed taggers' clear propensities to use all these facets after training.

The evidence suggests that online training can be effective in changing subject level tagging. In summary:

The results showed that training on the Shatford/Panofsky classification increased the volume of tags used by taggers, an effect observed over most facets.[241]

Discussion

Study E is an important contribution to the understanding of the nature of social tagging of historic photographs. Uniquely it investigated how training affects tagging of historic photographs. There have been some small case studies (Bar-Ilan et al., 2010; Golbeck et al., 2011) but the tagger training in these studies related to the test procedures and not image content analysis.

Unlike Jorgensen's (1996) image description template, the Shatford/Panofsky classification matrix appears to have been effectively used by taggers, several of whom commented on its usefulness.[242] When Jorgensen unsuccessfully explored her indexing template for users, she concluded it was potentially more useful for indexers but did not investigate further. The effect of the training on taggers in the current research suggests that similar training might provide professional indexers

[239] See p. 208.

[240] See pp. 206-207.

[241] Finding 8.1, p. 208.

[242] See section 8.7, pp. 226-229.

with useful strategies to enhance indexing. This was not specifically investigated and represents an opportunity for future research.

The increase in the volume of the tags that trained taggers contribute may provide further benefits in conjunction with recommender systems for photographs, such as those investigated in relation to Flickr tagging (Lee, 2011; Sigurbjornsson & van Zwol, 2008). Research is needed to investigate applications for historic photographs.

9.3.2 Conclusion: RQ3 - How does training affect user annotation for representing the subject content in historic photographs and the resulting folksonomies?

The results showed that the training affected tagging behaviour and stimulated taggers to increase their tagging and representation of subject facets.

9.3.3 RQ4 - How should tagging be supported to achieve better representation of subject content found in historic photographs?

The training effects persisted into the activity on the research website. The Study E taggers (23 of 28) used a mean of 74 subject level tags, double the mean of 37 tags used by the 52 active taggers in the baseline studies C and D.[243]

When facet usage was mapped to the Shatford/Panofsky classification, it showed trained taggers tagged all 12 facets.[244] The relation between the subject level facet tagging was explored to see if the significant differences existed in terms of individual tagging behaviour between baseline taggers and Study E taggers. This analysis revealed statistically significant differences for the distribution of facets for generics and abstracts, except the G1 and A3 facets.

Further clear differences were evident when the tags for untitled and titled photographs were compared across the "who?", "what?", "where?" and "when?"

[243] See section 8.8, p. 238.

[244] See Table 8.42, p. 239.

facets.[245] The tag distributions revealed that trained taggers used the "who?" less, and the "what?", "where?" and "when?" more than baseline taggers.

The survey responses[246] support the view that the training on subject levels and the "who?", "what?", "where?" and "when?" facets influenced the subsequent tagging. The data also showed trained taggers' propensity to use other generic and abstract facets more than untrained taggers.[247] The trained Study E taggers' consistently used a higher number of tags across all specific and generic facets and tagged each of the abstract facets. The increase in tagging and distribution across all facets would provide greater access to a fuller range of photographic subject content than either current indexing or baseline tagging.

Other Study E activity matched the findings in the baseline studies. In all the studies, the greatest amount of tagging occurred in the first two weeks and a few taggers contributed most of the tags. There was no evidence that existing tags or comments significantly affected subsequent tagging,[248] contrary to participant questionnaire responses.

Discussion

The differences in the proportions of subject levels between those of earlier studies (Ransom & Rafferty, 2011; Yoon, 2009)[249] and the current studies were greater for the trained taggers than the baseline taggers. In Study E the proportion of generics increased slightly and the abstracts increased by a factor of three.

Training on image content analysis resulted in improved representation of subject levels and the "what?", "where?" and "when?" facets when compared to the baseline tagging. Furthermore, trained taggers added twice as many tags as the baseline

[245] See Table 8.25, p. 218.

[246] See section 8.7, p. 223.

[247] See section 8.4.1, p. 213ff.

[248] See section 8.7.1.1, pp. 225-226.

[249] See section 8.4.1, pp. 214-215.

taggers. However, with the advantage that an increase in tags may provide for recall may be offset by a potential reduction in precision.

9.3.4 Conclusion: RQ4 - How should tagging be supported to achieve representation of subject content found in historic photographs?

Critically, in terms of the research goals, the training demonstrated a practical way for institutions to work with taggers to enhance representation of subject content in historic photographs. The intervention led to increases in the volume and value of tagging performed.

Specifically, the evidence showed that trained taggers tagged more generic and abstract facets than untrained taggers. Importantly, this means training supports the annotation of the higher levels of subject content and so potentially provides enhanced intellectual access, for example by providing a richer corpus of subject descriptors. Research by Kim (2011) has shown that tags relating to photographs posted by cultural organisations to Flickr are useful for search purposes. However, as discussed, confirmation of the information retrieval significance of the finding for enhanced representation of subject content requires further research that takes into account issues such as the quality of the metadata provided by tagging and how effective it is for information retrieval (Hider, 2012).

The research also revealed that participants had high levels of interest and willingness to participate in similar projects.[250] There have been a variety of cultural institution projects which have used crowdsourcing,[251] including some limited explorations of cooperative approaches.[252] In considering the potential of tagging Hider (2012, pp. 184-187) has raised the practical question of whether unpaid taggers will provide rich metadata. The results from the current research suggest that if institutions can recruit sufficient motivated participants for tagging historic photograph collections and engage effectively with them, as suggested by Holley (2010) then benefits in terms of collection accessibility will follow.

[250] See sections 7.6.4, p. 185, and 8.7.4, p. 237.

[251] See section 2.3.6.1, p. 45.

[252] See section 2.3.6.2, p. 47.

With appropriate mentoring from professionals, user interest in tagging might develop into partnering in the development of ontologies. Ontology is considered fundamental to the semantic web and using end-users' contributions is indispensable and will ensure ontologies better represent diverse domains than ontologies developed solely by experts (Bachore, 2012). Importantly, the research has pointed to the feasibility of re-conceptualising and re-inventing the nature and role of the professional indexer as mentor and community of practice coordinator. As resources for indexing decline and there are fewer indexers, transformation of the nature and role of professional indexing seems inevitable. The solutions-oriented study, Study E, explored one way indexers can work with taggers to make historic photographs more accessible. The application of community of practice methods could transform indexing and reinvent professional indexers' roles. At the very least, such training would enhance the contribution made by taggers and enhance that of professional indexers.

9.4 Limitations

With any research design involving fieldwork, there are usually limitations and opportunities for improvement. This section discusses these limitations and the following section will reflect on the research and opportunities for improvement.

The Shatford/Panofsky classification matrix was adopted as the intellectual framework in order to provide a standardised tool for analysing subject content terms/tags. The value of the framework has been demonstrated in pioneering research (Armitage & Enser, 1997) and is increasingly being used in contemporary research (Benson, 2011; Chung & Yoon, 2009; Ransom & Rafferty, 2011). The matrix provided both a clear schema for classification and indexing and for comparison of findings between the different studies carried out in this research and with other research. While the framework provided cognitive support, there is a risk that it might have been a limiting factor, both in data gathering during the interviews (see below) and in causing findings that did not fit the framework to have been overlooked or rejected.

A key challenge for this study was to recruit a balanced and representative group of participants of sufficient size to give valid findings.[253] The researcher was guided by the research problem, aims and questions in deciding to use purposive sampling for the interviews and to use students for the tagging studies. The use of students is an established practice in field research where recruiting can be difficult[254] and students have been used in a variety of studies relating to research on image description.[255] Furthermore, as a precaution to ensure reliability, the comparison between students and non-student taggers carried out as part of this research showed very similar tagging behaviour.[256] Ultimately, a suitable number was achieved. The size for the indexer cohort was similar to a variety of studies in the problem area and others exploring cognitive behaviours.[257] However, there is no doubt that robustness would have benefited from a larger cohort of indexers. While the pilot study interviews with users provided useful evidence, the research would have benefitted if a group of taggers also had been interviewed. However, the level of interest in this study, and the number of responses to participate that it would generate were outside the control of the researcher.

The data gathering through the semi-structured interview process were intended to allow the participants to engage in a less confined discussion. This technique was largely successful, with participants responding in their own way to the substance of the questions as well as making wider observations. The constraints to this data gathering may have come from the themes and terms, based on those which recurred in the literature and the analytic model, used in the questions. For example, questions were asked about the attributes and elements of historic photographs based on the assumptions gained from the literature. Moreover, the interview questions implied that the participants would be able to relate to a variety of theoretical concepts of image analysis and subject levels. After review, a different approach to the interview process seems advisable. While semi-structured interviews would still be used, more consideration would be given to the terms employed in the questions and greater

[253] The sampling for the studies is discussed in sections 3.3.1.1, p. 63, and section 3.3.1.2, p. 65.

[254] See discussion on p. 67.

[255] See examples provided on p. 67.

[256] See section 6.4, p. 143.

[257] See p. 64.

attention to avoiding pre-conceived concepts. The experience with the interview process also brings into question the participant groups that were targeted. The narrow focus on practice observed with most of the professional indexers suggests that the research might have benefitted from engaging with groups other than practitioners, such as managers and LIS educators. The user group would have benefitted if interviews had been conducted with active taggers to supplement the information gathered through the online surveys.

The choice of a field experiment was motivated by its potential to enable research in an authentic setting.[258] However, in a field experimental setting, components such the photo analysis sessions and image dataset tagging via the Flickr web site, could not be wholly isolated from the so-called Hawthorne effect (Babbie, 2010, pp. 233-234; Lavrakas, 2008, p. 255; Williamson & Johanson, 2013, pp. 496-497) and this effect cannot be excluded as a factor in the observed outcomes of the studies. The fact of participating in an experiment and being observed may have altered participants' behaviour and produced atypical results. This effect may mean the results observed in the research will not be seen in a real-life application because the processes involved are so subjective. However, the effects of observation in a real life application may produce a similar Hawthorne effect. A further limitation is that controls may not be strong enough to enable replication.

The data gathered through the online surveys provided a richer data set than had been expected. However, the questionnaires were developed based on the same terms and concepts used in the interviews. As in the interviews, the surveys may have benefitted from more consideration of terms and avoidance of pre-conceived concepts. Furthermore, interviews with a group of taggers might both have helped to inform the development of the questionnaire and provided further insights into tagging behaviour. Improvement to the research design to allow for test-retest reliability, that is making the same measurement more than once, would have strengthened the survey findings.

[258] See discussion on p. 58.

The content analysis was largely performed using the software package QSR N6. This assisted in managing and analysing the qualitative data associated with the study. The software was invaluable in organising and interrogating the volume and complexity of the data collected from various sources. While the software was a helpful tool, the large range of information captured needed to be further analysed and distilled as part of the presentation of the data. Without losing the essence of the data, the final presentation developed the nodes used in QSR N6 into higher level themes. A researcher more skilled in using the software may have been able to manipulate the nodes without losing the data and the already established links in developing these themes.

The historic photographs used in the photo analysis sessions and on the online research website proved to be successful stimuli. The combination of a dataset of untitled and titled photographs for tagging allowed some investigation about how documentation affects tagging, albeit with inconclusive results. A larger dataset and different types of information, including indexer subjects, notes, tags and comments, might assist further in determining documentation effects. As in any research, personal bias and interests might affect the neutrality of observations and improvements to the design, such as having other classifiers work with the researcher to categorise the subject terms/tags or more controls on the research website to analyse tagging interactions, would have strengthened the findings.

An aim in undertaking this study was to contribute to the theory of indexing. The findings, including the workflow model for the professional indexing process, address a gap in the research literature and contribute to the theory base. Upon review, the model would benefit by going back and testing it with participants. Additionally, a weakness of the model is that it is based on the interviews and photo analysis sessions. The model needs to be validated in work settings where the actual practice of professional indexers can be observed.

The research showed tagging behaviour changed after training over a limited study period but further study is needed to distinguish between training and other effects. Research into other forms of training and methods of intervention might also demonstrate more effective ways to work with taggers. The need for a longitudinal

study, aimed at determining whether the effects of training intervention endure, is also desirable. Furthermore, while the findings showed that the tagging was useful and specific enough to classify images into narrow categories and deeper levels of hierarchical taxonomies the research did not examine if the tagging represented the full potential range of subject content, for example, by comparing tagging to subjects provided by an expert group.

Finally, as acknowledged elsewhere in the thesis, the idea that tags are potentially useful in improving retrieval was not specifically tested in this research and formed a working hypothesis only. Future research needs to address the implications for information retrieval of Shatford/Panofsky trained taggers.

9.5 Reflections on the research experience

This section is a summation of the research journey and learning experiences on this journey.

This thesis began with an historic photograph, an explanation of the subjects professional indexers had provided for it, and a series of questions about how well these subjects represent its subject content. This introduced the key challenge of expressing the content of an image, which has been widely discussed over the last twenty years (summarised in Enser, 2008) and the optimum strategy for classifying and indexing images (Ransom & Rafferty, 2011; Rorissa, 2008). My research journey began from my own involvement as a practitioner and manager concerned about the effectiveness of institutional professional practice, especially in circumstances where institutional resources are constrained. The research goal was to gain insight into the interpretation of visual material, to develop indexing theory and guide professional practice, and to contribute to practical methods for making images accessible. These research aims informed the principal research questions and sub-questions. The research journey, with the benefit hindsight, has provided learning experiences. The opportunities for improvement have been discussed above in section 9.4. An overview of the learnings from the mixed methods approach are summarised below.

This research was originally conceived as a qualitative study suitable for largely exploratory research to investigate the research questions. The introduction of quantitative methods provided methodological triangulation to ensure greater confidence in the results.[259] The mixed method design was effective for the exploratory nature of the research. The quantitative findings help to confirm the insights from the qualitative evidence and conversely the qualitative evidence helped to illuminate the quantitative findings. Descriptive statistics were the main quantitative data analysis technique and were used to describe and summarise basic data features. However, some analyses, such as the analysis of skewness, might usefully have been further investigated to examine how skewness might be affected by taggers' consideration of pre-existing tags.[260] The use of inferential statistics provided the opportunity to investigate questions and explore potential relationships more usefully than had been anticipated and proved effective in analysing and identify significant associations in the data relating to the evidence for cognitive dissonance (see section 7.7) and training effects (see section 8.8).

9.6 Implications for image indexing and access

The research highlights the shortcomings of current indexing of historic images and the potential for harnessing tagging to create richer descriptions of historic photographs. The following discussion looks at the professional and work model implications of findings.

9.6.1 Indexing

As discussed in section 9.3.4, there is a clear need to re-consider the institutional model for historic image indexing.[261] The potential for indexers to work co-operatively with taggers also will require new skills and new ways of working which could re-define or even transform their role. Hider (2012) has suggested that it is likely in future that library professionals will increasingly become "metadata librarians" with new roles. Transformation of the role of the professional indexer

[259] See discussion on p. 60.

[260] See p. 262.

[261] Comparative research between library, archive and museum professionals (Angel, 2012) suggests this is an issue for all cultural institutions.

into a tagging community mentor and metadata manager is consistent with outcomes from this research and presents as an option for institutional response to the problems of escalating backlogs and diminished resources.

Findings from this research should therefore act as a catalyst for institutions to clarify indexing aims and goals and to develop improved policy, procedures and strategies, including improving training and informing users about local indexing practices. The importance of including other domain knowledge and points of view in the catalogue should encourage institutions to employ other discipline specialists as indexers and incorporate tagging alongside institutional indexing.

The research suggests that practical image indexing tools, such as an indexing template based on the Shatford/Panofsky classification matrix, could be an effective means of improving the analysis and representation of subject content.

There is a need for the LIS profession to re-visit and develop a better understanding of image searching (Oyarce, 2012) as a way to improve professional indexing.

9.6.2 Tagging

If institutions want to benefit fully from tagging they need to engage actively with their user communities. While the Flickr Commons and other projects have had some success, the LIS profession should not assume that simply making images available online will motivate taggers; the recruitment problems encountered in this research suggest that fruitful engagement with online groups requires a creative approach. Institutions need to have clear strategies and dedicate resources to effectively engage in crowdsourcing.[262] This research suggests that even a relatively small institutional investment might be effective as a small group of taggers over a short time span can add substantially to subject content representation. As well, institutions could adapt the research training to help taggers meet local requirements for subject access.

[262] Holley (2010) provides recommendations on designing crowdsourcing projects and encouraging and supporting active participation based on several major projects.

9.6.3 Image retrieval systems

The research has not directly considered image retrieval systems; however, facilitating tagging input has implications for systems design. While some current software systems allow tagging, institutions need to develop policies, procedures and strategies to incorporate tagging into current indexing structures.[263] If both indexers and users contribute to indexing, the information retrieval system will need to have suitable interfaces and functionality to allow easy inputting and appropriate management of the indexing/tagging contributions. There is potential for taggers to work with recommender systems to further develop the corpus of added tags (Lee, 2011; Sigurbjornsson & van Zwol, 2008) The likely increase in subject descriptors means that the information retrieval system will need functionality that allows search precision to be improved, including the active involvement of end-users in developing ontologies (Bachore, 2012).

9.7 Future research

This study has examined cognitive dissonance between indexing and users and explored how tagging can be used to enhance the description of the subject content of historic photographs. Importantly, the research has confirmed the value of the Shatford/Panofsky classification matrix as an analytic and comparative tool.

Future studies are needed to analyse indexer subject terms and validate the proposed indexing process model. A recommendation is to investigate indexing behaviour in real world field settings, such as the workplace and online tagging spaces. Research, to test whether indexing tools such as an image indexing template can assist in improving indexing, should also be undertaken.

There are several avenues for future tagging research:

- the findings from this study need to be replicated and explored through further quantitative studies on tagging;

[263] The Powerhouse Museum, Sydney (http://www.powerhousemuseum.com/), has pioneered work in this area.

- further study is needed to distinguish between training and other effects. Using different investigative techniques and training methods will help to identify any training effects and what form of learning is optimal;
- investigation is needed to determine how understanding of different subject levels develops with training and the strength and longevity of any effects. A longitudinal study could be used to investigate training effects over time;
- other interventions, such as online interaction with an indexer during tagging or tag recommender systems, should be investigated and compared to training;
- tagger activity and interaction effects need to be investigated; and
- tagging of personal photographs and other images should be compared.

The research investigated relatively short-term tagging outcomes. Further investigation is needed to establish longer-term effects on participation, tagger activity, and subject content representation.

This research has assumed that user descriptions relate to how users formulate search queries. Research is required to confirm this assumption. How tagging performs in providing access may relate to effects such as synonymy and polysemy in tags. The potential of tags to provide a usable and effective corpus for auto extraction warrants investigation.

It is hoped that the results of this research will provide both a foundation for, and an encouragement to, further investigations. This research has provided evidence that current indexing represents only a portion of the subject content of historic images. This is insufficient to enable intellectual access to all the levels of meaning found in images, as exemplified by the indexing of Dorothea Lange's 'Migrant Mother' (see Figure 2.2).[264] Improved content representation requires different approaches. This research has investigated one approach. More research is needed to improve intellectual access to historic photographs.

[264] See pp. 21.

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APPENDICES

Appendix 1 - Interview Questionnaires

Indexer Questionnaire

[These are indicative questions only. The direction the interview takes and the responses of the interviewee will determine the exact wording of these and the intervening and supplementary questions asked during the interviews. The interviews will be recorded with the date and time. A unique number will be assigned to each interview for reference purposes and the identity of the interviewee will be known only to the researcher and not recorded. All interviews will be transcribed. The tapes will be destroyed when the study is complete.]

Interview Ref no.; Date/Time

Demographic questions

- The first questions are dealing demographic questions. What is your position?
- And your age, you can give the decade range?
- And your years of experience in indexing?

What to Index (Process and Principles) Questions

- The next group of questions deal about what to index, the processes and principles. What are the steps you go through in looking at a photograph and deciding on its subjects?
- Do you have a special procedure for how you examine or visually scan a photograph when you are deciding on it subjects? If yes, please describe.
- How do you determine what constitutes a 'subject'?
- How do you approach indexing objects in a photograph?
- How exhaustively should objects be indexed? What parts of things should be indexed?

- How important is it to index objects? Why?
- What generic headings should be used in indexing a photograph?
- How important is it to index generically? Why?
- What abstract concepts should be indexed? If any, how should these be determined?
- How important is it to describe an overall subject or theme for a photograph? What factors would you take into account in determining what this is?
- What other sources of information do you use in indexing a photograph? How do you use these?

Collection Context/Relationship Factors Questions

- The next group of questions deal with the collection context, where a photograph is part of a specific collection. What is the effect on indexing if photographs are part of a specific collection?
- What is the effect on indexing if there are obvious groupings of photographs in a specific collection or the collection as a whole? How do you determine a 'grouping'?
- What effect do the differences between photographs in a collection have in determining the subject/s?
- What other factors effect indexing?
- How does having or not having a digitised photograph available for the client to browse affect your approach to indexing?

Indexing Orientation Questions

- The next group of questions deal with what I call indexing orientation. What role does the photographer's intention or purpose in taking the photograph have in your determining its subject?
- What effect does a consideration of how the user may be interested in the photograph have on indexing? How do you determine the subjects a user may be interested in?

- Do you think that indexing photographs is an objective or subjective process? Explain your viewpoint.

Library Systems Questions

- The next couple of questions deal with library systems. What policy does your organisation have about subject indexing? How does the organisational policy affect your indexing?
- What classification or subject heading systems does your organisation use? How do these systems affect your indexing?

Wrap up Question

- And finally: What do you find easy or difficult about analysing subjects in photographs?

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Intervening and supplementary questions

- What do you mean?
- Can you expand on that?
- Can you give me more detail on that process / issue?
- Can you explain that in more detail?
- Is there anything else?

User Questionnaire

[These are indicative questions only. The direction the interview takes and the responses of the interviewee will determine the exact wording of these and the intervening and supplementary questions asked during the interviews. The interviews will be recorded with the date and time. A unique number will be assigned to each interview for reference purposes and the identity of the interviewee will be known only to the researcher and not recorded. All interviews will be transcribed. The tapes will be destroyed when the study is complete.]

Demographic questions

- The first questions are demographic questions. What is your occupation or position?
- And your age, you may give a decade range?
- And your years of experience in your present occupation?

Finding Photographs Questions

- The next group of questions deals with finding photographs. What sources of information are important for finding the photographs you need? How do you use these?
- How do you decide what subject you should look under in a library catalogue or other source to find a photograph you want?
- What differences are there between the subject used to describe the photograph in a library catalogue and how you might describe the subject when actually looking at the photograph?

The 'Subject' and What Subjects should be Indexed for Access Questions

- The next group of questions deals with the 'subject' and finding photographs. How do you decide what constitutes a 'subject' in a photograph?

- In looking at a photograph what steps do you go through in deciding on its subject?
- How important in searching for a photograph is it to have the objects in the photograph indexed on a library catalogue? Why?
- How exhaustively should objects be indexed? What parts of things should be indexed?
- How important in searching is generic access to photographs? Why?
- What abstract concepts should be indexed? If any, how you think these should be determined?
- How important is it to have a subject for the main subject or theme of a photograph on a library catalogue? What factors do you think should be taken into account in determining what this is?
- How do you think your choice of subjects matches up with the subjects you find in a library catalogue?

Collection Context/Relationship Effects on Subjects Questions

- The next group of questions deal with what I call collection context or relationship effects on indexing. If photographs are part of a specific collection, what effect should this have on the subjects they are given?
- If there are groups of similar photographs in a collection what effect should this have on how they are catalogued and the subjects they are given?
- What other factors, in terms of the collection or context, are important to you and should be considered in giving subjects to a photograph?
- How does having or not having a digitised photograph available for browsing affect how you approach subject searching and how you think a library should provide subjects?

Indexing Orientation Questions

- The next group of questions I call, for want of a better expression indexing orientation. What role does the photographer's intention or purpose in taking the photograph have in how you see its subject?

- When looking for a photograph, do you consider how the indexer may have indexed the photograph? If so, how do you decide what subjects an indexer might have used?
- Do you think that identifying subjects in photographs is an objective or subjective process? Explain your viewpoint.

Library Systems Questions

- A question about library systems. How do library classification or subject heading systems affect how you search for subjects?

Wrap up Question:

- And finally: What do you find easy or difficult about subject searching for photographs?

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Intervening and supplementary questions

- What do you mean?
- Can you expand on that?
- Can you give me more detail on that process / issue?
- Can you explain that in more detail?
- Is there anything else?

Appendix 2 - Studies C and D: Qualtrics Online Survey

Sect 1 WELCOME TO THE TAGGING SURVEY

Thank you for participating in the online tagging research project.

As a final request and to help with the qualitative and quantitative assessment of online tagging I ask you to take about 10 minutes to answer the following questionnaire. Most questions can be answered by clicking on one of the choices provided and should be quick to complete.

Any information you provide will be kept confidential, and your identity will not be disclosed without consent. Any information you provide will be used as data for a dissertation and related publications. If you would like to receive information about the results you may request them in your reply e-mail.

If you have any questions or require any further information about the project please contact Brian Stewart, email bbstewar@our.ecu.edu.au or my supervisor Dr Donald McDermid, Faculty of Computing, Health and Sciences, Edith Cowan University, email d.mcdermid@ecu.edu.au.

This project has been approved by the ECU Human Research Ethics Committee. If you have any concerns or complaints about the project and wish to talk to an independent person, you may contact: Research Ethics Officer, Edith Cowan University, 100 Joondalup Drive, Joondalup, WA 6027, phone: (08) 6304 2170, email: research.ethics@ecu.edu.au.

Sect 2 ABOUT YOUR TAGGING ON THE RESEARCH WEBSITE
The following questions ask you to describe how you tagged photographs on the research website.

Q1 To what extent do you agree with the following statements describing how you tagged or commented on the photographs on the research website:

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
I named the specific objects or events shown (e.g. Sydney Harbour Bridge) (1)	m	m	m	m	m
I described the type of subject (e.g. bridge, portrait) (2)	m	m	m	m	m
I described the general or abstract idea that you think the photograph is	m	m	m	m	m

about (e.g. happiness) (3)					
I named places or locations (e.g. Sydney) (4)	m	m	m	m	m
I gave the date or time period (5)	m	m	m	m	m
I named or described only the things that interested me (12)	m	m	m	m	m
I thought about why the photograph was taken in order to decide what to name or describe (6)	m	m	m	m	m
I used the title to get ideas about what to tag (7)	m	m	m	m	m
I felt that knowing the date or time period of the photograph helped me decide what to tag (8)	m	m	m	m	m
I felt that knowing who the photographer was helped me decide what to tag (9)	m	m	m	m	m
I felt that other users' tags helped me think of tags (10)	m	m	m	m	m
I wanted my tags to help other users find the photograph (11)	m	m	m	m	m

Q2 How did you decide on what tags to use?

Sect 3 ABOUT TAGGING YOUR PERSONAL PHOTOGRAPHS
The following questions ask you to describe how you tag your personal photographs.

Q3a Do you tag or comment on your personal photographs?
m Yes (1)
m No (2)

Answer If Do you tag or comment on your personal photographs? Yes Is Selected

Q3b If you tag your photographs, how long have you been tagging on Flickr?
m 1 month or less (1)
m Between 1 and 6 months (2)

m Between 6 months and 1 year (3)
m Between 1 and 2 years (4)
m 2 or more years (5)

Answer If Do you tag or comment on your personal photographs? Yes Is Selected

Q3c To what extent do you agree with the following statements describing how you tag your personal photographs:

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
I use tags which may only be meaningful to me (e.g. my trip) (1)	m	m	m	m	m
I name the specific objects or events shown (e.g. Sydney Harbour Bridge) (2)	m	m	m	m	m
I describe the type of subject (e.g. bridge, portrait) (3)	m	m	m	m	m
I describe the general or abstract idea that the photograph is about (e.g. happiness) (4)	m	m	m	m	m
I name places or locations (e.g. Sydney) (5)	m	m	m	m	m
I give the date or time period (6)	m	m	m	m	m
I name or describe only the things I am interested in (7)	m	m	m	m	m
I look at other people's tags for ideas for tags to use on my photographs (8)	m	m	m	m	m
I try to use tags that I think will help other people find my photographs (9)	m	m	m	m	m

Q4 Do you tag or comment on photographs by others?
m Yes (1)
m No (2)

Answer If Do you tag or comment on photographs by others? Yes Is Selected

Q4a To what extent do you agree with the following statements describing how you tag or comment on a photograph by others:

	Never (1)	Rarely (2)	Sometimes (3)	Quite Often (4)	Very Often (5)
I name the specific objects or events shown (e.g. Sydney Harbour Bridge) (1)	m	m	m	m	m
I describe the type of subject (e.g. bridge, portrait) (2)	m	m	m	m	m
I describe the general or abstract idea that I think the photograph is about (e.g. happiness) (3)	m	m	m	m	m
I name places or locations (e.g. Sydney) (4)	m	m	m	m	m
I give the date or time period (5)	m	m	m	m	m
I name or describe only the things I am interested in (12)	m	m	m	m	m
I think about why the photograph was taken in order to decide what to name or describe (6)	m	m	m	m	m
I use the title to get ideas about what to tag (7)	m	m	m	m	m
I feel that knowing the date or time period of the photograph helps me decide what to tag (8)	m	m	m	m	m
I feel that knowing who the photographer is helps you to decide what to tag (9)	m	m	m	m	m

I feel that other users' tags help me to think of tags (10)	m	m	m	m	m
I want my tags to help other users find the photograph (11)	m	m	m	m	m

Q5 How do you decide on what tags you will use for a photograph?

Sect 4 SEARCHING FOR PHOTOGRAPHS
The following questions ask you to describe how you use tags when searching for photographs.

Q6 To what extent do you agree with the following statements describing your experience when searching for photographs:

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
Tags make finding photographs easier (1)	m	m	m	m	m
Using a tag cloud to search is the best way to find a photograph (2)	m	m	m	m	m
Tags make it easy to find photographs of specific objects or events I am interested in (3)	m	m	m	m	m
Tags relating to general subjects (e.g. portraits) are too broad to be useful in finding photographs I am interested in (4)	m	m	m	m	m
More tags for abstract subjects or ideas would make it easier to find the photographs I am interested in (5)	m	m	m	m	m
Searching by tags always retrieves photographs whose subject matter matches the tag description (6)	m	m	m	m	m
Location tags make it	m	m	m	m	m

easier to find photographs I am interested in (7)					
Date or time period tags are of little help in finding photographs I am interested in (8)	m	m	m	m	m
Words in titles are more useful than tags for finding photographs I am interested in (9)	m	m	m	m	m
Words used in comments are useful for finding photographs I am interested in (10)	m	m	m	m	m
Searching on all the text (title, comments, etc.) is a better way than searching on tags to find a photograph I am interested in (11)	m	m	m	m	m

Q7 Do you search for photographs on Picture Australia?
m Yes (1)
m No (2)

Answer If Do you search for photographs on Picture Australia? Yes Is Selected

Q7a To what extent do you agree with the following statements describing your experience when searching for photographs on Picture Australia:

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
Picture Australia searches are useful for finding the photographs I am interested in (3)	m	m	m	m	m
Flickr searches are better than Picture Australia searches for finding the photographs I am interested in (1)	m	m	m	m	m
Picture Australia subjects are similar to Flickr tags (2)	m	m	m	m	m

Picture Australia searches are better than Flickr searches for finding the photographs I am interested in (4)	m	m	m	m	m
Flickr tag subjects are more familiar than Picture Australia subjects (5)	m	m	m	m	m

Sect 5 FEEDBACK ON THE RESEARCH PROJECT AND WEBSITE
Your feedback will provide useful information about your participation in the research project.

Q8 To what extent do you agree with the following statements describing your participation in the research project and the research website:

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
I found the photographs on the research website interesting (1)	m	m	m	m	m
I would be interested in tagging more photographs like these (2)	m	m	m	m	m
The tags on the project photographs describe the photographs better than the tags usually found on Flickr (6)	m	m	m	m	m
Participating in this project has made me more knowledgeable about tagging (5)	m	m	m	m	m
Participating in this project will change how I tag in future (3)	m	m	m	m	m
Participating in this project made me understand more about how other people tag (4)	m	m	m	m	m
Participating in the project has made me	m	m	m	m	m

think differently about tagging (7)					
The comments made by other people were useful (8)	m	m	m	m	m
The comments were more useful than the tags (10)	m	m	m	m	m
I am likely to do more tagging in future because of participating in this project (9)	m	m	m	m	m

Sect 6 YOUR EXPERIENCE
Your information will help in understanding how experience may relate to tagging.

Q9 How often do you tag your own photographs on Flickr?
m Never (1)
m (2)
m (3)
m (4)
m Always (5)

Q10 To what extent do you agree with the following statements:

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
I know how to use the Internet to find the things I am interested in (1)	m	m	m	m	m
I know how to do everything I want on Flickr (3)	m	m	m	m	m
I know how to find photographs I am interested in online (2)	m	m	m	m	m
I know how to use social bookmarking sites, such as Delicious, Digg, or CiteULike (5)	m	m	m	m	m
I know how to find the photographs I am interested in on Flickr (4)	m	m	m	m	m

Sect 7 ABOUT YOU
Your information will help in understanding how background may relate to tagging.

Q11 What is your Yahoo ID?
(This is the ID shown on the tags you add. All IDs will be anonymised in the research findings and kept confidential)

Q12 What is your gender?
m Male (1)
m Female (2)

Q13 What is your age group?
m 20 or younger (6)
m 21 to 30 (1)
m 31 to 40 (2)
m 41 to 50 (3)
m 51 to 60 (4)
m 61 or older (5)

Q14 Is English your first language?
m Yes (1)
m No (2)

Q15 What is the highest level of education you have completed? (If you are currently studying check the highest level you have completed)
m Year 12 or less (1)
m Certificate i/ii (2)
m Certificate iii/iv (3)
m Advanced diploma/Diploma (4)
m Bachelor degree (5)
m Graduate diploma/Graduate certificate (6)
m Postgraduate degree (7)
m Other qualification (8)

Q16 What is your occupation?

Q17 And finally, any further comments?

Appendix 3 - Study E: Qualtrics Online Pre-training Survey

Sect 1 WELCOME TO THE PRE-STUDY SURVEY

Thank you for participating in the online tagging research project.

This pre-study survey will help determine how much you know about subject tagging. The survey should only take a few minutes to complete.

Any information you provide will be kept confidential, and your identity will not be disclosed without consent. Any information you provide will be used as data for a dissertation and related publications. If you would like to receive information about the results you may request them in your reply e-mail.

If you have any questions or require any further information about the project please contact Brian Stewart, email bbstewar@our.ecu.edu.au or my supervisor Dr Donald McDermid , Faculty of Computing, Health and Sciences, Edith Cowan University, email d.mcdermid@ecu.edu.au.

This project has been approved by the ECU Human Research Ethics Committee. If you have any concerns or complaints about the project and wish to talk to an independent person, you may contact: Research Ethics Officer, Edith Cowan University, 100 Joondalup Drive, Joondalup, WA 6027, phone: (08) 6304 2170, email: research.ethics@ecu.edu.au.

Section 1 Tagging a photograph

E.g. Title: First cars and trains across Sydney Harbour Bridge, March 1932
Photographer: Sam Hood

Q1 List the tags you would use to describe this photograph? (Please separate your tags with a semi-colon.)

Section 2 SUBJECTS FOR PHOTOGRAPHS
The following questions ask you about subjects

Q2 Have you heard of the Shatford/Panofsky matrix for analysing subjects?
m Yes (1)
m No (2)

Q3 To what extent do you agree with the following statements describing your understanding of subject levels

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
I know what specific subject tags are (1)	m	m	m	m	m
I know what generic subject tags are (2)	m	m	m	m	m
I know what abstract subject tags are (3)	m	m	m	m	m

Q4 The list below contains some tags that might be used to describe some photographs. Select the subject level which you feel best matches the tag

	Specific Subjects (1)	Generic Subjects (2)	Abstract Subjects (3)	Don't know (4)
Hope (1)	m	m	m	m
Sydney (2)	m	m	m	m
Crime (3)	m	m	m	m
Gender roles (4)	m	m	m	m
Gough Whitlam (5)	m	m	m	m
1950s home life (6)	m	m	m	m
1890s (7)	m	m	m	m
Christmas (8)	m	m	m	m
Coolgardie (9)	m	m	m	m
Frank Hurley (10)	m	m	m	m
Starbucks (11)	m	m	m	m
Sydney 2000 Olympics (12)	m	m	m	m

New South Wales (13)	m	m	m	m
Sports (14)	m	m	m	m
1950 (15)	m	m	m	m
War (16)	m	m	m	m
Weddings (17)	m	m	m	m
World War 1 (18)	m	m	m	m
Ned Kelly (19)	m	m	m	m
The Bush (20)	m	m	m	m
Sheep shearing (21)	m	m	m	m
Sun tanning (22)	m	m	m	m
Camels (23)	m	m	m	m
Windy (24)	m	m	m	m
Political rally (25)	m	m	m	m
Sydney Mardi Gras (26)	m	m	m	m
Racism (27)	m	m	m	m
Cyclone Tracy (28)	m	m	m	m
Portraits (29)	m	m	m	m

Q5 The list below contains some tags that might be used to describe some photographs. Select the facet which you feel best matches the tag.

	Who (1)	What (2)	Where (3)	When (4)	Don't know (5)
Hope (1)	m	m	m	m	m
Sydney (2)	m	m	m	m	m
Crime (3)	m	m	m	m	m
Gender roles (4)	m	m	m	m	m
Gough Whitlam (5)	m	m	m	m	m
1950s home life (6)	m	m	m	m	m
1890s (7)	m	m	m	m	m
Christmas (8)	m	m	m	m	m
Coolgardie (9)	m	m	m	m	m
Frank Hurley (10)	m	m	m	m	m
Starbucks (11)	m	m	m	m	m
Sydney 2000 Olympics (12)	m	m	m	m	m
New South Wales (13)	m	m	m	m	m
Sports (14)	m	m	m	m	m
1950 (15)	m	m	m	m	m
War (16)	m	m	m	m	m

Weddings (17)	m	m	m	m	m
World War 1 (18)	m	m	m	m	m
Ned Kelly (19)	m	m	m	m	m
The Bush (20)	m	m	m	m	m
Sheep shearing (21)	m	m	m	m	m
Sun tanning (22)	m	m	m	m	m
Camels (23)	m	m	m	m	m
Windy (24)	m	m	m	m	m
Political rally (25)	m	m	m	m	m
Sydney Mardi Gras (26)	m	m	m	m	m
Racism (27)	m	m	m	m	m
Cyclone Tracy (28)	m	m	m	m	m
Portraits (29)	m	m	m	m	m

Section 3 ABOUT YOU
Your information will help in understanding how background may relate to tagging.

Q6 What is your email address?
(All IDs will be anonymised in the research findings and kept confidential)

Q7 What is your gender?
m Male (1)
m Female (2)

Q8 What is your age group?
m 20 or younger (6)
m 21 to 30 (1)
m 31 to 40 (2)
m 41 to 50 (3)
m 51 to 60 (4)
m 61 or older (5)

Q9 Is English your first language?
m Yes (1)
m No (2)

Q10 What is the highest level of education you have completed? (If you are currently studying check the highest level you have completed)
m Year 12 or less (1)
m Certificate i/ii (2)
m Certificate iii/iv (3)
m Advanced diploma/Diploma (4)
m Bachelor degree (5)
m Graduate diploma/Graduate certificate (6)
m Postgraduate degree (7)

m Other qualification (8)

Q11 What is your occupation?

Section 4 YOUR EXPERIENCE
Your information will help in understanding how experience may relate to tagging.

Q12 Do you tag or comment on your personal photographs?
m Yes (1)
m No (2)

Q13 And finally, any further comments?

Appendix 4 - Study E: Qualtrics Online Training

Section 1 WELCOME TO THE TAGGING TRAINING

Thank you for participating in the online tagging research project.

This tagging training will help you to tag subjects. The exercise should only take a few minutes to complete.

Any information you provide will be kept confidential, and your identity will not be disclosed without consent. Any information you provide will be used as data for a dissertation and related publications. If you would like to receive information about the results you may request them in your reply e-mail.

If you have any questions or require any further information about the project please contact Brian Stewart, email bbstewar@our.ecu.edu.au or my supervisor Dr Donald McDermid , Faculty of Computing, Health and Sciences, Edith Cowan University, email d.mcdermid@ecu.edu.au.

This project has been approved by the ECU Human Research Ethics Committee. If you have any concerns or complaints about the project and wish to talk to an independent person, you may contact: Research Ethics Officer, Edith Cowan University, 100 Joondalup Drive, Joondalup, WA 6027, phone: (08) 6304 2170, email: research.ethics@ecu.edu.au.

Aim Training Outcomes:

The aim of this training exercise is:

- to gain a basic understanding of image subject theory; and
- to learn how to apply a subject classification tool to help in your tagging.

Subject Theory: Panofsky and Shatford

The art historian Erwin Panofsky (Panofsky, 1955) developed a method to analyse images combining both their objective and interpretive aspects. Panofsky distinguished three levels of subject matter or meaning which he called pre-iconographical description (objects or events), iconographical analysis (themes), and iconographical interpretation (meaning). Panofsky's approach was modified by Shatford to provide a theoretical basis for librarians describing image subject matter (Layne, 1994; Shatford, 1984, 1986).

Shatford considered an image may be both ‘of’ something and ‘about’ something. She defined four subject facets:

- who (objects and beings),
- what (activities, events and emotions),
- where (place) or
- when (time).

Each facet has three different aspects: the 'specific of', the 'generic of' and the 'about'. The 'aboutness' of an image tends to represent a more subjective analysis of the image. The classification scheme is shown in the table below.

Table 1 – Shatford/Panofsky subject level classification matrix

	Iconography (Specifics)	Pre-Iconography (Generics)	Iconology (Abstracts)
Who?	Individually named person, group, thing	Kind of person or thing	Mythical or fictitious being
What?	Individually named event, action	Kind of event, action, condition	Emotion or abstraction
Where?	Individually named geographical location	Kind of place: geographical, architectural	Place symbolised
When?	Linear time: date or period	Cyclical time: season, time of day	Emotion, abstraction symbolised by time

The purpose of the faceted classification is to provide the indexer with a structure for systematically identifying possible subject choices. As a minimum, Shatford proposes indexing images with both generic 'of' subjects (e.g. bridge; suspension bridge) and specific 'of' subjects (e.g. Brooklyn Bridge).

References

Layne, S. S. (1994). Some issues in the indexing of images. *Journal of the American Society for Information Science, 45*(8), 583-588.
Library of Congress. Prints and Photographs Division. (1995). *Thesaurus for graphic materials I: subject terms (TGM I)*. Retrieved 21 August, 2000, from http://www.loc.gov/rr/print/tgm1/
Panofsky, E. (1955). Iconography and iconology: an introduction to the study of Renaissance art. In *Meaning in the visual arts* (pp. 26-54). New York: Doubleday.
Shatford, S. (1984). Describing a picture: a thousand words are seldom cost effective. *Cataloging & classification quarterly, 4*(4), 13-30.
Shatford, S. (1986). Analyzing the subject of a picture: a theoretical approach. *Cataloging & classification quarterly, 6*(3), 39-62.

Hints for tagging

Historic photographs are "of" something, such as an identifiable person, place, or thing. They may also be "about" something; that is, an underlying intent or theme is expressed in addition to the specific elements depicted.

In tagging what a photograph is of and about it may help if you think about four questions:

- *Who* do you see? This includes people, animals or things.
- *What* is happening? This includes actions, events, and emotions.
- *Where* is it? The place (including building) or geographic location.
- *When* is it? Time of day; season, or date.

These subjects can be tagged both as a specific item or as a generic type of item. For example, the specific 'Sydney Harbour Bridge' or generic 'Bridges'.

A photograph may represent abstract or symbolic things. For example, a photograph of droving may be about the rugged life of the outback and Australian-ness.

The subject classification matrix can be used as a tool to help you to tag all possible subject categories. When tagging a photograph consider what tags you could use under each level and facet heading. Of course, the range of subject categories will not be applicable to all photographs.

Table 2 – Subject level matrix for tagging use

	Specifics	**Generics**	**Abstracts**
Who?	Named person, group, thing	Kind of person or thing	Mythical or fictitious being
Tags:			
What?	Named event, action	Kind of event, action, condition	Emotion or abstraction
Tags:			
Where?	Named geographical location	Kind of place: geographical, architectural	Place symbolised
Tags:			
When?	Linear time: date or period	Cyclical time: season, time of day	Emotion, abstraction symbolised by time
Tags:			

The example on the next screen shows the matrix in use to help describe different aspects of a photograph.

E.g. Here is a photograph with the matrix partially filled in with some tags.

'Royal Prince Alfred Hospital Christmas tree and party, Matron Dunn, 25/12/1940' by Sam Hood

E.g.

	Specifics	**Generics**	**Abstracts**
Who?	Named person, group, thing	Kind of person or thing	Mythical or fictitious being
Tags:	*Sam Hood*	*Children*	
What?	Named event, action	Kind of event, action, condition	Emotion or abstraction
Tags:		*Christmas parties*	
Where?	Named geographical location	Kind of place: geographical, architectural	Place symbolised
Tags:	Camperdown, NSW	Hospitals	
When?	Linear time: date or period	Cyclical time: season, time of day	Emotion, abstraction symbolised by time
Tags:		*Christmas*	

E.g. What additional tags would you add to this photograph?

'Royal Prince Alfred Hospital Christmas tree and party, Matron Dunn, 25/12/1940' by Sam Hood

Q1 Fill in the specific tags you would add for each facet below. If none, please enter 'none'.

Who	
What	
Where	
When	

Q2 Fill in the generic tags you would add for each facet below. If none, please enter 'none'.

Who	
What	
Where	
When	

Q3 Fill in the abstract tags you would add for each facet below. If none, please enter 'none'.

Who	
What	
Where	
When	

E.g. Here is the original matrix filled in now with some additional tags.

'Royal Prince Alfred Hospital Christmas tree and party, Matron Dunn, 25/12/1940' by Sam Hood

E.g.

	Specifics	**Generics**	**Abstracts**
Who?	Named person, group, thing	Kind of person or thing	Mythical or fictitious being
Tags:	*Matron Dunn* *Sam Hood*	*Nurses* *Children* *Verandas* *Uniforms*	*Santa Claus*
What?	Named event, action	Kind of event, action, condition	Emotion or abstraction
Tags:		Christmas parties	Soulful Nostalgic
Where?	Named geographical location	Kind of place: geographical, architectural	Place symbolised
Tags:	*Royal Prince Alfred Hospital* *Camperdown, NSW*	*Hospitals*	
When?	Linear time: date or period	Cyclical time: season, time of day	Emotion, abstraction symbolised by time
Tags:	*December 1940*	*Christmas*	*Innocent times*

Section 1 Now try tagging a photograph using what you have learned

Title: First cars and trains across Sydney Harbour Bridge, March 1932 Photographer: Sam Hood

Q4 Using the matrix to help you, list the tags you would use to describe this photograph? (Please separate your tags with a semi-colon.)

Section 2 SUBJECTS FOR PHOTOGRAPHS
The following questions ask you about subjects

Q5 Do you feel you understand and can use the Shatford/Panofsky matrix?
m Yes
m No

Q6 To what extent do you agree with the following statements describing your understanding of subject levels

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
I know what specific subject tags are (1)	m	m	m	m	m
I know what generic subject tags are (2)	m	m	m	m	m
I know what abstract subject tags are (3)	m	m	m	m	m

Q7 The list below contains some tags that might be used to describe some photographs. Select the subject level which you feel best matches the tag.

	Specific Subjects (1)	Generic Subjects (2)	Abstract Subjects (3)	Don't know (4)
Hope (1)	m	m	m	m
Sydney (2)	m	m	m	m
Crime (3)	m	m	m	m
Gender roles (4)	m	m	m	m
Gough Whitlam (5)	m	m	m	m
1950s home life (6)	m	m	m	m
1890s (7)	m	m	m	m
Christmas (8)	m	m	m	m
Coolgardie (9)	m	m	m	m
Frank Hurley (10)	m	m	m	m
Starbucks (11)	m	m	m	m
Sydney 2000 Olympics (12)	m	m	m	m
New South Wales (13)	m	m	m	m
Sports (14)	m	m	m	m
1950 (15)	m	m	m	m
War (16)	m	m	m	m
Weddings (17)	m	m	m	m
World War 1 (18)	m	m	m	m
Ned Kelly (19)	m	m	m	m
The Bush (20)	m	m	m	m
Sheep shearing (21)	m	m	m	m
Sun tanning (22)	m	m	m	m
Camels (23)	m	m	m	m
Windy (24)	m	m	m	m
Political rally (25)	m	m	m	m
Sydney Mardi Gras (26)	m	m	m	m
Racism (27)	m	m	m	m
Cyclone Tracy (28)	m	m	m	m
Portraits (29)	m	m	m	m

Q8 The list below contains some tags that might be used to describe some photographs. Select the facet which you feel best matches the tag.

	Who (1)	What (2)	Where (3)	When (4)	Don't know (5)
Hope (1)	m	m	m	m	m
Sydney (2)	m	m	m	m	m
Crime (3)	m	m	m	m	m
Gender roles (4)	m	m	m	m	m
Gough Whitlam (5)	m	m	m	m	m
1950s home life (6)	m	m	m	m	m
1890s (7)	m	m	m	m	m
Christmas (8)	m	m	m	m	m
Coolgardie (9)	m	m	m	m	m
Frank Hurley (10)	m	m	m	m	m
Starbucks (11)	m	m	m	m	m
Sydney 2000 Olympics (12)	m	m	m	m	m
New South Wales (13)	m	m	m	m	m
Sports (14)	m	m	m	m	m
1950 (15)	m	m	m	m	m
War (16)	m	m	m	m	m
Weddings (17)	m	m	m	m	m
World War 1 (18)	m	m	m	m	m
Ned Kelly (19)	m	m	m	m	m
The Bush (20)	m	m	m	m	m
Sheep shearing (21)	m	m	m	m	m
Sun tanning (22)	m	m	m	m	m
Camels (23)	m	m	m	m	m
Windy (24)	m	m	m	m	m
Political rally (25)	m	m	m	m	m
Sydney Mardi Gras (26)	m	m	m	m	m
Racism (27)	m	m	m	m	m
Cyclone Tracy (28)	m	m	m	m	m
Portraits (29)	m	m	m	m	m

Section 3 ABOUT YOU

Q9 What is your email address?
(All IDs will be anonymised in the research findings and kept confidential)

Q10 And finally, any further comments?

Appendix 5 - Study E: Qualtrics Online Final Survey

Sect 1 WELCOME TO THE TAGGING SURVEY

Thank you for participating in the online tagging research project.

As a final request and to help with the qualitative and quantitative assessment of online tagging I ask you to take about 10 minutes to answer the following questionnaire. Most questions can be answered by clicking on one of the choices provided and should be quick to complete.

Any information you provide will be kept confidential, and your identity will not be disclosed without consent. Any information you provide will be used as data for a dissertation and related publications. If you would like to receive information about the results you may request them in your reply e-mail.

If you have any questions or require any further information about the project please contact Brian Stewart, email bbstewar@our.ecu.edu.au or my supervisor Dr Donald McDermid, Faculty of Computing, Health and Sciences, Edith Cowan University, email d.mcdermid@ecu.edu.au.

This project has been approved by the ECU Human Research Ethics Committee. If you have any concerns or complaints about the project and wish to talk to an independent person, you may contact: Research Ethics Officer, Edith Cowan University, 100 Joondalup Drive, Joondalup, WA 6027, phone: (08) 6304 2170, email: research.ethics@ecu.edu.au.

Sect 2 ABOUT YOUR TAGGING ON THE RESEARCH WEBSITE
The following questions ask you to describe how you tagged photographs on the research website.

Q1 To what extent do you agree with the following statements describing how you tagged or commented on the photographs on the research website:

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
I named the specific objects or events shown (e.g. Sydney Harbour Bridge) (1)	m	m	m	m	m
I described the type of subject (e.g. bridge, portrait) (2)	m	m	m	m	m
I described the general or abstract idea that you think the photograph is	m	m	m	m	m

about (e.g. happiness) (3)					
I named places or locations (e.g. Sydney) (4)	m	m	m	m	m
I gave the date or time period (5)	m	m	m	m	m
I named or described only the things that interested me (12)	m	m	m	m	m
I thought about why the photograph was taken in order to decide what to name or describe (6)	m	m	m	m	m
I used the title to get ideas about what to tag (7)	m	m	m	m	m
I felt that knowing the date or time period of the photograph helped me decide what to tag (8)	m	m	m	m	m
I felt that knowing who the photographer was helped me decide what to tag (9)	m	m	m	m	m
I felt that other users' tags helped me think of tags (10)	m	m	m	m	m
I wanted my tags to help other users find the photograph (11)	m	m	m	m	m

Q2 How did you decide on what tags to use?

Q30 ABOUT YOUR INTERACTION WITH THE RESEARCHER AND OTHER TAGGERS
The following questions ask you about the interaction with the researcher and other taggers.

Q32 To what extent to you agree with the following statements describing the interaction between you and other taggers with the researcher on the research website:

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree	Agree (4)	Strongly Agree (5)

			(3)		
I found the training interesting (1)	m	m	m	m	m
The training made me think differently about tagging (2)	m	m	m	m	m
I decided to do more tags because of the training (3)	m	m	m	m	m
The training made me think more about what I tag (4)	m	m	m	m	m
The interaction with the other taggers was useful (5)	m	m	m	m	m
The interaction with other taggers made me think about tagging things I have not tagged before (6)	m	m	m	m	m
I felt the interaction with the researcher helped me to tag (7)	m	m	m	m	m
I am likely to tag differently in future because of the training (8)	m	m	m	m	m
I am likely to tag differently in future because of my interaction with other taggers (9)	m	m	m	m	m
I think the tags on the research website photographs described the photographs better than the tags usually found on Flickr because of the interaction (10)	m	m	m	m	m

Sect 3 ABOUT TAGGING YOUR PERSONAL PHOTOGRAPHS
The following questions ask you to describe how you tag your personal photographs.

Q3a Do you tag or comment on your personal photographs?
m Yes (1)
m No (2)

Answer If Do you tag or comment on your personal photographs? Yes Is Selected

Q3b To what extent do you agree with the following statements describing how you tag your personal photographs:

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
I use tags which may only be meaningful to me (e.g. my trip) (1)	m	m	m	m	m
I name the specific objects or events shown (e.g. Sydney Harbour Bridge) (2)	m	m	m	m	m
I describe the type of subject (e.g. bridge, portrait) (3)	m	m	m	m	m
I describe the general or abstract idea that the photograph is about (e.g. happiness) (4)	m	m	m	m	m
I name places or locations (e.g. Sydney) (5)	m	m	m	m	m
I give the date or time period (6)	m	m	m	m	m
I name or describe only the things I am interested in (7)	m	m	m	m	m
I look at other people's tags for ideas for tags to use on my photographs (8)	m	m	m	m	m
I try to use tags that I think will help other people find my photographs (9)	m	m	m	m	m

Q4 Do you tag or comment on photographs by others?
m Yes (1)
m No (2)

Answer If Do you tag or comment on photographs by others? Yes Is Selected

Q4a To what extent do you agree with the following statements describing how you tag or comment on a photograph by others:

	Never (1)	Rarely (2)	Sometimes (3)	Quite Often (4)	Very Often (5)
I name the specific objects or events shown (e.g. Sydney Harbour Bridge) (1)	m	m	m	m	m
I describe the type of subject (e.g. bridge, portrait) (2)	m	m	m	m	m
I describe the general or abstract idea that I think the photograph is about (e.g. happiness) (3)	m	m	m	m	m
I name places or locations (e.g. Sydney) (4)	m	m	m	m	m
I give the date or time period (5)	m	m	m	m	m
I name or describe only the things I am interested in (12)	m	m	m	m	m
I think about why the photograph was taken in order to decide what to name or describe (6)	m	m	m	m	m
I use the title to get ideas about what to tag (7)	m	m	m	m	m
I feel that knowing the date or time period of the photograph helps me decide what to tag (8)	m	m	m	m	m
I feel that knowing who the photographer is helps you to decide what to tag (9)	m	m	m	m	m
I feel that other users' tags help me to think of tags (10)	m	m	m	m	m
I want my tags to help other users find the photograph (11)	m	m	m	m	m

Q5 How do you decide on what tags you will use for a photograph?

Sect 4 SEARCHING FOR PHOTOGRAPHS
The following questions ask you to describe how you use tags when searching for photographs.

Q6 To what extent do you agree with the following statements describing your experience when searching for photographs:

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
Tags make finding photographs easier (1)	m	m	m	m	m
Using a tag cloud to search is the best way to find a photograph (2)	m	m	m	m	m
Tags make it easy to find photographs of specific objects or events I am interested in (3)	m	m	m	m	m
Tags relating to general subjects (e.g. portraits) are too broad to be useful in finding photographs I am interested in (4)	m	m	m	m	m
More tags for abstract subjects or ideas would make it easier to find the photographs I am interested in (5)	m	m	m	m	m
Searching by tags always retrieves photographs whose subject matter matches the tag description (6)	m	m	m	m	m
Location tags make it easier to find photographs I am interested in (7)	m	m	m	m	m
Date or time period tags are of little help in finding photographs I am interested in (8)	m	m	m	m	m
Words in titles are more useful than tags for	m	m	m	m	m

finding photographs I am interested in (9)					
Words used in comments are useful for finding photographs I am interested in (10)	m	m	m	m	m
Searching on all the text (title, comments, etc.) is a better way than searching on tags to find a photograph I am interested in (11)	m	m	m	m	m

Q7 Do you search for photographs on Picture Australia?
m Yes (1)
m No (2)

Answer If Do you search for photographs on Picture Australia? Yes Is Selected

Q7a To what extent do you agree with the following statements describing your experience when searching for photographs on Picture Australia:

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
Picture Australia searches are useful for finding the photographs I am interested in (3)	m	m	m	m	m
Flickr searches are better than Picture Australia searches for finding the photographs I am interested in (1)	m	m	m	m	m
Picture Australia subjects are similar to Flickr tags (2)	m	m	m	m	m
Picture Australia searches are better than Flickr searches for finding the photographs I am interested in (4)	m	m	m	m	m
Flickr tag subjects are more familiar than Picture Australia subjects (5)	m	m	m	m	m

Sect 5 FEEDBACK ON THE RESEARCH PROJECT AND WEBSITE
Your feedback will provide useful information about your participation in the research project.

Q8 To what extent do you agree with the following statements describing your participation in the research project and the research website:

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
I found the photographs on the research website interesting (1)	m	m	m	m	m
I would be interested in tagging more photographs like these (2)	m	m	m	m	m
The tags on the project photographs describe the photographs better than the tags usually found on Flickr (6)	m	m	m	m	m
Participating in this project has made me more knowledgeable about tagging (5)	m	m	m	m	m
Participating in this project will change how I tag in future (3)	m	m	m	m	m
Participating in this project made me understand more about how other people tag (4)	m	m	m	m	m
Participating in the project has made me think differently about tagging (7)	m	m	m	m	m
The comments made by other people were useful (8)	m	m	m	m	m
The comments were more useful than the tags (10)	m	m	m	m	m
I am likely to do more	m	m	m	m	m

tagging in future because of participating in this project (9)					

Sect 6 YOUR EXPERIENCE
Your information will help in understanding how experience may relate to tagging.

Q9 How often do you tag your own photographs on Flickr?
m Never (1)
m (2)
m (3)
m (4)
m Always (5)

Answer

Q10 If you tag your photographs, how long have you been tagging on Flickr?
m 1 month or less (1)
m Between 1 and 6 months (2)
m Between 6 months and 1 year (3)
m Between 1 and 2 years (4)
m 2 or more years (5)

Q11 To what extent do you agree with the following statements:

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
I know how to use the Internet to find the things I am interested in (1)	m	m	m	m	m
I know how to do everything I want on Flickr (3)	m	m	m	m	m
I know how to find photographs I am interested in online (2)	m	m	m	m	m
I know how to use social bookmarking sites, such as Delicious, Digg, or CiteULike (5)	m	m	m	m	m
I know how to find the photographs I am interested in on Flickr (4)	m	m	m	m	m

Sect 7 ABOUT YOU
Your information will help in understanding how background may relate to tagging.

Q12 What is your Yahoo ID?
(This is the ID shown on the tags you add. All IDs will be anonymised in the research findings and kept confidential)

Q13 What is your gender?
m Male (1)
m Female (2)

Q14 What is your age group?
m 20 or younger (6)
m 21 to 30 (1)
m 31 to 40 (2)
m 41 to 50 (3)
m 51 to 60 (4)
m 61 or older (5)

Q15 Is English your first language?
m Yes (1)
m No (2)

Q16 What is the highest level of education you have completed? (If you are currently studying check the highest level you have completed)
m Year 12 or less (1)
m Certificate i/ii (2)
m Certificate iii/iv (3)
m Advanced diploma/Diploma (4)
m Bachelor degree (5)
m Graduate diploma/Graduate certificate (6)
m Postgraduate degree (7)
m Other qualification (8)

Q17 What is your occupation?

Q18 And finally, any further comments?

Appendix 6 - Themes from the Content Analysis and a Detailed Example of the Process of Data Analysis

Through the process of content analysis a set of coding terms, concepts and themes emerged. This is displayed in Appendix 6: Table 1 - Emergent themes, concepts and unique coding terms.

This appendix also provides a detailed example of the categories and coding used in the data analysis process.

Appendix 6: Table 1 - Emergent themes, concepts and unique coding terms

Themes	**Concepts**	**Unique terms**
Theory and Praxis	Theory	LIS theory Visual theory Policy or guidelines Limitations
	Warrant	Textual Visual
	Practice	Context of practice Resources Systems Training and experience
What is a subject?	"Objective" [Ofness]	Objective Creator's intent
	Interpretive [Aboutness]	Interpretation Avoidance of interpretation
	Readings	Shared Multiple Context of reception Context of creation Context of collection
Models and approaches	User oriented	User needs Search process Criteria for search Viewer's frame of reference Domain issues
	Document oriented	Photograph as standalone item Documentary photographs
	Institutional mission	Institutional mission Institutional clients
	Criteria for identifying subjects	Utility Thresholds of utility Exemplars Quality
Subject levels	Perceptual	Perceptual Format
	Specifics	Specifics Shared perceptions Use of specifics
	Generics	Generics Uncertainty about generics Use of generics
	Abstracts	Abstracts Avoidance of abstracts Use of abstracts
Indexing process	Initiation	Gather information Examine documentation
	Concept identification	Identify main subject Photographer's intent
	Exploration	Explore photograph Identify secondary subjects
	Clarification	Clarification
	Information collection	Research Verify subject identifications
	Decide on subjects	Decide on subjects

The detailed example relates to the theme the "Indexing Process", which emerged from the data analysis. The theme and its categories and terms are shown in the table below.

Appendix 6: Table 2 - "Indexing process" theme

Theme	**Concepts**	**Unique terms**
Indexing process	Initiation	Gather information Examine documentation
	Concept identification	Identify main subject Photographer's intent
	Exploration	Explore photograph Identify secondary subjects
	Clarification	Clarification
	Information collection	Research Verify subject identifications
	Decide on subject	Decide on subjects

The data is presented grouped by concept as follows:

A. Initiation
B. Concept identification
C. Exploration
D. Clarification
E. Information collection
F. Decide on subject.

Within each concept grouping the data is ordered by interview subject according to alphabetical order. The number of each text unit appears to the left of the text itself. The words and phrases pertinent to the concept groupings are highlighted in yellow.

The interview questions are provided in Appendix 1 - Interview Questionnaires and the full interview transcripts are referenced in Appendix 7 - Electronic Data Files.

A. *Initiation*

Subject A

8 Interviewee First I look to see if we know anything about the photo or if the donor has given us any information and if the photographer has written any information on the photo.

Subject E

19 Interviewee That's the one. She was talking about photographs that actually had a life in itself. Which I found interesting because most of the photographs we have don't have that because they come from a lot of the older people in the area and it's just lived in the photo album. There's nothing written on the verso of them. So they come in, they tell you what it's of and you just take it from there and try to research it as much as you can. Because I have to… Another thing, because I have to report every month to a committee, I have got to get a certain amount done. So I also have those other pressures to get the main things in there. Yeah.

51 Interviewee The first thing, as I said before, is what the person who donates the photograph tells me, but obviously you're going to take some of that with a grain of salt. Because people give you a photo and insist it was taken in front of [Town] Oval and it wasn't, it was Perth Oval. So you do take what they say seriously, but you just double-check it, because you should do that anyway. But it's usually actually the verso. If you have information on the verso, it's by far the most useful information. But then I think there's also a fair bit of interpretation to be done of information on the verso. You're lucky if you get one that just says "My brother's wife and Clem at [Town] Oval, 1936. Clem's on the left". Great. That's easy. But it's when you get those ones that have been written on by different generations of people that it becomes…it becomes interesting. And I think you start to need - and this is actually where I actually think my BA in history actually helps me - because you can start to put that kind of thing in context and look at it a bit more critically.

Subject F

18 Interviewee Oh…um…hmm… Nothing sort of… I mean most of the photographs I dealt with actually had some sort of information on them

14 Interviewee Um…well I suppose looking at the photo itself, often that will give you some idea what it may be about. I mean, some photos are very hard to sort of discern what someone could be doing, or it could be a…just some scenery or something. And some of the photos actually do have…they might… It might have some information on the back of the photo that might provide some sort of information or something to that effect. But I mean there are a lot of photos that don't have any information at all, so often it's probably a lot of guesswork as well as to try and sort of ascertain what the photograph may be about. So that's…or, you know, you can sort of… the other option is probably, you know, sort of asking other staff what - that may have [some] sort of knowledge in that sort of

photographic field as well - as to what they might think the photograph is about as well. So, hmm…

Subject G

11 Interviewee Most of the photographs I have are City of [Name] ones and come in little envelopes that kind of give you a fairly…well a broad idea of what the subject is but not all the…

13 Interviewee Aah…no, not really. I - as I said before, I don't know if it came through - most of the photographs are City of [Name] ones and they come in envelopes which have a subject heading on but, um, the subject doesn't necessarily, isn't necessarily what I use. I mean, I might get a packet of photographs that says 'Cars illegally parked' but I look at it and say I don't care about the car that is illegally parked but what street is that in, because I'm looking for streetscapes. So, um, yeah it's…I don't really look at anything in…I'm getting confused. I'm sorry.

Subject I

62 Interviewee Yeah. I mean they [studio or photographer] basically just give us a name because they're their records that they kept and it was just important for getting the person to pay, I think. So that's about all we can get from those. Yeah, I think that's about it.

Subject N

8 Interviewee When I've got a photo in front of me I just have a look at it to see what it's about. And I'd have other information in front of me as well usually from the collection, the provenance of the collection, information about that. So, I'd be keeping that in mind, whether it's a single image just on its own or whether it comes from another collection, like a larger collection. I'd take that into account.

48 Interviewee Yeah, like there's always a correspondence file attached to any acquisitions we have so you would be going through that. You might already have work of the photographer so you might be aware of that or you might not depending whether you were the person who indexed it before. So there'd be that. I guess if let's say it's a historical photograph and it's documenting a particular period but not know anything about that and inform myself more about the period and then maybe understand, or feel you understand the photo better than because you know more about the context of it. Um, and perhaps if the photo's subject, if the subject is a person then maybe you don't know who the person and then you would be looking for information about them.

Subject O

14 Interviewee Well, we probably do not necessarily start in a particular way in looking at a photograph but we probably start from the starting point of the title, plus, um, using any accompanying material that has been received from, um, either the donor or whoever we acquired it, bought the material from plus any research we might have done to see if there is any sort of any aspects we want to bring out. And sometimes it's just in looking at the photograph ourselves and using our own knowledge

of just Australian history or, you know, sometimes it's, you know, if it's just a particular place for example, consulting another staff member who we know is familiar with that place um to actually bring out extra aspects that, you know, aren't evident from the title.

B. *Concept Identification*

Subject A

8 Interviewee First I look to see if we know anything about the photo or if the donor has given us any information and if the photographer has written any information on the photo. Sometimes then especially if it is a street scene and there is a sign and you can research to see which street it's in and that sort of information. Then you look at the major thing in the photo and if it's a street, then the major subject would be the name of the street or the name of the person.

12 Interviewee Usually I look at the whole or what the photographer meant to take the photo of, so if it's a street, he's looking down the street and he meant that photo to be of the street.

Subject B

10 Interviewee I'd look at it first and work out what the main focus of the photograph is. But you also have to look at the photograph overall as well and try to work out what different aspects of the photo different people will want to know about… You want to know what?

14 Interviewee Right. Decide the main subject and then I check on the catalogue, or our Innopac system, to see what subjects might best fit that…that category and try to find the most appropriate subject heading that will describe what I am trying to convey from the photograph. Sometimes its… you have to look at a number of different subject headings to get the message across of what you're trying to get the photo to convey.

Subject F

12 Interviewee Um, I'd say, hmm…Well…Hmm, that's a bit of a hard question. I don't know. I mean it's basically looking at the picture overall and sort of picking out if it's a…say a photograph of women, well then you'd look at it from…You know, you'd say it's 'Women - Western Australia - Photographs' and then possibly bring it, you know, bring it into a more narrower…you know, if they were cleaning or in the kitchen or something like that, and then try and narrow it down even further. So sort of start it at a broad range and then narrower it down even more. So if they are doing a particular task, well then, try and bring it down into that area.

14 Interviewee Um…well I suppose looking at the photo itself, often that will give you some idea what it may be about. I mean, some photos are very hard to sort of discern what someone could be doing, or it could be a…just some scenery or something. And some of the photos actually do have…they might… It might have some information on the back of the photo

that might provide some sort of information or something to that effect. But I mean there are a lot of photos that don't have any information at all, so often it's probably a lot of guesswork as well as to try and sort of ascertain what the photograph may be about. So that's…or, you know, you can sort of… the other option is probably, you know, sort of asking other staff what - that may have [some] sort of knowledge in that sort of photographic field as well - as to what they might think the photograph is about as well. So, hmm…

Subject G

9 Interviewee Ah, first of all, when I first look at a photograph I have to work out if it is actually in the City of [Name], because if it's not, I'm not interested. Um, subject, I look for the…er…probably the things I look for are time frame, what era I think the photograph is. I look for the subject either as a person or group of people or is it a particular street or is it a particular building. Um, the other thing I look for what kind of event this is. Full stop. That's probably all I can think of at the moment.

13 Interviewee Aah…no, not really. I - as I said before, I don't know if it came through - most of the photographs are City of [Name] ones and they come in envelopes which have a subject heading on but, um, the subject doesn't necessarily, isn't necessarily what I use. I mean, I might get a packet of photographs that says 'Cars illegally parked' but I look at it and say I don't care about the car that is illegally parked but what street is that in, because I'm looking for streetscapes. So, um, yeah it's…I don't really look at anything in…I'm getting confused. I'm sorry.

Subject I

10 Interviewee Okay. For subject indexing I would look to see if there is anything I recognise within the photograph. Try and identify the place by...if it was a street scene, by the buildings or any sort of landmarks. And then I would use existing photographs initially to help me identify. We would also use our computers and home-built thesaurus, our validation list, and we also use the Library of Congress Thesaurus of Graphic Images [Materials] to help us with particular subjects. [Laughs.] It's nerve-wracking.

14 Interviewee Um, not a standard routine, I don't think. We have a standard routine for describing the photograph itself. So, we follow a particular format. But, um, well if we can...if we... Just basically find out as much information as you possibly can that's really the process that we use. We... I guess, if it was a geographical shot, that would be the first thing that we do, be to try and locate it and take it from there. Then after that identify specific buildings. But for a portrait, well, there's no particular sequence that we go through. We just...If we can't get a name then we go to the content of what the people were wearing and that sort of thing. [Laughs.]

Subject L

18 Interviewee We t...In the case of...Here go back to the example the [Name] Photographic Archive. There we have several layers of

subject indexing. On the one hand we have provided content, the image, the reference to the actual house or church or interior view. Then on top of that we are adding that very layer which is called the view, a portrait, whatever it may be to add additional qualities or subject characteristics that are associated with the object. So, we do not at this point do an in-depth analysis of the content within the situ, if you get my meaning, with multiple buildings we are looking at. Typically it is a single photograph of a house or some other structure, and at this stage we are identifying its form, structure, and function and we stop at that point. We don't go into other de...we don't go beyond that. In the case of the Napoleon we are going in depth and adding additional layers which goes into something I was referring to earlier, in other words, geographical, personnage and historical events are pulled out and extracted. So we do, however, we do set limits on that because we could continue this process ad infinitum in terms of assigning subject or indexing terms for an object depending on its complexity. …

Subject M

10 Interviewee Well, I pretty much repeat what I just said, I guess. I just...As, like, I look at it as an outsider, what is this a photograph of, what is the main topic. Later I will use a magnifying glass to examine it more carefully to bring out other aspects of it.

Subject N

10 Interviewee Well, I guess when I'm deciding what the subjects are, I'm mindful of the subject headings we've got to pick from which are already on the database. So, I've being using that for a few years so I look at the image and I will try and work out 'okay these subjects will match, I can use those'. Often it happens there aren't any subject headings which will exactly match what you've got and then in that case you try and think more laterally and maybe apply broader headings in combination. So that they'll cover it, maybe not as well but they will still cover it. And I guess there is always the option if there's not a subject heading that fits that you can propose one on the APT. Because it's the APT that we use. That thesaurus.

11 *BS When you look at an image do you consciously thing step one is this, step two is this, step three is that?

12 Interviewee No, I wouldn't saw it's that rational, that ordered. Just thinking if the headings already fit for it, just slap them on. The best mix of headings. Because I know a lot of people they know there's not a heading for it, they could suggest one, but they're just too lazy. I try not to be like that.

14 Interviewee Language I guess. The phrases that come into your head when you look at an image. And whether those phrases are in the thesaurus. Yeah.

Subject O

10 Interviewee Okay I guess the principle is always to provide I guess - what do you call it - subject access based on what we think readers might be looking for. So depending who is in the photograph or what it is for, whether it has historical significance in some way to bring out that

aspect of it. Um, so, yeah, generally just an analysis of what the subject matter of the photograph is and what its historical significance is.

14 Interviewee Well, we probably do not necessarily start in a particular way in looking at a photograph but we probably start from the starting point of the title, plus, um, using any accompanying material that has been received from, um, either the donor or whoever we acquired it, bought the material from plus any research we might have done to see if there is any sort of any aspects we want to bring out. And sometimes it's just in looking at the photograph ourselves and using our own knowledge of just Australian history or, you know, sometimes it's, you know, if it's just a particular place for example, consulting another staff member who we know is familiar with that place um to actually bring out extra aspects that, you know, aren't evident from the title.

C. *Exploration*

Subject A

8 Interviewee First I look to see if we know anything about the photo or if the donor has given us any information and if the photographer has written any information on the photo. Sometimes then especially if it is a street scene and there is a sign and you can research to see which street it's in and that sort of information. Then you look at the major thing in the photo and if it's a street, then the major subject would be the name of the street or the name of the person. After that, I look at minor things that are in the photo that somebody might be interested in, for instance things like if it was in a street if in the foreground there is particularly good detail of street lighting I would give that a subject heading. I go through those sorts of steps.

12 Interviewee Usually I look at the whole or what the photographer meant to take the photo of, so if it's a street, he's looking down the street and he meant that photo to be of the street. And then I look at the smaller parts of that particular building or other thing which a photographer may have taken incidentally, sometimes there are very interesting things in there that the photographer just took incidentally and obviously didn't mean anything to him at the time (or her).

Subject B

10 Interviewee I'd look at it first and work out what the main focus of the photograph is. But you also have to look at the photograph overall as well and try to work out what different aspects of the photo different people will want to know about… You want to know what?

Subject F

12 Interviewee Um, I'd say, hmm…Well…Hmm, that's a bit of a hard question. I don't know. I mean it's basically looking at the picture overall and sort of picking out if it's a…say a photograph of women, well then you'd look at it from…You know, you'd say it's 'Women - Western Australia - Photographs' and then possibly bring it, you know, bring it into a more

narrower…you know, if they were cleaning or in the kitchen or something like that, and then try and narrow it down even further. So sort of start it at a broad range and then narrower it down even more. So if they are doing a particular task, well then, try and bring it down into that area.

Subject I

14 Interviewee Um, not a standard routine, I don't think. We have a standard routine for describing the photograph itself. So, we follow a particular format. But, um, well if we can...if we... Just basically find out as much information as you possibly can that's really the process that we use. We... I guess, if it was a geographical shot, that would be the first thing that we do, be to try and locate it and take it from there. Then after that identify specific buildings. But for a portrait, well, there's no particular sequence that we go through. We just...If we can't get a name then we go to the content of what the people were wearing and that sort of thing. [Laughs.]

Subject L

18 Interviewee We t...In the case of...Here go back to the example the [Name] Photographic Archive. There we have several layers of subject indexing. On the one hand we have provided content, the image, the reference to the actual house or church or interior view. Then on top of that we are adding that very layer which is called the view, a portrait, whatever it may be to add additional qualities or subject characteristics that are associated with the object. So, we do not at this point do an in-depth analysis of the content within the situ, if you get my meaning, with multiple buildings we are looking at. Typically it is a single photograph of a house or some other structure, and at this stage we are identifying its form, structure, and function and we stop at that point. We don't go into other de...we don't go beyond that. In the case of the Napoleon we are going in depth and adding additional layers which goes into something I was referring to earlier, in other words, geographical, personnage and historical events are pulled out and extracted. So we do, however, we do set limits on that because we could continue this process ad infinitum in terms of assigning subject or indexing terms for an object depending on its complexity….

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Subject M

10 Interviewee Well, I pretty much repeat what I just said, I guess. I just...As, like, I look at it as an outsider, what is this a photograph of, what is the main topic. Later I will use a magnifying glass to examine it more carefully to bring out other aspects of it.

D. *Clarification*

Subject A

8 Interviewee First I look to see if we know anything about the photo or if the donor has given us any information and if the photographer has

written any information on the photo. Sometimes then especially if it is a street scene and there is a sign and you can research to see which street it's in and that sort of information. Then you look at the major thing in the photo and if it's a street, then the major subject would be the name of the street or the name of the person. After that, I look at minor things that are in the photo that somebody might be interested in, for instance things like if it was in a street if in the foreground there is particularly good detail of street lighting I would give that a subject heading. I go through those sorts of steps.

36 Interviewee Okay. I use any information that's written on the photo, any information that came with the collection, so I go and look at the collection file, because sometimes the donor has written a letter, so occasionally I've had letters where the donor has written information that that person knew about the photo. Then there's internal evidence, so for instance if I've got a street and I'm not sure about where it is but you can see in the street there's a business name, you can look in the Post Office Directory or old phone books and identify the actual address.

40 Interviewee Quite a lot. It's more likely to have a thematic subject heading as part of a collection for instance, if I'm working my way through a collection and they're on a sort of subject theme, like somebody's trip to Kununurra then I'm more likely to give it a thematic subject heading and think somebody will get more out of having the series of photos rather than just one. Also often, it means we have more information because you sort of gather more information from the other photos and also you can judge… you've got five photos of a fellow going on his trip to Kununurra and there are five photos along the road, usually the best one I choose to put on as many subject headings as possible and the others I just use sketchy subject headings because I figure a researcher while they might be interested in all of them, the best one is probably the one that they'd choose. It doesn't always work of course, but what I think is the best one is not necessarily what the researcher does, so you have to be able to give them enough on the others.

41 The other thing about the context of the collection is you often also know something about who it is taking the photo, and, for instance, people like the [Name] Collection, we knew he took those photos while he was the Secretary to the Premier and many of those photos were taken while he was in his capacity of Secretary, they weren't while he was on holidays or anything. So it gives you more clues why the photos were taken and that the subject is fairly important. I mean it's not just…there's a group of men gathered around a table, it not just a group of men gathered around a table, there's something important about the photo and after a bit of research you discover that the person in the middle is actually the Prime Minister and so you give them a subject heading.

50 Interviewee Not really, no. Except you might wonder why they're different and try to find out and then perhaps they were taken at different times, different events and hopefully there is some internal clue as to why that is.

Subject E

19 Interviewee That's the one. She was talking about photographs that actually had a life in itself. Which I found interesting because most of the photographs we have don't have that because they come from a lot of the older people in the area and it's just lived in the photo album. There's nothing written on the verso of them. So they come in, they tell you what it's of and you just take it from there and try to research it as much as you can. Because I have to… Another thing, because I have to report every month to a committee, I have got to get a certain amount done. So I also have those other pressures to get the main things in there. Yeah.

34 Interviewee Again that depends on the mission of your collection. If it's something, flowers on the [Town] Memorial, War Memorial, the first Anzac Day that it was built, I think you would definitely index that. A stray dog leaning up against it circa 1985 - oh, you'd probably do that as well because you'd be a bit surprised why the photo was in the collection. Um…I'm trying to think of an example of something you wouldn't. Something to do with the [Town] War Memorial. Maybe the Australian flag at half-mast behind it. You might, you know, because if you don't have the date, well, that would probably indicate the date. Yeah, it depends on what you're looking for, I think. But I have actually been thinking about this because you do have that…that issue when, as time moves on and issues in the community change, then you have to re-visit your indexing. Yeah. So… But I'm trying to think of a way to resolve that, but I'm not sure it can be. Yeah.

68 Interviewee Time. Money. Quality of volunteers. Quality of the photograph actually is a big thing. Sometimes you just can't make out… you look at it for ages with a magnifying glass and everything, scan it at high resolution and zoom right in and you can't tell what on earth that thing is. But it could be something amazing. It could radically affect town planning or something, you don't know. You could make a massive discovery, I sometimes wish that. But, um…I actually think it's… Time is the biggest issue and what actually… what your system can cope with as well. Ours only lets us put 16 terms down, descriptors. I think it's 16. Which is fine for books but when you come to photographs you can easily go past that. Very easily. So you do tend to…start thinking about what it is you're likely to be asked for and make this photograph as easy to locate as possible. So, yeah. It's about time, money, I think are the main things.

Subject F

18 Interviewee Oh…um…hmm… Nothing sort of… I mean most of the photographs I dealt with actually had some sort of information on them or, if they didn't, I'd sort of come down and have a look through…sometimes the card catalogue or something like that. If it was, you know…if the cards were still there. That might give me some idea as to what it was about. Umm, yeah, I mean I can't think of anything that comes to mind. Umm, you know, I mean sometimes the ones when people are in the forest and they could be using a bit of equipment or something, sometimes that was a bit hard to ascertain what was really going on. And it may just be a matter of, you know, sort of having a look in the bound volumes [of photocopies

of photographs in the State Library], or, you know, seeing if…you know, checking the…um, the actual collection records or the collection files of that actual photo and seeing if there is some sort of a description.

Subject G

25 Interviewee Okay, probably the only thing I do with cars is the fact it helps sometimes with the time frame. You look at the registration number and you think 'well, so the photograph can't be this age because of all these cars'. So that's the main… You know as far as we're concerned it doesn't matter to me if it's a Mazda or a Peugeot or a Ford, it's the dateli…it's the date on it or the registration. So, um, those kind of objects that's the only information I get from [them]. If it's something like a statue it would be indexed. Um...

29 Interviewee Benches, um, different things like that. You know, if you're asked, say, someone's doing a pi…film or TV show on a particular city and a time frame and you can show them photographs that fit in with that time frame. So I'd be interested in things like that. So, once again, to get the time frame.

Subject H

50 Interviewee Um, the clarity of the photograph and the condition that it's in obviously affect how much you can get out of it, how much you can actually see. And then if it's a very difficult photograph, if you don't have enough material to back it up in terms of Wise's or maps or material around that era it's...you feel sometimes that you are flying blind and that you can only really put down what you see. But in terms of relating it to a definite street you can say roughly if you think... And I have had instances when I haven't been able to work out what the street is, but in the distance I might see a landmark which I've maybe had a photograph from the other direction. So I have managed to finally get two or three together and worked out that maybe I can quite safely say where it is. So in that situation... But probably the important thing is really the clarity of the photograph. If it's very badly damaged or there is a lot of silverisation on it or something it's very hard, you know, to be complete in your indexing, I think.

E. *Information collection*

Subject A

8 Interviewee First I look to see if we know anything about the photo or if the donor has given us any information and if the photographer has written any information on the photo. Sometimes then especially if it is a street scene and there is a sign and you can research to see which street it's in and that sort of information.

36 Interviewee Okay. I use any information that's written on the photo, any information that came with the collection, so I go and look at the collection file, because sometimes the donor has written a letter, so occasionally I've had letters where the donor has written information

that that person knew about the photo. Then there's internal evidence, so for instance if I've got a street and I'm not sure about where it is but you can see in the street there's a business name, you can look in the Post Office Directory or old phone books and identify the actual address.

37 Also occasionally especially if it's a photo of an event, I've managed to find the photo published, for instance recently I did a series… there was a grand prix held in Narrogin in 1951 I think it was and all I knew was that it was a grand prix, Narrogin and the year, but I managed to find the Western Mail where they had published a couple of exactly the same photos that I had and their captions I used as my title and the captions also gave details like who won, who the people in the photos were, what the names of the cars were, the exact date of the event, so it's very useful if you can find them published somewhere.

38 Occasionally too, when I've got a photo of a specialised subject I can look to see if we've got anything in our collection of a history of that subject and often you find the same photo or one very similar and give you information, more information about what's in the photo. The problem with that is time and after a while you get to be able to judge if you think you will be able to find anything or not and usually I give it, if I think I can find something, I give it only half an hour and if I haven't had any luck I give up, I just do my best with what's in front of me.

40 Interviewee Quite a lot. It's more likely to have a thematic subject heading as part of a collection for instance, if I'm working my way through a collection and they're on a sort of subject theme, like somebody's trip to Kununurra then I'm more likely to give it a thematic subject heading and think somebody will get more out of having the series of photos rather than just one. Also often, it means we have more information because you sort of gather more information from the other photos and also you can judge… you've got five photos of a fellow going on his trip to Kununurra and there are five photos along the road, usually the best one I choose to put on as many subject headings as possible and the others I just use sketchy subject headings because I figure a researcher while they might be interested in all of them, the best one is probably the one that they'd choose. It doesn't always work of course, but what I think is the best one is not necessarily what the researcher does, so you have to be able to give them enough on the others.

41 The other thing about the context of the collection is you often also know something about who it is taking the photo, and, for instance, people like the [Name] Collection, we knew he took those photos while he was the Secretary to the Premier and many of those photos were taken while he was in his capacity of Secretary, they weren't while he was on holidays or anything. So it gives you more clues why the photos were taken and that the subject is fairly important. I mean it's not just…there's a group of men gathered around a table, it not just a group of men gathered around a table, there's something important about the photo and after a bit of research you discover that the person in the middle is actually the Prime Minister and so you give them a subject heading.

Subject B

42 Interviewee Yeah. Indexing a photograph can involve quite a lot of

research. If it's a photograph of a place, it may be a street in a town, there may not be any identification of the street on the photograph, so you can use various sources such as post office directories or histories of the town to try and identify particular buildings. If there are shops that have identifiable names on them you may be able to find those through post office directories. They would be the main sources. Certainly local histories. If it's a photograph of a particular building there may have been something written on it from newspaper articles or a history. So there can be quite a lot of historical research that needs to go in before you can positively identify and be able [to] index a photograph usefully.

Subject E

51 Interviewee The first thing, as I said before, is what the person who donates the photograph tells me, but obviously you're going to take some of that with a grain of salt. Because people give you a photo and insist it was taken in front of [Town] Oval and it wasn't, it was Perth Oval. So you do take what they say seriously, but you just double-check it, because you should do that anyway. But it's usually actually the verso. If you have information on the verso, it's by far the most useful information. But then I think there's also a fair bit of interpretation to be done of information on the verso. You're lucky if you get one that just says "My brother's wife and Clem at [Town] Oval, 1936. Clem's on the left". Great. That's easy. But it's when you get those ones that have been written on by different generations of people that it becomes…it becomes interesting. And I think you start to need - and this is actually where I actually think my BA in history actually helps me - because you can start to put that kind of thing in context and look at it a bit more critically. So…um…and the only other way to find out information is… Oh, I use the Historical Society but that's very similar to here, you get the same problems with the donations…yeah, the donors. Yeah, there're the main ones. Because you do end up with photographs you have no idea of what they're actually of and you can only index them knowing that you've got no idea what they're of. And so… Actually thinking of it, they're the ones you actually put the broader subject headings on, because they're…you don't know what they are but you can get a vague sense of it… So, yeah, I guess you do that sometimes because you've got nothing else to do with it [laughs]. So, you've got to do something with it.

Subject F

14 Interviewee Um…well I suppose looking at the photo itself, often that will give you some idea what it may be about. I mean, some photos are very hard to sort of discern what someone could be doing, or it could be a…just some scenery or something. And some of the photos actually do have…they might… It might have some information on the back of the photo that might provide some sort of information or something to that effect. But I mean there are a lot of photos that don't have any information at all, so often it's probably a lot of guesswork as well as to try and sort of ascertain what the photograph may be about. So that's…or, you know, you can sort of… the other option is probably, you know, sort of asking other staff what - that may have [some] sort of knowledge in that sort of photographic field as well - as to what they might think the photograph

is about as well. So, hmm…

18 Interviewee Oh…um…hmm… Nothing sort of… I mean most of the photographs I dealt with actually had some sort of information on them or, if they didn't, I'd sort of come down and have a look through…sometimes the card catalogue or something like that. If it was, you know…if the cards were still there. That might give me some idea as to what it was about. Umm, yeah, I mean I can't think of anything that comes to mind. Umm, you know, I mean sometimes the ones when people are in the forest and they could be using a bit of equipment or something, sometimes that was a bit hard to ascertain what was really going on. And it may just be a matter of, you know, sort of having a look in the bound volumes [of photocopies of photographs in the State Library], or, you know, seeing if…you know, checking the…um, the actual collection records or the collection files of that actual photo and seeing if there is some sort of a description.

46 Interviewee Well sometimes with the cards, um, they did tend to give some sort of information. It may not be a great deal it may give you a bit of a description, more about the photo and possible date of when it was produced or published or whatever, or when it was taken. Also, the fact with the…with the collection notes also, they could also be consulted as well, because there may be some further information that, you know, you could glean from there. But they were sort of the sources I tended to use if I had something that, you know, I was sort of unsure about and I'd sort of go and consult them.

Subject G

55 Interviewee Well, seeing a lot of ours are City of [Name] publications I use the annual reports, especially older ones that had quite a few photographs in. But also, if it was about constructing of a drain or something then I look into the City Engineer's reports to see if there was anything relevant that will pertain to that. Different books, um, things like Seddon's A sense of place, is it? Anyway Seddon's book, which lists a lot of buildings that perhaps I might be interested in finding out when it was built or what it was used for or when it changed its name. So, um…But primarily the annual reports would be my first reference.

Subject H

40 Interviewee Well, we use, where we've got them, the photographer's record, either hand written or card...or a card index which we might have got from him or someone might have first...when they first arrived in the department drawn up some sort of database manually. When it comes to geographic photographs or street scenes we use, obviously, maps of the town. We use a thing called Wise's index which is...goes right back to the 188... Yeah, which tells you if you look up Smith Street and it will give you going up on the left and coming down on the right. So you will get your photograph round the right way and then you will just walk up that street and you'll write down everything that you see in terms of whatever, a draper or a grocer, up and down. And then you will note signs, as well, which will be in Wise's. You might look up a book on the era that might have been talking about that particular company. And like the clothing, for example. We had to find some books on clothing of the

era. And that was very helpful for things you weren't sure about. For World War I portraits of soldiers we had to get books on badges and all the different uniforms so we knew exactly whether it was a lieutenant or a...Yeah, so sometimes that can be very time-consuming too. But once you've got your base information in place, away you go, because quite often it's a series so you're okay then.

Subject I

10 Interviewee Okay. For subject indexing I would look to see if there is anything I recognise within the photograph. Try and identify the place by...if it was a street scene, by the buildings or any sort of landmarks. And then I would use existing photographs initially to help me identify. We would also use our computers and home-built thesaurus, our validation list, and we also use the Library of Congress Thesaurus of Graphic Images [Materials] to help us with particular subjects. [Laughs.] It's nerve-wracking.

24 Interviewee Right. Um, for things like cars or ships, that sort of thing, we would use textbooks to help us to identify them. We would, first of all, we would go to our existing records again to see if we had the same boat or type of car already on our database and then after that we would use textbooks to help us identify. For buildings we would use directories to, if we can find out the location and the date, we would use directories and they would help us identify particular buildings.

60 Interviewee There aren't really standard ones [reference books] that I can think of but we use whatever we possibly can here to help us. Oh, what we do use a lot are the Wise's directories, that sort of thing. And we also used a lot the World War I rolls, that sort of thing, for... We had whole lot of soldier portraits. They were really, really good to help us. We also use things like photographers' registers, as well. They're very useful

Subject M

56 Interviewee I use the Thomas Guide map. Are you familiar with the map books of Los Angeles? Because we put a lot of emphasis on geographic location. And if it's...I just did one, for example. There was a flood on Roosevelt Highway and Las Tunas Canyon. So I look in the Thomas Guide, 'Las Tunas' that doesn't sound right. And I find there is a Tuna Canyon in Malibu which crosses with now what is called Pacific Coast Highway, formerly Roosevelt Highway. So I mention all of that, so that we can find it from the old name and the new name. And so I use the Thomas Guide a lot. And then also to determine if the photo is in a particular geographic area of the city - is it in Los Angeles? Is it in Echo Park which is really Los Angeles. You put Los Angeles in parentheses. That sort of thing. And then I use the telephone book to look up an address or a building, theatre or whatever, and put that in the record, if it's possible. And, I use just our internal numbering system document a lot. And I go into our database to see what's been done before in a similar area. And, um, what else. Oh, and then, when we've done photos of big crimes, for example, the Manson Family and other things, then I go to the department and get books on the subject. If it's a large number of photos and we really want to have good factual information. I go to the Internet and sometimes print out a page for the subject. Sometimes these photos go

to other cataloguers so I was the one that would make the template available to them and get them started. That's all. I try and, you know, bring out what's possible to bring out.

Subject O

14 Interviewee Well, we probably do not necessarily start in a particular way in looking at a photograph but we probably start from the starting point of the title, plus, um, using any accompanying material that has been received from, um, either the donor or whoever we acquired it, bought the material from plus any research we might have done to see if there is any sort of any aspects we want to bring out. And sometimes it's just in looking at the photograph ourselves and using our own knowledge of just Australian history or, you know, sometimes it's, you know, if it's just a particular place for example, consulting another staff member who we know is familiar with that place um to actually bring out extra aspects that, you know, aren't evident from the title.

34 Interviewee Okay, well we use a huge a variety of sources. Well we actually will look at what other material we have on the subject, we will do searches on the Internet to try to find out about an organisation or a person or a particular activity. We will often do research because there isn't sufficient information provided for us to do a really full catalogue record. Um, we'll also do refer to the library's biographical files to find some background on the person which can something be quite useful because it can explain why they were racing around in a car in the middle of New South Wales or something and, and it might tell us when or whatever. When there isn't sufficient information accompanying a photograph um we will generally do some research to try to provide a bit of extra information. And often that will, you know, help us in then determining the subject headings and providing complete subject access to the photograph.

F. *Decide on subject*

Subject A

8 Interviewee First I look to see if we know anything about the photo or if the donor has given us any information and if the photographer has written any information on the photo. Sometimes then especially if it is a street scene and there is a sign and you can research to see which street it's in and that sort of information. Then you look at the major thing in the photo and if it's a street, then the major subject would be the name of the street or the name of the person. After that, I look at minor things that are in the photo that somebody might be interested in, for instance things like if it was in a street if in the foreground there is particularly good detail of street lighting I would give that a subject heading. I go through those sorts of steps.

Subject B

14 Interviewee Right. Decide the main subject and then I check on the catalogue, or our Innopac system, to see what subjects might best fit that…that category and try to find the most appropriate subject heading

that will describe what I am trying to convey from the photograph. Sometimes its… you have to look at a number of different subject headings to get the message across of what you're trying to get the photo to convey.

Subject E

51 Interviewee […] Because you do end up with photographs you have no idea of what they're actually of and you can only index them knowing that you've got no idea what they're of. And so… Actually thinking of it, they're the ones you actually put the broader subject headings on, because they're…you don't know what they are but you can get a vague sense of it… So, yeah, I guess you do that sometimes because you've got nothing else to do with it [laughs]. So, you've got to do something with it.

84 Interviewee The only policy we have is we use…is basically I've said 'use this and this and this', which is the Australian Pictorial Thesaurus, a list of indexing terms that apply to [Town], and the occasional Library of Congress one if it links into the books in the collection, because the idea is that somebody does a search on 'Swan River', they find general library stock and they also find local history material as well. So you have to make that link as well. But there's nothing written down. It's just what we do. So in terms of procedures: you choose a general subject heading or indexing term that fits the photograph, so 'Streetscape' or 'Portrait', whatever, terms from the [Collection] thesaurus and then some more terms from the Australian Pictorial Thesaurus to give it that broader context. So, yeah.

Subject F

10 Interviewee Um, well basically looking at it I go into our Innopac database and see if there are…if the subject [heading] has already been identified and, if so, try and gain it that way in relation to indexing it. So, if a subject heading has already been used, well then I just basically duplicate that across to what I might be indexing. Also, I use the Australian Pictorial Thesaurus as well. So if there…If I look on our database and I can't find a suitable subject heading, then I would go into the Pictorial Thesaurus and try other keywords and see if there is something there that would be suitable and that gives you a listing as well.

12 Interviewee Um, I'd say, hmm…Well…Hmm, that's a bit of a hard question. I don't know. I mean it's basically looking at the picture overall and sort of picking out if it's a…say a photograph of women, well then you'd look at it from…You know, you'd say it's 'Women - Western Australia - Photographs' and then possibly bring it, you know, bring it into a more narrower…you know, if they were cleaning or in the kitchen or something like that, and then try and narrow it down even further. So sort of start it at a broad range and then narrower it down even more. So if they are doing a particular task, well then, try and bring it down into that area.

44 Interviewee Yeah, I use the Australian Pictorial Thesaurus, um…which I found was very good because it… If you went into our catalogue and you

couldn't find a subject heading, I would use that as I always had that sort of window open on the system, so I could actually try a few words that I thought were suitable for that particular photo in regards to it as a subject heading. And often in relation to using it, it would also give you other… you know, it would say 'see something else' or it would say 'this word, we don't use this word, we use something else' which would cover the subject that I was looking for. So the Australian Pictorial Thesaurus I found was very useful to have because, in relation to what I thought should be on our system but wasn't, but was available on the Pictorial Thesaurus.

106 Interviewee Um, I mean the thesaurus was very good because it gave you other alternatives and gave you terms that you could use and terms that you couldn't use. So, I mean, it was a good resource to have available.

Subject L

18 Interviewee We t...In the case of...Here go back to the example the [Name] Photographic Archive. There we have several layers of subject indexing. On the one hand we have provided content, the image, the reference to the actual house or church or interior view. Then on top of that we are adding that very layer which is called the view, a portrait, whatever it may be to add additional qualities or subject characteristics that are associated with the object. So, we do not at this point do an in-depth analysis of the content within the situ, if you get my meaning, with multiple buildings we are looking at. Typically it is a single photograph of a house or some other structure, and at this stage we are identifying its form, structure, and function and we stop at that point. We don't go into other de...we don't go beyond that. In the case of the Napoleon we are going in depth and adding additional layers which goes into something I was referring to earlier, in other words, geographical, personnage and historical events are pulled out and extracted. So we do, however, we do set limits on that because we could continue this process ad infinitum in terms of assigning subject or indexing terms for an object depending on its complexity.

Appendix 7 - Electronic Data Files

The electronic data files are arranged in folders as follows:

Studies A and B:

- Studies A and B Interview and Photo Analyses Transcripts (Word file)
- Studies A and B Photo Analysis Subjects by Interview Subject (Word file)
- Studies A and B Photo Analysis Subject Counts (Excel file)

Study C Website (copy of the research website captured by HTTrack) (WinRAR ZIP Archive File)

Study D Website (copy of the research website captured by HTTrack) (WinRAR ZIP Archive File)

Studies C and D Website Subjects and Surveys:

- Study C Website tagging activity (Excel file)
- Study D Website tagging activity (Excel File)
- Study D Website comments (Excel file)
- Studies C and D Combined Surveys Report (Word file)
- Studies C and D Survey responses identifier listing

Study E Website (copy of the research website captured by HTTrack) (WinRAR ZIP Archive File)

Study E Website Subjects and Surveys:

- Study E Website tagging activity (Excel file)
- Study E Pre-Training Survey Report (Word file)
- Study E Training Survey Report (Word file)
- Study E Final Survey Report (Word file)
- Study E Surveys responses identifier listing