My good old Kodak: Understanding the impact of having only 24 pictures to take

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Abstract
Today’s abundance of cheap digital storage in the form of tiny memory cards put literally no bounds on the number of images one can capture with one’s digital camera or camera phone during an event. However, studies have shown that taking many pictures may actually make us remember less of a particular event. In this position paper, we propose to re-introduce the paradigm of old film camera in the context of modern smartphones. The purpose is to investigate how users will behave when a significant capture limitation is imposed in a picture-taking context, and in what kind of pictures this will result. Ultimately, we are interested in the effect on memory recall of such a limitation, and describe a potential study setup that will help us explore this question.

Author Keywords
Human Memory Augmentation; Experience Reconstruction; Experience Sampling Method (ESM); Day Reconstruction Method (DRM);

ACM Classification Keywords
H.5.m. Information interfaces and presentation
Introduction

Commercial cameras have evolved a lot since they first appeared in the early 19th century. In 1883, George Eastman invented the photographic film, and his portable “Kodak Snap Camera” (Fig 1) revolutionized picture taking, which had hitherto required long exposure times, as hence a tripod to operate. Over the years film cameras became smaller, cheaper and universally available but the principle remained the same: buy film, load film, take pictures, deliver film to be developed and repeat. It was not until 1991 that Kodak again revolutionized the traditional photography by introducing the first commercially available digital camera, the DCS 100 (Fig. 1); changing forever the way pictures were captured. The DCS 100 had a maximum resolution of 1.3 megapixel, could store up to 156 digital images and was outrageously expensive (~20,000$) but did not require film. Since then, miniaturization has made it possible to integrate imaging units in mobile phones, smart watches, and even glasses (Fig. 2), while flash storage technology and wireless connectivity now allows for a virtually unlimited number of pictures that can be taken. This unprecedented access to mobile capture hardware pushed the boundaries of traditional image capture, transforming literally everybody into an amateur photographer.

These advancements have not only pushed “traditional” photography, but also created entirely new forms of practices, such as “life logging”. Life logging entails the capturing of personal experiences in an automated and continuous fashion, utilizing hardware that spans from small digital cameras to positioning technology and physiological sensors. People employ life logging for several reasons but mainly for recording experiences (such as trips and sports), keeping an overview of their progress and habits, as a personal reflection tool, or simply for security reasons. What is particularly fascinating about life logging is that capture ideally occurs without the user’s intervention, allowing the user to fully focus on the experience, and not on the capture process. In research, life logging is a valuable technique, suitable for revealing user patterns and habits. However, as capture hardware is increasingly becoming smaller and more discrete (cf. Fig. 2), the fact that these devices often also capture the co-presence, actions, and potentially utterance of others has raised significant ethical concerns. In fact, the concept of continuous capture of everything and everyone conflicts with recent privacy law developments, such as the “right to be forgotten” [6].

Figure 1: First commercial film camera produced in 1888; first commercial digital camera produced in 1991; and a 24-exposure 35mm film.

Whether it comes to life logging or “traditional”, conscious (i.e., user controlled) capture – both tend to produce an extraordinary volume of content that is seldom or never reviewed. In fact, users end up with such great amounts of data that they often find themselves unable to filter or otherwise control them. Pictures in particular are often highly similar (e.g. burst shots), making it tedious for user to manually sort out individual “keepers”. One approach is the development of automated filtering tools that can help to automatically reduce and order the captured content. Popular social networks such as Facebook and Google Plus have recently introduced such services. Another reported phenomenon known as “photo-taking impairment effect” [2] suggests that frequent conscious picture capture may inhibit memory recall. The study showed that participants who only observed exhibits in a museum were better able to recall details when compared to those who took a picture of them.
As an alternative to this, we want to explore the implications of limiting the number of pictures captured in the first place, in effect reintroducing the concept of the classic film camera in the ubiquitous context of smartphones. We hypothesize that a capture limitation will attribute a higher significance to the process of actual image capturing, leading users to be more engaged when taking a picture (as they will have a limited amount of pictures available), which in turn will not only influence the choice of images taken, but also support richer recollections of the actual event.

**My pictures, my memories**
What shapes our personality, what influences our behavior, what makes us unique, is our set of memories. Consequently, people strive to protect their memories from fading away through time. From the first ever recorded attempt to capture a moment by drawing it on a prehistoric cave wall, to the high-resolution picture we capture with our smartphone during our summer vacation, pictures have been a prime tool in this struggle against time and forgetting. But what makes pictures particularly successful in evoking memories? The answer is found in the nature of our episodic memory which is responsible for registering past events and experiences. Episodic memory has a primarily visual nature and as such, visual cues (pictures) have been proven to be exceptionally effective in assisting the recall process [7]. The reason why visual cues are so effective in triggering memories lies in the so-called “configural” nature of visual images and the ability of represented objects to relate to each other, maximizing the information they contain [1].

**Our Approach**
In this position paper we propose an experimental design to investigate if and how a limitation in the pictures one can capture would result in pictures of higher memory value. Specifically, we want to contrast both limited and unlimited picture capture via smartphones with automated life logging picture capture. For this reason, we introduce “Snappy”, a mobile app that implements the traditional film camera paradigm by limiting the number of pictures one can capture. We expect to discover potential behavioral changes exhibited due to the imposed capture limitation. More specifically, we will try to answer the following questions: Would participants think twice before capturing? Will they capture only important events during an experience? Will they have richer recollections when reviewing these pictures afterwards? Will they feel more engaged during capture and reviewing? Will they have a higher feeling of ownership (“This photo is mine, I took it myself”)? Will they remember more by printing them and reviewing them through a physical album?

Below we discuss a study design that examines the ability of pictures to support episodic memory recall. We plan to employ Experience Sampling (ESM) and Day Reconstruction methods (DRM) for obtaining both quantitative and qualitative results. We hypothesize that an imposed limitation during picture capture will produce pictures of higher memory value.

**Envisioned Study Design**
We propose a within-groups design, i.e., all participants will undergo all three conditions. For limiting any potential bias and learning effects we will counterbalance the condition order across participants.
First condition (Limited)
In the first condition, participants are asked to use the Snappy app to document their day by capturing a limited number of pictures. The limitation could be a maximum of 12 or 24 pictures per day, same as a regular 12/24-exposure film, or even less if pilot trials show that this would not yet constitute a limitation. Afterwards, participants are asked to review their pictures and reconstruct their day based on them.

Second Condition (Free)
In the second condition, participants use the default camera app to capture as many pictures as they wish in order to document their day. Afterwards, participants are asked to review their pictures and reconstruct their day based on them.

Third Condition (Automated)
In the third condition participants use a life logging camera (e.g., the Narrative clip) to continuously capture their day. Afterwards, participants are asked to review their pictures and reconstruct their day based on them.

Each condition is separated by a week (for a 3-week study), and covers one or more days (depending on the results of an initial pilot study). Several interview / reconstruction sessions intersperse the conditions.

Method
Ideally, all groups should share the same uncommon experience (a trip, a hike, sightseeing etc.). If this is not possible then we will ask participants to use the app and the Narrative clip for a period of time that will ensure enough content is captured (1 week per condition at least). The difference between a “regular” day and a special experience might in itself be an interesting condition to explore.

At the end of each day participants will be asked to review all the pictures captured in every condition via Snappy app on their smartphones. For this, they will use a custom made GUI that will ask for each picture to quantify (from 1 to 5) the importance of it for the participants (“How important is this picture for you?”), the ownership feeling (“How much ‘yours’ does this picture feel?”) and the general feeling during the process (“How happy do you feel right now?”). Moreover, participants will have the option to discard a picture but they will have to select a reason (dark, blurry, irrelevant, private, or other) for doing so.

- The importance question aims at revealing the overall gravity of the picture in terms of sentimental and memory value. Is this a picture that triggers any memories?
- The ownership question aims at revealing the participant’s inclination towards the picture. Does she feel she took the picture? Does the picture hold any personal value or attribute or is it just a random picture for her?
- The happiness question aims at revealing the participant’s emotional levels during the reviewing session. Will she perceive the task as a joyful activity?

For every participant for each condition, we will schedule one lab interview at the end of a predefined day (3 days per participant) and we will perform DRM (Day Reconstruction Method) [4], where we will ask the
participants to describe their day without the aid of any memory cue to extract ground truth. Next, we will provide any captured content for each condition respectively and we will ask participants to describe again their day (think aloud). This will help us to obtain insights on which approach (limited, free, automated) generates pictures that elicit the highest number of memories.

**Discussion**

All in all, we expect to detect plausible differences among all three conditions when it comes to capture behavior. We hypothesize that the first condition (limited) will produce pictures of higher assigned importance, particularly when compared to the third condition (automated). Moreover, we expect that pictures taken during the first condition will systematically include more people than the other two conditions. One reason is that the imposed capture limitation during the first condition will drive participants into taking pictures that primarily include themselves or others. Besides, social interactions have been proven to be one of the most effective cues for triggering episodic and autobiographic memories. For example, Lee and Dey [5] used SenseCam [3] pictures to investigate what elements included in a picture can enhance memory recall and found that the co-presence of people in images was often associated with rich recollections. As such, we expect that pictures originating from the first condition will support better recall of one's momentary experiences.

Moreover, we expect pictures captured during the first (limited) and second (free) condition will be assigned as of higher ownership, when compared with pictures captured during the third condition (automated). A plausible explanation for this is that participants are fully aware and in control when capturing a picture using their smartphone. We expect pictures with higher assigned ownership feeling will lead to richer recollections.

Last, we expect the review of pictures captured during the first condition (limited) will produce the highest reported happiness feeling, followed by second and third condition. The reason to believe so is that the first condition keeps the number of pictures limited and thus, participants will review their pictures with considerable ease. We expect the exact opposite with the third condition (automated), where participants will have to go through a large number of almost identical pictures.

**Conclusions**

Overall, we believe that we will be able to find that conscious, limited capture leads to pictures of higher memory value. However, people constantly adapt their behavior to different situations and settings. Therefore, we expect that the context in which the capture will take place will strongly affect the outcomes of this study. A trip, a hike or any other memorable experience can trigger naturalistic picture capture. In the absence of such occasion, an incentive could motivate participants to take more pictures but at the same time may dilute external validity.

**References**