

# Rediscovery of forgotten images in domestic photo collections

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**Abstract** The exponential growth of digital photo collections, combined with the legacy of printed photographs, is leading families to experience difficulties in remembering and finding photographs. Paradoxically this creates new opportunities for the rediscovery of forgotten images. This paper reports a new study in this area, based on interviews and creative activities with ten families in the south-east of England. The study found that many triggers for photo reuse were either speculative or accidental and led people to reinterpret the meaning of photographs in the light of subsequent experience and social discussion. This suggests a need to support serendipitous browsing of photographs and a more fluid and provisional approach to the semantic tagging of personal media.

**Keywords** Digital photography · Photo collection · Memory · Remembering · Retrieval · Browsing

## 1 Introduction

Personal autobiographical memory is triggered and shared in a social and material context. Events are brought to mind

through contact with associated materials or through chance remarks in a conversation. Accounts of events are rehearsed and tailored for the audience at hand, and may be corrected and compared with the accounts of others who were present at the time. A good deal of research on these processes has been carried out in HCI as it relates to the use of photographs in a family context. The emphasis is usually on the use of digital photographs and how to support it, although contrasts with analog photography are common in early work. In this paper we continue this tradition of naturalistic memory research by addressing a topic that applies equally to print and digital photographs: the forgetting of images.

Compared to remembering, forgetting has received little attention in the research literature [2], yet the forgetting of images is becoming a serious problem as the size of image collections rises exponentially. For example, a recent study by Whittaker et al. [18] showed that nearly 40 % of digital photographs in a family collection could not be found in the collection when cued by the naming of a memorable event mentioned by family members. Viewed from another perspective, the rediscovery of forgotten media can be a very powerful and pleasurable event in its own right, as shown in studies of music and physical memorabilia including photograph albums and prints [e.g. 8, 13, 14]. Building on these latter studies as a complement to the Whittaker et al. work on forgetting, we report a new study on the social and material triggers for returning to old photographs in the family collection, and the kinds of associated memories and interpretations given to forgotten images rediscovered.

Our methods were similar to those used by Whittaker et al. and also by Frohlich et al. [9] in their early study of photo organisation and sharing. Ten families with teenage children were interviewed at home about photo archiving

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and reuse before being asked to carry out a creative photo retrieval task. At the end of the first interview, families were asked to fill in diaries of photo use over a subsequent 4-week period. Follow-up interviews were then conducted to discuss diary entries and some of their associated photographs. In the rest of the paper we introduce the motivation for the study with respect to existing literature, outline our methods in greater detail, and report findings across these methods.

## 2 Related work

Early studies of digital photography practices in the home showed that families are no more organised in managing digital photos than analog ones. For example, in a home visit survey of 11 families in northern California, Frohlich et al. [9] found that digital photographs were archived on the family computer in disorganised collections of virtual folders similar to packs of printed photographs. However, in contrast to printed photos, digital photos were not usually put into photo albums. This meant that most printed images were shared loose, out of the packet, in various forms of ‘phototalk’. Further understanding of digital photo management was generated in a later study of ‘photowork’ [12]. Photowork was defined as ‘practices around the organisation and preparation of photos before they are ready to be shared’ (p. 762) and was examined with 12 home users of digital photos in the UK. A photowork life cycle was described in which users apply various filtering and selection activities on a camera or cameraphone, when downloading to a computer, and just prior to sharing via prints or screens. This reflected more detailed organisation than had previously been observed but a continued lack of annotation or consistent backup procedures. Since most sharing of images was done on recent images, participants did not report difficulty in finding photographs and indeed seldom searched for individual images at all. People tended to browse, for example, photos from specific events that were often indicated in folder names, leading the authors to recommend better facilities for browsing and sorting photographs.

In contrast to these findings, Whittaker et al. [18] found that family members often struggled to locate digital photographs from family events which took place more than a year ago. Eighteen UK participants could only find 61 % of such photographs which were an average of 3.1 years old. This surprised participants themselves who were recruited for their role in digital photo archiving and thought they knew where they had stored many of the target photos. Reasons for failure to find photos included a high volume of photos to search, distributed storage across folders, directories, devices and discs, minimal hierarchical

organisation, and minimal revision and maintenance of the photo collection.

In a variation of these studies, Bentley et al. [4] interviewed six digital photo users about their photo collections and compared their behaviours to those of 13 digital music users. Both photos and music were often browsed for a certain ‘kind of’ thing in mind, rather than for specific images or tracks. This resulted in the selection of items that were a ‘good enough’ match to the criteria in *satisficing* behaviour. It also led to people getting sidetracked into reminiscing and storytelling on irrelevant media items encountered accidentally in the search. Despite the computational inefficiency of sidetracking, users reported great pleasure and even joy at coming across photos or music they had not experienced for a long time. Subsequent studies of music and photos have since confirmed the pleasure of serendipitous encounters with forgotten media and begun to explore how to support them by design [e.g. 8, 11, 13].

These studies reveal not only the complexity of organising and finding photos but also two levels of associated remembering. Most studies above deal with memory for photos (or the locations of photos) rather than memory for the events to which they refer. Photographs themselves are not memories but rather memory triggers traditionally thought to be valued for cueing episodic and autobiographical memory [16]. The case of coming across forgotten images, lost in the physical and digital filing structures of the home, may be pleasurable because they bring to mind past events not considered for many years. Whether these memories have themselves been forgotten is an interesting question, especially for the understanding of memory itself. A number of theorists use this contrast between memory and forgetting to challenge conventional psychological notions of memories as things. Bartlett [3, p. 205] describes memory as “an imaginative reconstruction, or construction, built out of our attitudes towards a whole active mass of organised past reactions or experience”. Halbwachs [10, p. 40] talks about current interests and social membership influencing the way in which the past is refashioned, “on the basis of our current concerns and needs”. Bergson [5] and Ricoeur [15] both developed a phenomenological approach to remembering and forgetting in which things are only forgotten for present purposes, and memory acts as a kind of attention to past experiences in the light of the present. Bannon [2] has been one of the few HCI researchers to call attention to this literature, and promote forgetting as a positive feature of human experience that might be supported rather than eradicated by new technology.

To understand the paradoxical value of forgetting better, we undertook a new study of domestic photography focused on forgotten images. By definition, it is not

possible to ask about such images directly. We therefore chose to examine instances and reflections of *photo re-use* in which both remembered and forgotten images are rediscovered. Photo reuse was defined as any occasion on which a photograph is reviewed individually or socially, subsequent to its first viewing. Each occasion of reuse is referred to as a ‘photo outing’ [after 10]. In addition to throwing further light on the influence of image archiving practices on their subsequent reuse, we aimed to identify the social triggers for photo reuse and to observe retrieval and reuse strategies in action. Furthermore, by looking at digital and printed photo reuse over an entire family photo collection, we hoped to revive an interest in printed photo retrieval and extend the photo-range of previous studies to those taken well before the mid-1990s when digital cameras were first purchased by consumers.

### 3 Methods

In summary, the current study aimed to address the paradox of forgotten images by answering two research questions relating to both digital and printed photos:

1. What is the motivation for photo reuse and the discovery of forgotten images?
2. How is photo reuse carried out through particular photo retrieval strategies?

To answer these questions we used a combination of interview, diary and task-based methods adapted from Frohlich et al. [9] and Whittaker et al. [18]. Ten families participated in field work for the study between May and September 2007. The families were based in the south of England, and were recruited through University of Surrey and Guildford Photographic Society mailing lists. No participants in the study were affiliated with the University of Surrey, either as staff or students. Participating households were required to consist of at least two individuals, including at least one parent or guardian and at least one teenage child. They were also required to own at least one personal computer and at least one digital camera in regular use. We requested that at least one parent/guardian and one teenage child to participate in the home visit activities. We were particularly interested in recruiting families with teenagers, as several members of the family would likely be involved in photo taking and reuse practices. Families of this generation were also likely to own a sizeable collection of both analog print and digital photos.

The field work for the study consisted of two home visits with each family, with a period of self-recording in between. During the first home visit, the participating family members took part in a semi-structured interview regarding their practices for taking, storage, and reuse of

photos. After the interview, a teenager and parent were asked to collaborate over the creation of a 10 photo life story album for the teenage child. This was effectively a photo reuse task involving a collaborative search for suitable photographs from the family’s photo archives, and afterwards telling the story of the selected photos. The researcher observed and videoed the process of searching for photos to uncover conversations around photos in the collection, and potential incidences of serendipitous discovery around content. Life history elicitation of this kind has a long history of its own in psychology [17] but has seldom been done collaboratively with photographs. This particular form was used here to encourage creative search for both printed and digital photographs across the lifespan of an individual, within a practical and observable period of time (of around 30–40 min).

For a period of at least 4 weeks between the home visits, the family was also given a “photo diary” in which to record any instances of photo reuse. We asked them to record what prompted the activity, who participated, where the activity took place and the form of the photo set (e.g. analog, digital, prints, on the PC, on the back of a camera). In the second home visit, a researcher collected the completed diaries and discussed the entries with the participating family members.

### 4 Results

We organise the results in relation to the main research questions and a discovery regarding the interpretation of old images that emerged during the analysis. Data from different parts of the procedure are analysed and interpolated to address these issues.

#### 4.1 Motivation for photo reuse

In this section we draw primarily from the discussions we had with the families during the semi-structured interview sessions in both home visits. Various motivations for returning to old photographs emerged as themes in the discussions and we present these here in order of frequency of occurrence. Wherever possible, we refer to specific instances that were noted in the diaries.

##### 4.1.1 Visits of family and friends

The presence of external visitors in the family home was by far the most common prompt for accessing photos. This could either be a pre-meditated event, or more spontaneous sharing, for example, when the family was asked “what they had been up to recently”. We observed that sharing photos between people within the household was prompted

through convenience and proximity. A family member involved in either a photowork or browsing activity would invite, or be joined by, other members of the family who happened to be in the vicinity of the PC on which the browsing was taking place. In this fashion, participants told us that browsing often took place with those that happened to be present at the time, rather than a pre-meditated event where the majority of the household were involved and photos were shared. We observed that it was common for the family computer to be located in a public area of the house which facilitated spontaneous sharing of photos between multiple members of the household. “When I’m on the computer and ... (my wife) will come and we’ll both sit there and have a look at it”, Phil, Family 10.

One instance where older photos were regularly reported as being viewed by visitors were baby photos being brought out to show new girlfriends/boyfriends of teenage children in the household. This was a tradition that most participants could relate to and seems to be based around humour and embarrassing the subject. “... the Christmas before we were showing my daughter’s boyfriend, but not all of them, just some of them, just when she was like really little (laughs) don’t show them that, please don’t show them that!”, Kathryn, Family 7.

#### 4.1.2 Serendipitous discovery of photos

Families identified chance discovery as the most likely reason for exploring their extended print photo archive. In many cases, the last time that the print archive had been accessed was after “accidentally” rediscovering it during a significant event such as moving house or decorating a room. In one instance reported in the photo diary, two members of the family chanced upon a bag of old photos while moving a bed to make way for a new carpet, which led to spontaneous browsing of the images and reminiscing. “We pulled all the carpets up, so we moved the bed and there were another few carrier bag loads ... didn’t even know they were there, but then it was really nice to flick through them”, Phil, Family 10.

A similar kind of chance discovery was also reported for digital photos. Instances of photo work were reported as often triggering extended browsing activity through the photo collection. This could be prompted by a visual cue, such as seeing the directories or thumbnails, or, as reported in some cases, more specific reminiscing and association made surrounding the recently uploaded photos. Simply spotting the desktop icon for photo browsing software was reported as enough to spark interest in some participants, particularly if they were not involved in any immediate tasks, or perhaps tasks they did not want to perform. “If you are sitting on the computer and say, oh I’ll just click on that, oh look, and you can end up spending 15, 20 min. It’s

like when you come across an album. You don’t mean to, but you just idly start and you can’t put it down”, Caroline, Family 8.

Visual cues from desktops and screen savers set to display photos were also common prompts for further exploration of the archive. This was true for members of the household and also for external visitors who noticed particularly arresting or eye-catching images being displayed on the PC. “I suppose, having a screensaver, the wallpaper picture, I think (my friend) said, oh, that’s a good photo, and that would probably go on to, oh, we’ve got some more...”, Sarah, Family 1.

By its very nature, browsing resulting from this type of activity tended to be more spontaneous than pre-meditated. This type of browsing seemed to be indelibly linked with absent-minded “pottering” [19], work avoidance, and other activities centred on procrastination. Participants told us that they would often break off from their original purpose in order to browse photos they had discovered.

#### 4.1.3 Reminiscing about a specific event

Families reported that a more purposeful search of the family photo archive could be prompted by reminiscing about or discussing a particular event with family or friends. In this manner, photographs were often produced as visual evidence to support a particular discussion point. Photographic evidence was seen to be irrefutable if members of a family disagreed over a particular detail about an incident in their past. As opposed to many of the other instances of triggers for photo outings, this resulted in a very deliberate and purposeful search of the archive, as opposed to browsing the photos, with a perhaps less well-defined goal in mind. It is interesting to note, however, that instances like this were seen as an excuse to trawl through the deeper family archive and often resulted in procrastination and more general browsing activities, due to serendipitous discovery of other interesting, unrelated photos during the search. “if I’m looking for something and I have to go through everything, then I’ll start looking, and I’ll start looking and I’ll think ‘oh, I don’t remember that one’, and then I’ll actually start looking further away”, Theresa, Family 4.

Instances of this motivation recorded in the photo diary included a teenager reminiscing about a previous holiday during preparation for their current one, and the mother of a family attempting to settle a disagreement with her husband over details of a car that the family had previously owned. “And he said he had one car that we’d borrowed and we went on a certain holiday, and I said no, we didn’t go on that holiday we went on another holiday. So we were tossing this backwards and forwards about which car we went in. So I thought I could prove it by coming and getting a photograph out of the album”, Theresa, Family 4.

#### 4.1.4 Special photo projects

All the families in our study reported that they had participated in at least one activity that could be classified as a special project undertaken for a milestone event. However, this was a relatively infrequent activity, and we did not capture any instances of special photo projects during the diary recording period. However, we can be certain these activities take place due to the resulting artefacts families showed to us, such as scrapbooks and collages.

Selecting photos for use in special projects often required a deep exploration of family archives. While this process was often inefficient, a great deal of pleasure was derived from revisiting the photos and discovering previously forgotten images. Creation of special projects often was a catalyst for major activities such as scanning of existing print photos and creating hard copies of digital images. “When she was going away we wanted to do her a photo album of all the, you know, of her childhood growing up, so we gave her the originals but so I didn’t lose them I scanned them in kept them all on the computer and I will reprint them so that we’ve got them, rather than losing them”, Theresa, Family 5.

Typical events that prompted such activities were significant birthdays, family weddings and anniversaries. The finished product can take the form of a photo album, a collage of images, or on some occasions, a more temporary display of images around the home during a family gathering. Participants reported using significant memorabilia other than photos in these projects, for example, certificates, ticket stubs, and newspaper articles. A variation of these projects appeared to be pairs of children or young teenagers simply having fun with image editing tools. Although this would often result in new images or collections, the value was in the process of manipulation rather than the end product.

#### 4.2 Photo retrieval strategies

The way in which family members return to and explore their photograph collection was partly revealed in the life story task carried out at the end of home visit 1. This was essentially a special photo project designed to get parent–teen pairs to find up to 10 old photographs representing the life of the teen. By looking at the way this activity was carried out we hoped to shed light on the kind of photo retrieval strategies used in the home and the way in which these lead to the discovery of forgotten images.

Participants spent about half an hour on the task and generally complained that this was not enough time to ‘do justice to it’. In fact, many participants of both generations seemed to enjoy the challenge, frequently got sidetracked from the task in hand, learned new things from it, and

wanted to spend more time going through their photo collections together. This reflects the intrinsic enjoyment derived from reviewing old photographs and its amplification from doing this in conversation with another person who brings their own perspective to the images. All pairs completed the task, assembling around 10 photos representing significant events in the teenager’s life and explaining these in a single narrative at the end. Some features of the images chosen and the narrative told about them are revealing of the way this task was approached, and will help us to understand the organisation of manual and conversational activities in photo retrieval.

For example, the types of images chosen represented a chronological story structure representing the beginning, middle and end of the teenager’s life so far. This seemed to be assumed by both parties from the outset of the task with very little discussion and resulted in selection of an early or baby photograph in position 1 and a very recent photograph in position 10. Between these ‘brackets’, participants selected images representing landmarks in the teenagers’ life. These included the first time something was achieved (e.g. walking), special moments, people or places (e.g. a favourite relative who has now died), memorable holidays or holiday haunts (e.g. a place visited year after year), mundane family moments (e.g. dressing up with a sister), personal interests and hobbies (e.g. sport, music, endurance), personal achievements and successes (e.g. trophies, awards, certificates), and coming of age markers (e.g. birthday parties, girlfriends, boyfriends, trips alone, etc.).

The reporting of these landmarks in the final narrative was shared between parent and teenager in a particular way. Parents tended to start the narrative with reference to the earliest photographs, with initiative shifting to the teenager as the narrative and photographs progressed. This phenomenon in collaborative storytelling reveals the influence of childhood amnesia before the age of about four and the growing independence of teenage children from their parents. Teenagers are reliant on their parents to find and comment on very early images of their lives while parents are reliant on teenagers to find and comment on recent ones. Between these extremes both generations are able to find and comment on images depicting shared experiences. This was done extensively in the narratives to us, revealing a kind of solidarity in the remembering of events between parent and child.

This dynamic was also reflected in the way in which parent and teens browsed their printed and digital photo collections to find suitable photographs for the life story itself. Parents would often take the primary role in identifying and handling early printed photo sets while teens would often take the lead in manipulating the computer to find the most recent digital photos. The choice of who in the pair would actually handle and control the review of

photographic materials turned out to significantly affect the trajectory of the activity and its associated talk. The primary handler tended to drive the browsing and conversation by making suggestions to their partner for comment. Typically, this was the first person to get to the appropriate set of photographs after agreeing a target category to look for.

Participants tended to agree on particular target photo categories sporadically throughout the activity, sometimes making progress at different rates on multiple categories at the same time. For example, the mother in Family 3 began the life story activity with suggestions for a ‘Wedding’ photo relating to her own wedding when the son was 16. The son agreed, but in the same sentence also mentioned ‘Borneo’ as another category to search for. After finding a wedding photo and a second ‘Baby’ photo suggested by his mother, the son introduced two further special places to represent in the life story as follows. Pause intervals in seconds are shown in brackets.

S: I was looking at (a number) an’ stuff and I thought there were some photos of Wales (0.8) cottage

M: Welsh cottage yeah

S: And Brittany we could find, probably not, we could go for Brittany and Wales or one or the other...

These exchanges essentially set up searches for photos 2, 3 and 6 in the life story series, which were dealt with in the order of discovering the appropriate photo sets. One of the affordances of the paper collection in this scenario is that it allowed for parallel searches to be carried out by each participant at the same time. This is illustrated in Fig. 1 which shows the same mother and son searching concurrently for Brittany and Wales photo packs in separate drawers. This kind of behaviour was never observed in connection with digital photographs because there tended to be only one point of access in each home, in the form of a home computer.

Within a particular photo search, participants tended to look through a range of photographs waiting for one which appealed to both of them for the life story. The criteria for satisfaction were not usually discussed, but suggestions and refutations were passed in both directions between handler and observer until agreement was reached. Strong disagreements were voiced by the teenagers at some of their parents’ suggestions, revealing unspoken sensitivities in how they wanted to be displayed in the life story. Again the paper medium afforded more parallel control of the photographs and easier transfer of control between participants. This can be seen in the joint manipulation of a baby album by Family 3, in which pointing and page turning was done simultaneously by four hands (Fig. 2).

Joint control of a screen-displayed album was more difficult, as revealed by an episode with Family 10 shown in the video sequence of Fig. 3. A father and son pair were



**Fig. 1** Concurrent searching through paper collections



**Fig. 2** Joint control of a paper photograph album

searching for a photo from the son’s 15th birthday party at TGI Friday’s, from a thumbnail display controlled by the father. As the son knew the folder system better than his father, he started pointing and giving out navigation instructions to direct his father’s search (Fig. 3a). This culminated in a stylised ‘claw’ gesture over his father’s hand while it was holding the mouse (Fig. 3b), and final withdrawal of his father’s hand to allow him to take over himself (Fig. 3c). In fact this transition was triggered by the father’s suggestion to abandon the birthday party search and look for a specific photograph of the son in a football shirt with his name on. This might have been assisted by direct name-based search for the photograph if the participants had remembered that, but they did not since it had been auto-named with a number. As it was, they made some use of a timeline facility in a software package on the computer to find the image by its date and position. This illustrates a more general point. The ability of the digital medium to present an array of thumbnail images for browsing, and to reorganise a view of these very quickly, was found to be valuable for photo reuse in this task. But performing keyword searches was not.



**Fig. 3** Concurrent searching through digital collections. **a** Son directing PC search, **b** claw gesture over mouse, **c** father removes hand

The rarity of remembering particular images to search for on this task led participants into a particular kind of photo discovery. Individual images and the details they revealed were rediscovered within a *category* of images and experience. Sometimes this resulted in side discussion of these details and the memory they represented. At other times there was less discussion of forgotten images, but more of a mutual homing in on a photograph that seemed to perfectly articulate the period or experience sought for. One example involved a digital image of a fencing match given to the son by a Hungarian friend. This simultaneously captured the memory of a friendship, fencing tournament and personal skill for the life story, despite not being a conventional photograph. Occasionally an image would disrupt the conversation and search activity, and be set aside for later use outside the boundaries of the task. This happened dramatically to the daughter of Family 9 upon viewing a particular early-school photograph. It triggered a 25 s fit of giggles with her sister, and ended with her saying “I’m going to put that up on my wall”. These events had a serendipitous character to them, in the sense of surprising and delighting participants with images or memories they had not experienced for some time. However, none led to serious digression from the task because of the formal and time-constrained context in which it took place.

#### 4.3 Reinterpretation of images

All our participants reported deriving pleasure from opportunities to revisit their household’s photo archives. When participating in a pre-meditated photo project, participants reported an intrinsic pleasure from browsing their photo archives in order to complete the project. Non-goal oriented, opportunistic browsing was also reported as highly pleasurable.

Verbal accounts as to the source of this pleasure were often linked to reinterpretation of images. Revisiting older photos acted not only as a mnemonic to allow recall of prior events, but also facilitated a reappraisal of their

content from a new perspective in order to uncover or create new interpretations, and to make serendipitous discoveries. Thus, each “photo outing” potentially provided a further layer of inscribed, semantic associations with the visual content, enriching the sentimental value of the photo [7]. This was summed up by one mother at the end of the exercise, as a process of losing yourself in an image and its meanings. “That’s the nice thing with photography, that you can sort of lose yourself really. You can look back and see different things or you forget you had something. Its nice to do that”, Caroline, Family 8.

During the home visits, we were told several examples of personally meaningful connections that our participants had discovered or constructed around special photos in their collection. A commonly articulated source of pleasure when viewing older images was “how I’ve changed”. While photos are often taken for the purpose of documentation at the time, reflection on how things have changed can only be discovered following reappraisal of content, and is dependant on personal knowledge of both the past and present. Similarly, uncovering family resemblances within photo collections was also a source of delight. These could be more personal and whimsical than facial or physical resemblances, such as the pose of the subject in the photo of Fig. 4. “I really enjoy this photo because of the way she’s brought her hands up, and in fact, I think the reason I like that one, (is) I’ve got a baby picture somewhere of myself, where I’ve done something very similar and I think it really reminded me of, you know, this is definitely my daughter”, Susan, Family 5.

Humour was a significant source of reported pleasure while revisiting older photos from the archive. Perhaps in contrast to more recent images, it was deemed acceptable (or actively encouraged) to make humorous comments regarding legacy images from the archive. These could be self-deprecating comments made by an individual about themselves as a subject, or directed from an observer to the subject of the photograph. Some photos, particularly those involving younger children in the family, had intentional or scripted amusing content, while other more mundane



**Fig. 4** The pose of a daughter reminds the mother of herself

aspects such as clothing and haircuts were reappraised as amusing or embarrassing. In this sense, humour was often a vehicle used by members of the family to reflect on changes, by lampooning dated fashions or childish behaviour in photos. This can be seen in the following comment on a prom picture (Fig. 5). “And I’ve still got blonde hair there. It’s not even blonde, it’s just like, disgusting colour. Why I had hair of that colour I’ll never know. (B laughs in the background)”, Amy (aged 18), Family 2

Photographs of tents, caravans and holiday cottages were common in the life stories, reflecting British childhoods spent by the sea. These images have grown in significance over the years as families travelled back repeatedly to the same locations or toured with the same caravan or tent. The meaning of these images therefore expanded over the years to stand for multiple holidays and



**Fig. 5** A young woman looks back on her old hair colour

experiences, any one of which could come to mind when reviewing the image again. Families described these photographs as standing for entire eras of their lives, sometimes with a sense of nostalgia if those eras had now ended. For example the holiday cottage shown in Fig. 6 has now been sold by the grandmother of the family. “My mother had this cottage in Wales that she no longer has but as you can see it’s very remote we used to spend a lot of holidays there as well... It was a real shame that she’s sold it. Errmm so yeah, special place to us North Wales along with several others”, Hilary, Family 3.

The content of photos was reported as providing inspiration for non-photo activities. For example, one of our participants described finding an old photo of him on holiday (see Fig. 7). This prompted reminiscing about the holiday, but also a desire to re-read a book he read at the time, and a resolve to visit a local museum related to the history of the holiday destination. In this way, photos can often stimulate new activities or bring latent desires back to the forefront of one’s attention. “I was reading a book, about the D-day landing, and we went to the café that was liberated, the first place in France ... this photo made me think, oh I’ll read the book again”, Phil, Family 10.

Occasionally, photos were a vehicle for quiet reflection on important or especially poignant moments in the life of the household or extended family. For example, the photo shown in Fig. 8 depicts a young son happily taking the trash out for his parents. However, when reviewed several years later, the parents remembered a life-threatening illness experienced and survived by their son, shortly after the photo was taken. “This is Steve off out to the dustbin. We had this in a frame for ages. The thing I always think of



**Fig. 6** Nostalgia for a holiday cottage in Wales





**Fig. 7** An old photo reminds the subject to re-read a book and visit a museum



**Fig. 8** A photo remembered for what happened to the subject shortly after the photo was taken

is this: I took Steve for a check-up at the doctors and he suddenly found Steve had a heart murmur ... and I always look at this photo because it was round about that same time and I always think it's a lovely photo, but also around that time all the worry and fear we had, because we didn't know how bad it was", Phil, Family 10.

Photographs representing the character and identity of their subjects were particularly favoured for the life story album. With hindsight, some of these appeared to have predicted or foreshadowed a characteristic now integral to the personality of the older subject. For example, the left hand image of Fig. 9 predicted the right hand image in later life, showing a love of music from an early age. "About a year there, I think, probably, maybe just a little bit older, always interested in music, right from the word go. And I've never shut the piano. All the kids, as long as they didn't bang on it, they could always go to the piano and play it and do what they like. And as I said, from an early

age he was always on the piano, he loved playing the guitar, you name it, and he just loved playing instruments", Theresa, Family 4.

In many of these examples, the value of a photograph seemed to increase with time, because of the way it connected to other photographs, memories and events since the original was taken. This happened independently of the technical quality of the image and sometimes caused families to return to discarded images, not initially considered worthy of albums, frames or public displays. "They are not brilliant photographs and at the time I put them away and just thought oh yeah, they are not the sort of thing I would put in a frame. But they do capture a moment... like doing her sister's hair. Its sort of a nice family moment and they are both older than that now so looking back it is an interesting picture now. So you do see different things when you go back over them", Caroline, Family 8.

## 5 Discussion

The original motivation for the study was the lesson from previous research that home consumers are forgetting the location and identity of digital photographs as the size of their collection increases. Paradoxically, this appears to lead to intense forms of autobiographical remembering as family members rediscover forgotten images in unexpected ways. Through our study of forgotten images we have found that although there are some purposeful triggers for returning to existing photographs, such as visits by family or friends and reminiscing about specific events, a number of other triggers are more speculative or even accidental. These include children having fun with photo editing tools, special photo projects and chance encounters with printed or displayed images in the home. Many of these activities appear to be done collaboratively, and often lead to the kind of side-tracking reported in previous work [e.g. 4]. This could be seen at work in the life story task, where parents and teens moved seamlessly between manual retrieval, practical discussion and casual reminiscing over time.

Discussion of the *interpretation* of forgotten images begins to explain the intensity of interest in them, and therefore the attraction of sidetracking in photo retrieval. Participants are reminded of activities off-frame and around the time the photo was taken, such as reading a book or visiting a museum (Fig. 7). They fall into making natural contrasts with the appearance of photographic subjects then and now, and see likenesses and similarities between themselves and their relatives (Figs. 4, 5, 9). Finally, they remember and discuss 'future' activities which happened *after* the photograph was taken, which

**Fig. 9** A premonition of things to come



completely change their interpretation of the photograph itself (Figs. 6, 8). These experiences seem to be the exact opposite of habituating to a photograph reviewed over and over again. In the latter case, it is often said that the memory for an image becomes fused with the memory for the event it represents. In the case of encountering a forgotten image, memory for that image triggers a much broader memory for the associated event and unlocks a flood of related memories for subsequent images, people and events. In reviewing an image not viewed for a long time, participants were literally seeing that image anew in the light of their intervening experience and perhaps the absence of a memory for the image itself. Little wonder they stopped and stared in many cases, to ponder its meaning again.

This then is perhaps the most significant theoretical finding of the study, that photo browsing is not only a simple act of navigating to particular images or even remembering events triggered by a particular region of the collection, but it is also a creative attempt to make sense of existing images viewed at the current moment in time and often with others. This goes beyond the mere reconstruction of memory from past experience [3] and adds to the understanding of memory as a phenomenological and social event (see again [5] and [15]). A family looking back on a cottage they used to spend time in (Fig. 6), are in that moment, co-remembering multiple trips and experiences. We can imagine this remembering experience itself now fused into a new ‘memory’ for each member of the family, spanning a longer duration of time and having a new nostalgic relation to the present in which the cottage is no longer accessible to them. Discussion of these perspectives by family members constitutes a microcosm of Halbwach’s collective memory in action, as they come to negotiate what it was to be a family in that place. Personal reflection on that simple image of a child standing in front of a window, with the hindsight of subsequent individual

experience, begins to show the role of photographs in Bergson’s view of memory as an interruption and change to the flux of perception: “By allowing us to grasp in a single intuition multiple moments of duration, it [memory] frees us from the movement of the flow of things, that is to say, from the rhythm of necessity” [10, p. 228].

Other findings elaborate this insight in different ways in relation to the study’s two research questions. From the analysis of photo outings obtained in the photo diaries and their subsequent discussion, we have highlighted two important areas of photo reuse that have received scant attention in the literature to date (Q1). Solitary browsing of photos were common diary entries where an individual reviews their photo collection purely for the intrinsic benefit of deriving pleasure from the collection, without an end goal in mind. This can be instantiated as an adjunct to photowork, through receiving photos from friends or family, specific reminiscences, or serendipitous discovery of images around the home or on the home computer. Social photowork was more popular than solitary photowork for the families in our study, and included selective deletion of images and creating a sub-set of images as a collaborative activity between family members. Its organisation in the life story task shows that it contains aspects of both photowork and phototalk. In effect, the photo-related conversation involved in this kind of activity, is a hybrid form compared with those which have been described before in storytelling or reminiscing conversations [e.g. 1, 6, 7].

The conduct of photo retrieval activities in the home (Q2) is also illuminated by the life story task. The same kind of sidetracking and satisficing behaviours observed by Bentley et al. [4] were observed here, but in social and collaborative form. Indeed, different kinds of images were found by different participants, searching in parallel through printed and digital collections. This division of labour was often agreed by participants early in the

conversation. It led to both solitary sidetracking in the search for materials and social sidetracking when participants came back together to discuss their ‘shortlists’. Participants rarely searched for specific images, but sought to satisfy image criteria as best they could. This was dramatically affected by the affordances of print versus screen-displayed materials as shown in Figs. 1, 2 and 3. Printed photographs were easier to pull out and manipulate, whereas digital photographs were easier to review at a glance in thumbnail mode, and duplicate. The lack of a suitable social setting for many home PCs made collaborative photowork difficult.

An important caveat to our results is that since conducting the study, we have witnessed an exponential growth in the use of social networking services, in particular the popularity of Facebook. This clearly has implications for the way that people share, discover and collaborate around photo collections. At the time of conducting the study in 2007, use of social networking had yet to experience an explosion in popularity, particularly amongst users of the age of the parents in our study. The older teenagers of Family 2 and Family 6 (aged 17 and 18, respectively) reported using Facebook to share photos, and at least one of their parents (the lead respondent in our study in both cases) had also signed up to Facebook, although they reported their own photo-sharing behaviour as very limited. The most frequently reported practice for digitally sharing photos was targeted sharing with a small number of recipients over e-mail.

The findings that we report have a number of implications for domestic digital photo technologies. In particular, the reinterpretation of image meaning and inscribed content, and the highly subjective and personal nature of this content have implications for both the tagging of images, and automated image retrieval tools and software. While tagging has seen wide uptake within both social networking sites and online photo-sharing communities (such as Flickr), results would suggest that it is still not much in evidence in domestic photo collections. Indeed, we would argue that tagging or labelling of images to promote efficient retrieval of content may actually prove to be counter-productive to the user’s phenomenological experience of remembered events and memories. It may lead to an over-familiarisation with the content and a stylisation of the context within which a photo been viewed. Many of the most powerful instances of reinterpretation of content occurred after retrieval of an image in an unexpected or serendipitous manner, and we surmise that it may well be the change of context and unexpected juxtaposition with other photos and materials that may trigger the reinterpretation of the image. In other words, there can be value in inefficiency of search and retrieval from a personal standpoint within domestic collections.

Similarly, the field of automated image-based content retrieval has a long-standing association with efforts to improve the efficacy of searching and browsing domestic photo collections. The findings of our research stand as a counter-point to these approaches by highlighting the cumulative value of inscribed semantic meaning that is accrued over time through a process of review and reflection. In particular, the deeply personal associations made around photographs are often related to events that have transpired off-camera, either at the time or in an intervening time period. Quite clearly, for held meanings such as these, even the most sophisticated image recognition and content retrieval algorithms would struggle to make this association.

To summarise, we therefore advocate an approach that emphasises the user as the *auteur* or author of their own interpretations of images. We have demonstrated that reuse of legacy content in domestic photo collections affords not only rediscovery of previously forgotten images and events, but that this rediscovery can herald the further discovery and creation of new meaning and personal knowledge through reinterpretation of content in light of the current and intervening contexts.

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