

# The Effect of Smartphone Usage on Family Photo Retrieval

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## Abstract

Family photos play an important role in preserving old memories and documenting family events. Within the family, photographs are cultural artifacts which document events shaping family life, often telling a story about relationships within, and between, family members. People make concerted efforts to generate photographic memories of important events, making it nearly impossible today to imagine a birth, child's birthday, wedding or a graduation without associated photographs.

Whittaker et al. (2010) investigated the effects of digital photography technologies on long-term storage images from past events and the ability to access personal image collections. They examined the ability of participants to extract images related to family events from personal collections. The results showed a failure rate of 40%. *Too many pictures* was mentioned by the researchers as a possible reason for the relative failure in retrieval performance. This study was conducted among digital camera users about a decade ago. The smartphone has made its mark over the last ten years. The present study replicates the study of Whitaker et al. (2010) on participants who took photos with their smartphones instead of digital cameras. By comparing the findings of the two studies, the present study examines the effect of smartphone use on family photo retrieval. We expected smartphones to have two opposite effects: On the one hand, the easy availability of mobile phones is likely to significantly increase the number of photos and thus make retrieval difficult. On the other hand, smartphones have introduced new sophisticated image organization and retrieval technologies that are expected to facilitate image retrieval.

The present study is primarily quantitative and is based on the Elicited Personal Information Retrieval (EPIR) experimental technique, according to which the experimenter collects retrieval targets belonging to the participant's personal information collection, and then the participant is asked to retrieve them one after another. This experiment was performed via

Zoom. Each participant joined a Zoom online session through the mobile app which he was asked to download before starting the experiment and the researcher connected with him through Zoom via laptop. The study involved 35 parents who have at least one child under the age of 12 and who photographed their children using smartphones for over two years. The gender distribution and the age of the participants were adjusted to that of the previous study: 14 women (40%) and 21 men (60%) whose age ranged from 28 to 50 years. The retrieval task was artificial, therefore its ecological validity was tested. The test revealed that participants often retrieved their images in a similar manner to that performed in the previous experiment. They retrieved images of events and did so with others. They often searched for images from the distant past and did so mostly with the help of their smartphone. These findings indicate the high ecological validity of the experiment.

At the beginning of the session participants answered a questionnaire about their motivation for long-term retrieval of family photos of their children. They were then asked to mention 5 family events where they photographed their children with smartphones over two years ago. Afterwards in order to perform the experiment, participants were asked to retrieve one by one images from the events mentioned earlier. Participants were not restricted to their retrieval device and could retrieve the images from their smartphones but also from their PCs if they had transferred their photos there. The researcher allowed the participants to reach the target or give up on the retrieval task, without any intervention on her part, in order to prevent research bias. In addition to the audio recording of the session, a manual recording of their actions was made for the sake of privacy for the participants' photos. An additional questionnaire was then proffered which related mainly to the retrieval task they had undergone. This questionnaire also contained open-ended questions that formed the qualitative part of the study. For each retrieval task, the last retrieval method that was used, the retrieval device and whether the retrieval was successful or not were measured. At the end of each experiment, the retrieval times, the size of the image collection (number of images), the age of the collection (when the oldest image was taken) and the average number of images per year were measured. The participants of the study initiated 147 of the tasks themselves (74%) and the rest of the tasks were suggested by the researcher. Retrieval targets included: trips, birthdays and bar/bat mitzvahs, births, first/last day in kindergarten/school and holidays. On average the photographed events occurred 38.31 *months*

before the study ( $SD = 21.48$ ). The participants performed 128 retrieval tasks, an average of 3.66 retrieval tasks per participant ( $SD=1$ ).

The results of the study showed that the importance of family photos among the participants is high and the motivation of the participants to retrieve photos of their children from past events remained high with no significant difference from the previous experiment. No significant difference was found in the percentage of failures or retrieval time between the current study and the previous study and in both studies the participants were unable to find about half of the images from their significant family events.

However, this is not a static, but a dynamic equilibrium. The study's findings clearly indicated two opposing forces. The average number of images in collections has increased six fold, which probably led to the dramatic increase in the percentage of failures in finding images on a computer. From 37% in the previous study to 71% in the current study. However, when the participants retrieved the images from their smartphone, the failure rate dropped to 29%, which is less than half the failure rate when using the computer. This finding shows that the organization and retrieval technologies that the smartphone offers, including the chronological organization of the timeline, search, facial recognition and the use of social networks, have significantly helped retrieve the images.

In the present study most of the target images (75%) were on the participants' smartphones. This seems to indicate that most of the participants were more comfortable retrieving the images on their smartphone thanks to its mobility, accessibility, availability and advanced retrieval technologies. This is in line with what the participants noted about the effects of the smartphone on retrieval. It was also found that most of the retrievals on the smartphone were made by using the timeline in which the images were displayed chronologically. In this method the participants could get directly to the photos' capture date, if known to them. In most cases the date wasn't known to the participants accurately but only in an estimated way. So they estimated the chronological environment and browsed the images up and down the timeline.

The study's findings confirmed the hypothesis that the smartphone's technological literacy and fluency affects the retrieval ability. This means that the more skills the participants had in their smartphone use, the more successful they were in retrieval. This finding is not surprising since heavy smartphone users who have good control over the smartphone's

technologies, knew how to manage, search and retrieve images better than users who only have basic skills in using their smartphone and rarely use the technologies it offers.

The answers to the open-ended questions in the qualitative part of the study revealed that most (69%) claimed that they marked their pictures as favorites. Some indicated that they tend to share the photos on social networks (mainly Facebook and WhatsApp) (29%) and keep the photos as favorites (29%). However, the participants did not retrieve using the 'favorites' category because they had too many photos and only 4% of the retrievals were with the help of manually created albums. The participants' answers may indicate that they marked certain pictures and kept them as favorites due to their desire to share these pictures with their relatives.

The analysis of the participants' answers to the open-ended questions in the qualitative part of the study also revealed that most of the participants had a positive attitude (69%) regarding the effect of smartphone use on the retrieval of the images. These participants had a positive attitude towards the experiment and they indicated that they were comfortable and experienced enjoyment and fun during the experiment task. Half of the participants (49%) noted the effects of the advanced technologies for arranging and managing photos and referred mainly to the various new technologies in the Google Photos app, which include face and place recognition, searching and a chronologically arranged timeline. These rely on artificial intelligence technology. Some of the participants (26%) mentioned mobility, availability and accessibility in their answers as one of the significant advantages of the smartphone. In contrast, the main factors that interfered with participants' ability to find the images were stress, unpreparedness, disorder and disorganization in folders and albums, non-recall and uneven distribution/various storage devices. Participants also noted that as parents of children they do not have time to arrange the pictures and folders, which would have made it easier for them to remember and retrieve the pictures. Participants failed to retrieve most of the images that were in their computer folders, although some participants indicated prior familiarity with the folders as a factor that facilitated their retrieval. Participants had difficulty remembering the sequence and order of events and did not always remember whether they were the ones who took the photos or someone else even though they noted that the use of chronological retrieval by the date in which the event was photographed made it easier for them to retrieve the photos. A small proportion of the participants also mentioned a lack of organization in folders and albums, too many pictures

and duplications and even noted the shortcomings of technology such as date errors and inaccuracies in face recognition and location that sometimes caused disruptions in retrieval. In addition, the research participants suggested various ideas designed to improve the retrieval interface, such as improving the search engines on social networks so that it would also contain the semantic context of the image.

The results of the present study demonstrate the great importance of family photos among parents of young children who take pictures of their children in order to document and preserve memories for the future and to keep in touch with relatives. It can also be learned from the experimental task that the use of the various advanced retrieval methods, especially the timeline, significantly improved the retrieval success and led to a decrease in the percentage of retrieval failures compared to the previous study where these advanced retrieval methods were not used. In the past, people organized images in folders so that the images would be saved not only on the digital camera but also on the computer. Today, however, photo collections have grown, but image retrieval and organization technologies have evolved. The study concludes that the number of images is too large for manual organization, and users should give up trying to do so and instead rely on the various organization and retrieval technologies that the smartphone offers. These conclusions are important because the trends of growing image collections and improving retrieval technologies are expected to rise in the future.

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