



Raisa Halonen

**FROM PHOTOGRAPHERS TO VIEWERS –
WHAT MAKES EDITORIAL PHOTOS INTERESTING?**

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Supervisor Professor Pirkko Oittinen
Instructor Docent Jukka Häkkinen

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|---|--|------------------------------|---------|
| Author | Raisa Halonen | | |
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Abstract

The licentiate thesis focused on the editorial interestingness of photos. The term editorial interest was coined in the study; it refers to all factors that contribute to making a photograph editorially interesting in professional workflow. The thesis considered the whole process from taking, editing and selecting editorial photos to viewing the final, published photos.

Three research questions were set for the study. The first concentrated on the factors that influence the editorial interestingness of photos in the process of their creation and selection. The second question dealt with the factors, which affect the interestingness of editorial photos according to viewers. These two questions were approached through three case studies. The third research question analyzed what factors of editorial interest are overarching independent of the scenario.

The two first cases examined the production perspective of news photos: the first with observations and thematic interviews in a photo agency, the second through a survey integrated in the publishing system of four newspapers. The third case study was conducted as an interestingness evaluation with supporting interviews in a laboratory setting with amateur participants and magazine photos as material.

All three cases had five factors of editorial interestingness in common; those factors were overarching independent of test setting, photo genre, and role of evaluator. The factors were aesthetics, affect, novelty-complexity, semantics, and utility. The editorial interestingness of a photo was thus influenced by aesthetic criteria, the ability of the photo to evoke emotion, unexpectedness, content-related criteria, and versatile possibilities of photo use.

Viewers considered editorial interestingness to encompass two additional factors: the ability of the photo to attract and hold attention, and self-reference experienced by the viewer. These two were confirmed by literature, which suggested also one additional factor, so called coping potential, i.e. person's ability to adapt and to cope with a novel, complex view.

Keywords Photographs, interest, interestingness, editorial photo workflows, editorial interest, viewer interest, aesthetics, affect, attention, novelty-complexity, self-reference, semantics, utility

Tekijä Raisa Halonen

Työn nimi Valokuvaajasta katsojaan – mikä tekee toimituksellisista kuvista kiinnostavia?

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Tiivistelmä

Lisensiaatintyön aiheena oli valokuvien toimituksellinen kiinnostavuus. Toimituksellinen kiinnostavuus asetettiin työssä kattotermiksi, jonka alle kuuluvat kaikki kuvan kiinnostavuuteen ammattilaistyönkulussa vaikuttavat tekijät. Työssä tarkasteltiin koko prosessia kuvan ottamisesta, käsitteystä ja valinnasta valmiin, julkaistun kuvan katseluun.

Työlle asetettiin kolme tutkimuskysymystä. Ensimmäinen keskittyi tekijöihin, jotka vaikuttavat toimituksellisten kuvien kiinnostavuuteen niiden luonti- ja valintavaiheessa. Toinen kysymys selvitti, mitkä tekijät vaikuttavat toimituksellisten kuvien kiinnostavuuteen katsojan näkökulmasta. Näitä kahta tutkimuskysymystä lähestyttiin kolmen tapaustutkimuksen kautta. Kolmas kysymys analysoi, mitkä toimituksellisen kiinnostavuuden tekijät ovat yhdistäviä tilanteesta riippumatta.

Kaksi ensimmäistä tutkimusta selvittelivät tuotantonäkökulmaa uutiskuvien puolella: ensimmäinen havainnointien ja teemahaastattelujen kautta kuvatoimistossa ja jälkimmäinen toimitusjärjestelmään integroidulla kyselyllä neljässä sanomalehdessä. Kolmas tapaustutkimus toteutettiin aikakauslehtikuvien kiinnostavuusarvioina ja tarkentavina haastatteluina laboratoriossa, amattöoreillä koehenkilöillä.

Kaikissa kolmessa tutkimuksessa nousi esiin viisi toimituksellisten kuvien kiinnostavuuteen liittyvää osatekijää, jotka yhdistivät kaikkia tapauksia koeympäristöstä, kuvagenrestä, arvioijan ammattimaisuudesta riippumatta. Nämä tekijät olivat: affektiivisuus, estetiikka, käyttökelpoisuus, semantiikka ja uutuus-kompleksisuus. Kuvan toimitukselliseen kiinnostavuuteen siis vaikuttivat kuvan kyky herättää tunteita, esteettiset tekijät, monipuolinen käytettävyys, sisältöön liittyvät semanttiset tekijät, sekä ennennäkemättömyyteen ja monimutkaisuuteen liittyvät attribuutit.

Katsojien näkökulmasta kuvan kiinnostavuudella oli kaksi muutakin tekijää: kuvan kyky kiinnittää ja ylläpitää katsojan huomio, sekä katsojan kokema omakohtaisuus. Nämä vahvistuivat kirjallisuuskatsauksessa, kirjallisuudesta löytyi lisäksi yksi tekijä, nk. selviytymispotentiaali, eli katsojan kyky sopeutua ja selvittää katselemastaan uudesta ja monimutkaisesta asiasta.

Avainsanat Valokuvat, kiinnostavuus, toimituksellinen kuvatyönkulku, toimituksellinen kiinnostavuus, affektiivisuus, estetiikka, huomio, käyttökelpoisuus, omakohtaisuus, semantiikka, uutuus-kompleksisuus

Preface

The research for this thesis was carried out during the years 2009-2013 in the Visual Media research group at the Department of Media Technology (previously Laboratory of Media Technology) at Aalto University (previously Helsinki University of Technology), in Finland.

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June 13, 2014 in Pune, India

Raisa Halonen

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1 Introduction

A key theme in Next Media¹ (2010-2013), a recent national collaboration program, was the development of methods and tools to enhance visual communication in professional contexts. In a task dedicated to content workflows, special emphasis was put on creating methods to assist and automate professional workflows related to photographs, especially in the context of cross-media publishing.

With the goal of streamlining professional photo retrieval and management in mind, we began to study the concept of editorial interest. More precisely, we wanted to determine the factors that contribute to making a photograph editorially interesting, i.e. lead to its selection in an editorial workflow. In addition to investigating editorial interest from the production point of view, we studied the interestingness of editorial photos according to non-professional viewers who view the published final products.

This thesis builds grounded theory by employing a constructive, exploratory approach that crosses the disciplinary boundaries of visual journalism, information technology, and experimental psychology. Through an extensive review on relevant literature and rich methodology built on case studies, the study covers the complete editorial photo production process from photographers to viewers.

1.1 Motivation and Background

High-level image quality criteria, such as interestingness, are particularly important for editorial photos, as technical quality factors alone can rarely differentiate photos taken by professionals. Subjective quality evaluations continue to provide the ground truth for image quality measurements, creating a demand for generic models that predict overall visual quality. Uses of such models include development of visual information technologies, editorial photo management, and cross-media publishing. The overall visual experience is highly multifaceted, as photos raise a variety of experiences related to perception, emotion, understanding, and preference. Furthermore, preferential high-level quality attributes, such as interestingness, are

¹ www.nextmedia.fi

key issues in visual application areas aimed at improved perceived quality and viewer engagement.

The ultimate aim of this line of research is to enable quality prediction without the need for subjective evaluation. A great challenge in the research area has been the difficulty to define the characteristics of high-level visual quality attributes in a precise manner, and to break them down into lower-level features (Datta, Li, & Wang, 2007; Datta, 2009). To address the challenge in the context of editorial photos, this thesis defines the factors through which professionals and amateurs evaluate the interestingness of editorial photos. Furthermore, the study aims at deconstructing these concepts into smaller, potentially computable constructs.

Computation of interest from photos remains relatively modest considering that the first effort to measure reader interest was witnessed already in 1939 (Kobré, 2004), albeit the metric only incorporated points assigned for event news value, subject notoriety, and amount of action. Flickr, a popular online application for photo management and sharing, provides the current state-of-the-art by employing interestingness as the only photo quality criterion (Flickr, 2011). Subsequently, several attempts have been made to predict Flickr interestingness, one of the more advanced by Dhar et al. (2011) with higher-level, describable attributes. Recent efforts have also been made to implement an interestingness metric into cameras (Vaquero, 2012). Closely related is the research direction of predicting the interestingness of videos as several approaches base their computation on video frames (e.g., Liu, Niu, & Gleicher, 2009; Redi & Merialdo, 2012), though different approaches have also been presented (e.g., Y. Jiang et al., 2013).

In addition to interestingness, other high-level concepts related to photos are also computed. For example aesthetics has received vast attention (e.g., Bhattacharya, Sukthankar, & Shah, 2010; Datta, Joshi, Li, & Wang, 2006; Datta, Li, & Wang, 2013; W. Jiang, Loui, & Cerosaletti, 2010; Li, Loui, & Chen, 2010). Even concepts with more abstraction and less regularity—memorability (Isola, Xiao, Torralba, & Oliva, 2011) as an example—have been explored. While there are several high-level concepts that describe the quality of photographs as such, we claim that editorial interest is the umbrella term, which explicates the factors through which professional photos are valued in an editorial workflow, and which covers all relevant criteria contributing to the evaluation.

1.2 Objectives and Scope

To investigate the attribute space of editorial interestingness, three research questions are set. The first question considers interestingness in the editorial workflows of photo production and selection:

1. What factors influence the editorial interestingness of photos during
 - a) editorial photo production, and

b) editorial photo selection?

The second research question takes the opposite approach and concentrates on the viewing experience of published photos:

2. What factors affect the interestingness of published editorial photos according to non-professional viewers?

To answer the above-mentioned research questions, a multiple-case design with three exploratory cases (Yin, 2003) was prepared. The cases covered different test settings, photo genres, and participant types. Table 1 summarizes the details of the case studies.

Table 1. Characteristics of the three case studies: respective research questions (RQ), test settings, photo genres and professionalism of the participants

| Case | RQ | Test Setting | Photo Genre | Participants |
|------|------|--------------|-------------------|-------------------|
| I | 1.a. | Photo agency | News and magazine | Professionals |
| II | 1.b. | Newsroom | News | Professionals |
| III | 2 | Laboratory | Magazine | Non-professionals |

The third research question combines and analyzes the findings of all three case studies, and seeks similarities to answer the following:

3. What are the themes of interestingness that surface in all case studies, i.e., the factors of editorial interest that are overarching independent of test setting, photo genre, and role of participant?

In answering the above research questions, the thesis also seeks to identify possible gaps between the professional and non-professional viewpoints on editorial interest. The literature part of the thesis discusses theories on interest, and the interestingness of photographs both in amateur and editorial contexts. The experimental part builds grounded theory of interestingness on theme interviews, observations, survey data, category scaling, photo elicitation, and ratings of interestingness statements.

1.3 Structure of the Thesis

The following sections review previous research on interest and interestingness, followed by a description of the research methods and experiments completed for this thesis. Next, results are presented and discussed, followed by the conclusions.

Section 2 discusses related research in the areas of interest as emotion, aesthetics vs. interestingness, and interestingness in context. Section 3 reviews the factors and attributes of editorial and viewer interest. Section 4 provides an overview of the research approach and reports on the methods and data in the studies. Section 5 presents the results for the case studies; the results are discussed in Section 6. Lastly, Section 7 presents the conclusions drawn.

2 Theories on Interest

While research on the psychology of interest is plenty, theories on interest fall into two fields (Silvia, 2006b). On one hand, interest is a momentary feeling—a part of an emotional experience, curiosity, and passing motivation. On the other hand, interest is stable and enduring—a part of personality, individual differences, and personal goals. As for the term interestingness, it refers to the artefact of interest itself, and more precisely, its quality of being interesting (OED Online, 2014).

This chapter reviews theories of interest from three viewpoints: the first section discusses interest as an emotion, the second covers the cumbersome relationship between aesthetics and interestingness, and the final section handles the understanding of interestingness in different contexts.

2.1 Interest as Emotion

An emotion is a complex phenomenon with neural, motor-expressive, and experiential components (Izard, 1991). There are two opposite stands on whether interest is an emotion. One stand sees interest as a purely cognitive state with no affective component; the other combines the two to affective-cognitive structures.

Ortony and Turner (1990) represent the first viewpoint by stating that interest stems from attention or curiosity, not from affect. Similarly Greisdorf and O'Connor (2007) differentiate affect from interest. They suggest that the gap between looking and seeing is bridged by steps of engagement with what is being looked at. Greisdorf and O'Connor regard interest as mere cognitive awareness of attention, whereas later in the process involvement gives meaning to the awareness, and finally affect comes into picture as feeling is attached to the meaning.

Currently the stronger viewpoint on the matter is that interest has an affective component, and is indeed an emotion (Izard, 1991, 1992; Silvia, 2006b, 2008, 2010). Izard (1991) explains the basic concept of affective-cognitive structures— thought-feeling bonds that form when one or more emotions associate with mental images, symbols, or thoughts. A variety of emotional experiences can be explained as a function of these relations; while fear prompts thoughts related to protective action strategies, joy is more likely to elicit

thoughts on relaxing, and anger to activate strategies on barrier removal (Izard, 1992). The division of interest into an affective and a cognitive component was supported also by Harp and Mayer (1997), who studied emotional and cognitive interest, and found the promotion of the latter to trigger better understanding of scientific text and illustrations.

According to Izard (1991), interest is the most frequently experienced positive emotion. The basic difference between interest and cognitive processes of attention and information processing is that interest as an emotion involves physiological processes, expressive behavior, and a feeling. Silvia (2005a, 2005b, 2006a) introduced the appraisal theories of interest. Appraisal theories consider interest as an emotion instead of a judgment or a stimulus property (Silvia, 2005a). According to Silvia (2010), interest is a knowledge emotion belonging to the same family of emotions with confusion, surprise, and awe. Knowledge emotions build on people's beliefs about their own thoughts and knowledge. Interest can also be classified as an aesthetic emotion (Silvia, 2006a).

2.2 Aesthetics vs. Interestingness

Aesthetics and interestingness are concepts that often appear together, but the relationship of which is unclear. Lack of clear definitions has led to vague use of both terms; the ambiguity of the concepts has broadened with time. Early views on the matter, such as the one of Haserot (1952), considered the concepts as mutually exclusive by definition. Interestingness was seen as the stimulating power of an object apart from its aesthetic form.

According to Haserot, interestingness arises from several criteria, most significantly from appetitive and emotional appeal, representation, expressiveness, content, and usefulness. Haserot's definition of expressiveness—the power of expressing something extraneous to the form—can today be understood to overlap with the term aesthetics (e.g., Axelsson, 2007a).

Scherer (2005) also elaborates on the exclusiveness of the terms. He refers to Kant's (2001, orig. 1790) definition of aesthetic experience—disinterested pleasure—and suggests that interest plays no role in aesthetic emotions. Scherer explains them rather to arise from the appreciation of intrinsic qualities of beauty or artistic performance. This is a contradictory view to that of Silvia (e.g., 2005a), which regards interest as an aesthetic emotion, as explained in the previous section, 2.1.

Millis (2001) described aesthetic experiences as cognitive and emotional responses to art. He suggested that an aesthetic experience builds on the appraisal of four components: interest, enjoyment, emotion, and the number of thought stimulated by the art piece. Axelsson (2007a, 2007b) studied aesthetic photo preferences, and particularly the concepts of preference, hedonic tone, expressiveness, familiarity, uncertainty, and dynamics. Of these, he found expressiveness to be highly related to interestingness.

While there are yet other studies that treat interestingness as a component of aesthetics (e.g., Moshagen & Thielsch, 2010), the concepts have also been treated as not inclusive or exclusive, but parallel (Dhar et al., 2011). Furthermore, prior research by the author (Halonen, Westman, & Oittinen, 2011) shows that people also consider aesthetics when judging interestingness. This underlines the intertwined nature of the terms.

2.3 Interestingness in Context

The concept of interestingness is relevant in several research fields; in addition to studies on photos and video, interestingness has been discussed e.g., in the context of websites (Pazzani & Billsus, 1997), education (Tsai, Kunter, Lüdtke, Trautwein, & Ryan, 2008), learning (Harp & Mayer, 1997; Mayer, Griffith, Jurkowitz, & Rothman, 2008), news (Pon, Cárdenas, & Buttler, 2008), and social media (Naveed, Gottron, Kunegis, & Alhadi, 2011; Weng, Lim, He, & Leung, 2010).

Depending on the context, the term interestingness refers to different things. The following sections give a brief overview of three application areas in which interestingness is applied: knowledge discovery, consumer photographs, and art and film.

2.3.1 Knowledge Discovery

Interestingness is a key concept in data mining. Measures of interestingness help determine whether data patterns discovered are of interest to the users (Geng & Hamilton, 2006). Despite the application area being very active, no formal, widespread agreement exists for the concept. Geng and Hamilton identified objective, subjective, and semantics-based criteria that best described the interestingness of a pattern: conciseness, coverage, reliability, peculiarity, diversity, novelty, surprisingness, utility, and actionability. Of these, novelty and surprisingness were considered subjective, whereas utility and actionability were found semantics-based. The rest of the criteria only depended on the data and patterns, and were therefore objective (Geng & Hamilton, 2006).

Masood and Soong (2013) confirmed that interestingness is difficult to define exhaustively, especially from the viewpoint of machine learning. They elaborated on the concept of interestingness in data mining, and the surrounding taxonomy of interestingness measures, anomalies, novelty, and surprisingness. Masoon and Soong summarized that a pattern is most likely found interestingness if it suggests a change in an established model.

2.3.2 Consumer Photographs

Photography is probably the application area with the vaguest use of concepts related to interest and aesthetics, as terms related to attractiveness, appeal,

appreciation, interestingness, and aesthetics are sometimes applied with little consideration, resulting in overlap and confusion.

Clear demarcations also exist. Savakis et al. (2000) defined image appeal in the context of consumer photography as the interest generated by a photo when viewed by a third-party observer. Using a form of photo elicitation, they asked participants to rank photos based on their relative appeal within a group and to describe the decision-making criteria. Analysis revealed attributes related to e.g., composition, quality, and content. They also hosted a category of attributes related to photo redundancy, as the context of the study was albuming.

Though Flickr does not define interestingness in the traditional sense, it has taken a firm grip on the term with its metric. Flickr interestingness is computed through several parameters, including who marks a photo as a favorite, where the click-throughs are coming from, who comments on the photo and when, and what are the tags affiliated with it (Butterfield, Fake, Henderson-Begg, & Mourachov, 2006; Flickr, 2011). As Flickr currently holds the only established metric of interestingness for photographs and alongside provides a substantial database of photos, the metric has quickly become the prevalent ground truth for subjective interestingness of photos.

2.3.3 Art and Film

The term interestingness links tightly to aesthetics in the context of art and film. Leder et al. (2004) modeled the process for aesthetic appreciation of art. Interestingness in their consideration related to the cognitive aspects of the aesthetic judgments, as opposed to e.g., pleasingness, which reflected more of the aesthetic emotions, including involvement. Markovic (2012) considered aesthetic fascination as the interest for a painting. His model for aesthetic experience starts with a perceptual appraisal of interestingness, which leads to increased attention and facilitates further aesthetic appraisals and continuous aesthetic fascination.

The connection of interestingness and aesthetics in art and film was also confirmed by Augustin et al., who studied the usage of aesthetic words in the context of visual art, film and music (Augustin, Carbon, & Wagemans, 2012). In another study (Augustin, Wagemans, & Carbon, 2012), they analyzed the generality vs. specificity of the terms for eight object classes—visual art, landscapes, faces, patterns, cars, clothing, interior design, and buildings. According to their results, interestingness and originality were specific terms that described the aesthetic nature of visual art. By specificity, they referred to the terms being frequent only for one object class even though they would have theoretically been applicable to other classes, too.

Silvia (2005b) conducted a thorough investigation on the appraisal of interest in the context of random polygons, poetry, and visual art. He predicted based on theories of appraisal process and structure that interest consists of appraisals of novelty and coping potential, which his experiments confirmed. Novelty was brought upon by factors related to unfamiliarity and complexity,

whereas coping potential referred to the ability to understand the new, complex thing. Jakesch and Leder (2011) studied the role of ambiguity—a concept closely related to novelty and complexity—in aesthetic appreciation. Artworks shown together with auditory statements revealed that the level of ambiguity affected the interestingness of the pieces. This suggested that a certain level of ambiguity is appreciable in art.

The aesthetics of a film is part of its interestingness (E. S. Tan 2011). In addition to the artefact itself, the fictional world created by it is also of interest. For films, there is also a two-fold temporal aspect to take into account. This does not only refer to the change in the intensity of interest over time, but also the effect of the promises inherent in the situation viewed. Expected outcomes thus tone the momentary intensity of interest. While interest manifests itself through emotive responses with varying intensity, it also steers the selectivity of attention to an extraordinary degree. Attention is directed especially based on the expectations and anticipations built by the cognitive responses on the stimulus.

3 Interestingness of Editorial Photographs

Editorial photos aim at attracting attention. Kobre (2004) states that the main task of a photo editor is determine the photos that attract the largest audience. Similarly, according to Rössler et al. (2011) photo editors choose photos with the aim of attracting viewer attention, evoking emotions, and getting readers to the stories. Markkula and Sormunen (2000) also discussed the primary goal of a journalist: to make the illustration of a page attractive, balanced, and dynamic.

These statements all agree on the importance of photos in attracting attention to newspapers and magazines. As seen in the previous chapter, the mechanisms of interest closely relate to attention. Furthermore, viewers make individual contributions to the interpretation of photos (Russel, 1993). These contributions can be triggered e.g. by observed details, interpreted meanings, or recalled personal memories, and can extend beyond the intentions of the photographer. To discuss interestingness of photographs and to shed light on the criteria that make them attractive to viewers in an editorial context, this chapter reviews literature on editorial and viewer interest.

3.1 Editorial Interest – Capturing and Selecting Photographs for Editorial Purposes

Markkula and Sormunen (1998, 2000) contrasted journalists' behavior as users of a newspaper photo archive with indexing practices of archivists. By observing journalists at their tasks, Markkula and Sormunen identified the criteria through which archive photos were evaluated during search and selection. Criteria covered a multitude of factors: e.g., related article, page layout, section's illustrative style, editorial policy, and ethical rules of journalism. Markkula and Sormunen called these factors relevance criteria and considered them situational by nature.

The concept of situational relevance was originally introduced by Wilson (1973). It has been discussed in the context of news photo retrieval—in addition to the above-mentioned study—e.g., by Neal (2006). Situational relevance implies that the relevance of information is not static, but dependent

on situation. When the information meets questions of concern, it becomes situationally relevant. In the study by Markkula and Sormunen (1998, 2000) the journalists considered first the topicality of the photos along with technical and biographical attributes. After this, a more abstract set of criteria related to the impression conveyed and aesthetics came into play.

Rössler et al. (2011) investigated the selection and impact of press photography. Based on literature, they defined eight news photo factors: damage, violence/aggression, controversy, celebrities, unexpectedness, emotions, execution and technique, and sexuality/eroticism. They hypothesized that a strong representation of any of these factors would lead to intensified attention by the viewer. Empirical results supported this: the presence of a photo news factor resulted in longer viewing of the photos, their better recall, and increased interest in reading the respective articles.

Rössler et al. (2011) found photo editors of different departments to employ same criteria, but to emphasize them differently. Overall, the news magazine under study valued photos with “strong emotions, great colors, a surprising situation, and prominent persons”. While the research concluded that the presented photo news factors influenced both the photo selection and the viewers’ interest, the exhaustiveness or representativeness of the set of factors was not validated from the viewers’ point of view.

From a photojournalism viewpoint, Kobre (2004) suggests the approach of choosing photos that meet at least two of the following criteria; the photos should be informational, graphically appealing, emotional, and/or intimate. Joe Elbert, an assistant managing editor in Washington Post, first coined these descriptions. The criteria are hierarchical: purely informational photos require the least to reach, while intimate photos that transform the viewer to a participant are the hardest to create.

Westman found the photo selection process at a newspaper to be contextual to a high degree (Westman & Oittinen, 2006; Westman, 2011). As the aim of photo selection was to find the best match with respect to specific illustration tasks, contextual factors formed a frame for suitable photos. While topicality was a necessary criterion for all selected photos, it was not sufficient as is. Compositional, aesthetic, and affective criteria complemented topicality at later stages of the evaluation. Even though a photo could be the best match for a task, it was not always selected, as norms and practices overtook the selection, or a photo with more versatile utility was preferred.

Caple and Bednarek (2013) reviewed literature on news visuals from the viewpoint of news value. Their thematic categorization of the factors contributing to news value resulted in 12 categories ranging from visual attractiveness and novelty to personalization of an event (showing a human side of an issue) and human interest (viewer being compelled by the visual). These categories and other literature reviewed above are summarized in Table 2. The data in the table is grouped to related factors of editorial interest based on knowledge gathered in the experimental part of this thesis.

Table 2. Overview of literature on editorial photo production (ordered by year) with notions of the discussed attributes relevant to editorial interest and the context of study. Attributes are grouped to factors based on knowledge from the experimental part of the thesis. No mentions of attributes related to attention or self-reference were found.²

| Reference | Aesthetics | Affect | Novelty-Complexity | Semantics | Utility | Other | Context |
|---|--|---|---|--|---|--|-------------------------|
| Markkula & Sormunen (1998, 2000) | Color, illustrative style, page layout, composition, quality | Affect, impression to be conveyed | Non-typicality, novelty, ability to provoke thought | Topicality, people, particular detail, posing, storyline | Selection history, situational relevance, technical and biographical criteria | Editorial policy, ethical rules of journalism | Newspaper photo archive |
| Kobré (2004) | Graphical appeal | Emotions, intimacy | | Information content | | | News photography |
| Westman & Oittinen (2006), Westman (2011) | Compositional criteria | Affective criteria | Non-typicality | Topicality, informational criteria | Versatile utility, contextual criteria, constraints | Norms and practices | Newspaper photo archive |
| Rössler et al. (2011) | Execution and technique | Emotions | Controversy, unexpectedness | Violence/aggression, sexuality/eroticism, damage, celebrities | | Editorial guidelines, social conditions, judicial restrictions | Weekly newsmagazine |
| Caple & Bednarek (2013) | Visual attractiveness, photographic technique | Positivity, conflict and negativity, human interest | Novelty | Prominence of people, proximity of event, personalization of event | Balance in content provision, time | Impact, significance or relevance of event on audience | News visuals |

² Although Rössler et al. (2011) reported personal attitudes as a factor influencing photo selection, the photo editors interviewed in their study insisted that personal attitudes are kept aside when selecting photos. Personal attitudes are therefore not a criterion that professionals use in their evaluation, nor considered as an instance of self-reference in this table. Rössler et al. (2011) also stated that consideration of the photo news factors in photo selection will lead to increased attention, but did not consider the abilities of the photo to attract or hold attention as evaluation criteria per se.

3.2 Viewer Interest on Amateur and Editorial Photographs

The ground-setting work on image interestingness was done by Berlyne and his colleagues in 1960's and early 1970's (Berlyne, Ogilvie, & Parham, 1968; Berlyne, 1971, 1972). The focus of the studies was on dimensionality of visual complexity, interestingness, and pleasingness on patterns. Research has advanced gradually to images more sophisticated and expanded eventually to photographs, paintings, and other artistic forms of imagery.

This section reviews attributes that literature links to the interestingness of photographs, both in the amateur and editorial context. To date, the attributes of photo interestingness discussed in literature have not been approached this comprehensively, nor has there been any attempt to group them to factors. Similarly to Section 3.1, we group the criteria here based on the knowledge gained in the experimental part of the thesis.

3.2.1 Aesthetics

Several aesthetic attributes affect interestingness of photos according to literature. Savakis et al. (2000) evaluated aesthetics through composition, colors, balance, shooting distance., and aspects of technical quality, such as sharpness and contrast. Similarly, Obrador and Moroney (2009) designed a set of low-level photo features to predict appeal computationally. Based on interviews with amateur and semiprofessional photographers, and a user study on photo query results (Obrador, Anguera, de Oliveira, & Oliver, 2009), relevant aesthetic attributes were composition, cropping, quality, and color.

Dhar et al. (2011) considered the aesthetic attributes of an interesting photo to be related to composition and lighting. In detail, the compositional attributes were based on presence of salient objects, portrayal of main object following the rule-of-thirds, use of low depth of field, or display of opposing color pairs. Furthermore, to characterize lighting in a photo, they incorporated a classification of natural outdoor illumination. Also Gygli et al. (2013) approached interestingness through low-level photo features. They predicted interest in a photo with aesthetic measures of colorfulness, arousal by color, contrast, and edge distribution.

Vaquero (2012) developed computational assistance of point-and-shoot photography with the aim of suggesting interesting frames for an amateur user. In doing this, he considered some aspects of aesthetics, e.g. the rule-of-thirds and sharpness.

3.2.2 Affect

The connection between pleasingness and interestingness was of high importance in the early years of image interestingness research. Several studies were conducted to investigate the two concepts as functions of complexi-

ty (Aitken, 1974; Berlyne, 1972; Day, 1967). The results indicated that following a U shape, pleasingness was high when interestingness was either low or at its peak.

Other links of emotion and interest exist. Highly arousing photos increase interest ratings and the time spent viewing them (Bradley et al., 2003). Furthermore, positive affect elicited by a photo increases its interestingness (Obrador et al., 2009). Viewers also consider if a photo is fun or boring (Savakis et al., 2000). Interesting photos, however, need not be pleasant (Turner & Silvia, 2006).

3.2.3 Attention

Greisdorf and O'Connor (2007) elaborated on the difference between looking and seeing as mentioned in Section 2.1. They suggested that the engagement on a photo builds gradually from attention to attitude through the steps of interest and involvement. By attention, they referred to the focus on the photo startled by its interest-drawing capacity—a function of the viewer's cognitive style, level of awareness, and experience. Respectively, they defined interest as the cognitive awareness of having focus on a photo.

Kaspar and König (2011) studied the guidance of gaze while looking at interesting photos. Eye-tracking data showed that a participant interested in a set of photos had a more global focus of attention compared to those not interested. This manifested itself as shorter fixation durations, higher saccade frequencies, and more extensive fixation distributions. Furthermore, the content of a photo guided viewing behavior more for people who were interested in the photo. Inspired by the principles of eye-tracking, Vaquero (2012) used an attention map as the basis for his method of predicting interesting frames from pointing a camera.

3.2.4 Novelty-complexity

Novelty-complexity is a component of interest that refers to a combination of attributes closely related to each other: novelty, complexity, uncertainty and ambiguity (Silvia 2005b). Novelty relates to unfamiliarity (Silvia, 2005b) and unexpectedness (Mendelson, 2001), whereas complexity refers to dissimilarity within a stimulus (Berlyne, 1971). Uncertainty refers to the suspense created by a stimulus, and ambiguity to the multiple meanings that can arise from it (Berlyne, 1971).

Different types of novelty can be distinguished (Berlyne, 1971): absolute vs. relative, and short-term vs. long-term. Absolute novelty refers to a stimulus that is unlike anything seen by the viewer before. Relative novelty is seen when known elements are portrayed in unprecedented combinations or when a new element combines characteristics of other, familiar stimuli. Furthermore, novelty can appear in different timeframes. Berlyne suggested that a stimulus loses its arousal potential if viewed repeatedly in a short

span of time. Empirical findings confirmed that a stimulus was rated less novel if it resembled another stimulus just seen and more novel if it differed from the previous stimuli.

Mendelson (2001) suggested that for news photos there are two aspects of novelty: those of content and visual look. Content novelty is brought upon by unexpected elements in the photo, such as subject matter, setting, characters, props, action, or gestures. Novelty of the visual look comes from attributes related to composition and style, i.e. unexpectedness of camera angle, lighting, proximity, lens choice, and how elements are combined.

Empirically, Mendelson (2001) found novelty of news photos to increase their interestingness. Novel photos were more likely to qualify for further viewing and had better recall. This was, however, the case only for photos shown isolated from context. When he placed the photos in a page context with other photos, stories, and advertisements, the set-up brought no effects of novelty on interest or recall in either the photos or the stories.

Complexity of photos has also received a good deal of attention. Greisdorf and O'Connor (2007) explained photo complexity through its number of focal attention points that can generate meaning through cognitive awareness. Gygli et al. (2013) estimated complexity by comparing photo size before and after JPEG compression: the higher the compression rate of a photo, the lower its complexity. Vaquero (2012) approached his camera assistance tool from the viewpoint of simplicity and dissimilarity; he incorporated metrics for structural and color simplicity of photos, as well as a feature that deduced similarity with other frames.

3.2.5 Self-reference

The relationship between familiarity and interestingness is not straightforward (Chu, Fedorovskaya, Quek, & Snyder, 2013). Some studies have reported familiarity to have lead into greater interestingness, whereas some have found the opposite. While familiarity can startle greater interestingness through personal connection and self-reflections, familiarity in a photo might lead to lack of perceived novelty and thus evoke less interest.

In the context of aesthetic appreciation of photos and paintings (Hager, Hagemann, Danner, & Schankin, 2012), self-reference was found to influence the assessment through the viewer's life history, personal biography, and memories. Similarly, links to personal history and interest increase the interestingness of a photo (Obrador et al., 2009). While familiar faces increase interestingness, familiar contexts decrease it (Chu et al., 2013).

3.2.6 Semantics

As explained in 2.3.2, Savakis et al. (2000) studied image appeal in the context of consumer photography. Semantic criteria for selecting photos for albuming arose mostly from people present in the photos—their number,

pose, expressions, or age. Photos that depicted a location or that were considered as good representatives of certain events, were also appreciated.

According to Obrador and Moroney (2009), the most important semantic criteria were people and the portrayed event. Another study conducted by the same group with users selecting their favorite photos from query results (Obrador et al., 2009) complemented this knowledge with mentions of setting and storyline.

Dhar et al. (2011) defined the semantics of a photo through attributes related to people, objects, setting, and scene. The following criteria were computed from photos to predict interestingness: the presence of people and animals, whether the photo is a portrait, whether it was taken indoors, and its scene type. Scene type was also considered by Gygli et al. (2013), who included it as the only semantic criterion in computing interestingness, though discussed it as a general preference. A recent study by Fedorovskaya and Lawrence (2014) analyzed the gender differences on the interestingness evaluation of photos. The results revealed the influence of content: while women were interested in e.g., photos with beach scenes, social activities, interiors, and vegetation, men preferred skylines, depiction of single men, close-ups of arranged objects, and food to these photo groups.

3.2.7 Other Factors

A factor that is present in literature, but did not emerge in our experiments is coping potential (Silvia, 2005a, 2005b, 2006a), an appraisal component of interest that complements novelty-complexity. Coping potential refers to a viewer's ability to understand new, complex elements of a photo. More specifically, the term signifies the viewer's own appraisal of whether she can understand the ambiguous event in the photo (Silvia, 2005a)

Utility on the other hand is a factor that emerged in the experiments, but has not been previously linked to interestingness of photos. The utility of a photo depends on its context. While context influences the way a photo is being looked at by constructing expectations, a photo can also be analyzed without a context and designed to suit several (van Leeuwen & Jewitt, 2001).

Table 3 reviews recent research efforts on the interestingness of photos. In summarizing the latest decade-and-a-half on the field, the table includes also a relevant paper by the author—an interestingness study conducted in the context of photos designed for testing digital imaging processes. As no prior classifications exist for the interestingness criteria, the attributes are grouped based on knowledge gathered in the experimental part of this thesis.

Table 3. Overview of recent research on interestingness of photos (ordered by year) with notions of attributes studied and stimuli used. Attributes are grouped to factors based on knowledge from the experimental part of the thesis. No mentions of attributes related to utility were found. Computational approaches are marked by an asterisk*

| Reference | Aesthetics | Affect | Attention | Novelty-Complexity | Self-reference | Semantics | Other | Stimuli |
|------------------------------|---|------------------------|-----------------------------|---|------------------------------------|--|---------------------------------|---|
| Savakis et al. (2000) | Composition, quality, color | Boring, fun | | Personality/unusualness | | People, objects, event, scene | Redundancy | Amateur photos |
| Mendelson (2001) | | | | | | | | News photos |
| Wolf & Deng (2005)* | Color, contrast, orientation | | | Novelty, complexity | | | Coping potential | Amateur photos |
| Silvia (2005a, 2005b, 2006a) | | | | | | | | Photos of paintings |
| Greisdorf & O'Connor (2007) | | | | | | | | Amateur and professional photos |
| Obrador et al. (2009)* | Composition, quality, lighting, color, cropping | Positive affect | | | Personal interests and experiences | People, event, story, setting | Expectations | Picasa photos |
| Dhar et al. (2011)* | Composition, quality, lighting, color | | | | | People, objects, setting, scene | | Flickr photos |
| Halonen et al. (2011) | Composition, quality, color, photography | Affective, fun, boring | Eye-catching, viewed longer | Ability to provoke thought, unusualness | Personal connection | Subject matter, people, objects, setting | Function, reality, manipulation | Test photos for digital imaging processes |
| Vaquero (2012)* | Composition, quality | | Attention | Similarity, simplicity | | | | Amateur photography |
| Gygli et al. (2013)* | Aesthetics | | | Unusualness, complexity | | Scene type | | Photos, webcam sequences |

4 Methods and Experiments

This section reviews the methodology applied in the study. To investigate the concept of interestingness in the context of editorial photographs, the following research questions were set and respective case studies designed:

1. What factors influence the editorial interestingness of photos during
 - a) editorial photo production (Case I), and
 - b) editorial photo selection (Case II)?
2. What factors affect the interestingness of published editorial photos according to non-professional viewers? (Case III)
3. What are the themes of interestingness that surface in all case studies, i.e., the factors of editorial interest that are overarching independent of test setting, photo genre, and role of participant?

As Table 1 in the Introduction summarized the general details of the cases, Table 4 here presents their methodological key characteristics.

Table 4. Methodological characteristics of the three cases: respective research methods, number and role of participants, and a short description of the data collected.

| Case | Methods | Participants | Data |
|------|---|---|---|
| I | Observations, theme interviews | 7 (photographers, photo editors, news editor) | Attribute data from interviews in photo agency, ~400 news and magazine photos in workflow during observations |
| II | Survey in workflow | 35 (news editors, associate editors) | Attribute data from 73 news photos selected for newspapers |
| III | Category scaling, photo elicitation, statement rating | 24 (viewers) | Interestingness values and attribute data from 50 magazine photos in a lab setting |

Altogether 66 people (42 professionals, 24 non-professionals) participated in the case studies. We conducted all studies in Finnish and the participants were native Finnish speakers.

4.1 Overview of Research Plan

Following the guidelines for aesthetic evaluation by Datta et al. (Datta, Li, & Wang, 2008; Datta, 2009), we paid special attention on the key contextual

aspects of the test data—the questions posed about the photos, the type of people rating the photos, and the type of photos rated—when designing the cases. Firstly, we considered carefully the exact phrasing of the questions on all case studies. Secondly, we decided to maintain a clear distinction between the professionalism of the participants in different cases. Finally, to cover editorial photo genres from news to magazine photos we wanted to treat the genres separately for two cases and combine them in the third. As Datta et al. (2008) pointed out, contextual information on the evaluation remains extremely important prior to reaching a common understanding on a concept and its instances.

In all three cases, we adopted a grounded theory approach. The term ‘grounded theory’ refers to theory derived from systematically gathered and analyzed data (Strauss & Corbin, 1998; Urquhart, Lehmann, & Myers, 2010). Grounded theory was originally introduced by Glaser and Strauss (1967), who suggested the approach of *discovering* grounded theory in contrast to *verifying* existing theories, the prevalent research approach of social sciences at that time. The discovery of new theory is enabled by the examination of a research area without any preconceived theories that would dictate relevancies in concepts and hypotheses.

All qualitative data was analyzed by coding. Here, ‘coding’ refers to the analytic processes of fracturing, conceptualizing, and integrating data to form theory (Strauss & Corbin, 1998). We employed an open coding procedure: in vivo codes—words originating from participants (Glaser & Strauss, 1967)—were used as the base. Subsequently, we performed comparative analysis (Strauss & Corbin, 1998) to refine the coding scheme to better describe participants’ meanings in the context of the study. Comparative analysis generates the elements of theory: first conceptual categories and their properties, then hypotheses of generalized relations among the categories and their properties (Glaser & Strauss, 1967).

Similar to other conceptual studies on photos (e.g., Russel, 1993; Savakis et al., 2000), individual participants were not the focus of analysis in any of the case studies, but instead the variation in the experiences was of most interest to us.

4.2 Case I: Editorial Interest at Photo Agency

To understand the photo creation and selection process at a photo agency and collect data on the factors of editorial interest, observations were carried out at STT-Lehtikuva. The observations lasted for two working days. The first day of observation (with a focus on photo planning) was in January 2013, the second (focus on photo capture and edit) in February 2013. Three meetings related to photo planning were attended to understand the process prior to photo capture and edit.

4.2.1 Case Company Overview

STT-Lehtikuva³ is the leading news and photo agency in Finland. The agency originated in 2010, when The Finnish News Agency⁴ acquired the largest photo agency in Finland, Lehtikuva⁵. STT-Lehtikuva is a limited company owned by 38 media companies. Its largest shareholders are Sanoma, Alma Media, and TS-Yhtymä.

In addition to its own production, STT-Lehtikuva offers a wide range of photos from international partner agencies. They provide an online Image Store (see Figure 1) with over two million photos from topical news photos to stock illustrations and archive footage. STT-Lehtikuva offers its customers two elementary services: a news service and a news photo service, which feeds approximately 300 photos per day to a variety of media customers.

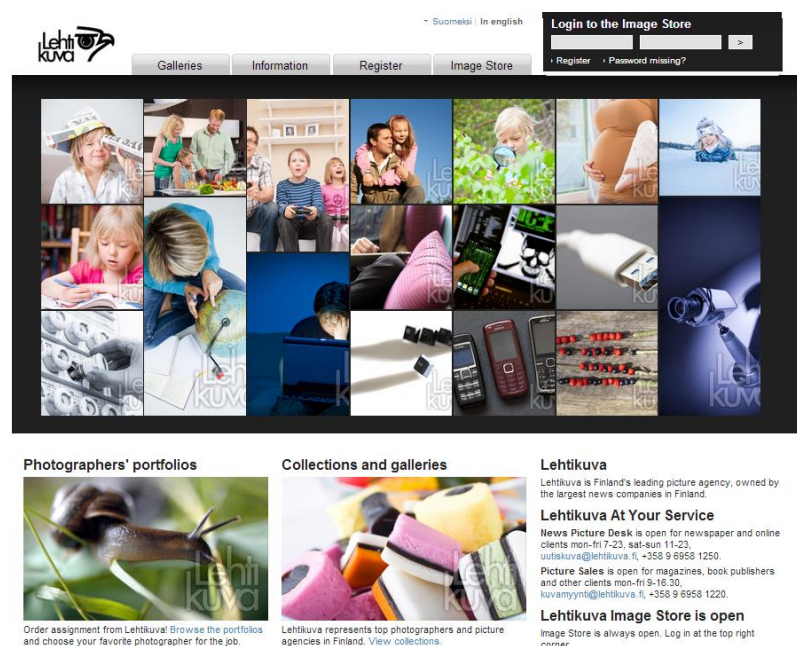


Figure 1. Lehtikuva's Image Store⁶ contains over two million photos originating from their own production and international partner agencies

4.2.2 Photo Production Process at Case Company

Simply put, two types of actors work at the news photo desk at STT-Lehtikuva: photographers and photo editors. Around ten photographers work for STT-Lehtikuva on a regular basis, in addition they hire freelance photographers. Photo editors take turns in photo planning and editing: every week a different photo editor acts as the photo planner. The remaining photo editors work in two shifts taking care of the fulfillment of the daily

³ www.stt-lehtikuva.fi

⁴ Suomen Tietotoimisto (STT), founded in 1887

⁵ Lehtikuva Picture Agency, founded in 1951

⁶ kuvakauppa.lehtikuva.fi

schedule, arranging photo gigs, following changes in the news feed, and finally selecting photos from their own production and international partner agencies for the photo stream offered to customers.

The key item in photo planning at STT-Lehtikuva is the photo promise list. The list is based on the story promise list of the news desk and it covers all stories of the day for which photos will be provided. A photo planner creates the photo promise list for each day in advance. The list is communicated to the customers 1-5 days prior to the actual day via e-mail and publishing systems. Advance lists are updated daily: on Thursdays, the advance lists stretch over the weekend to Monday or Tuesday. The final list for each day is provided in the morning. An example of a photo promise list is presented in Figure 2. In case of breaking news, changes on the lists are informed real time. If a less urgent news story emerges during the day, archive photos outside the list are offered to illustrate it.

| |
|--|
| <p>STT-LEHTIKUVAN KUVAUSLISTAA KESKIVIIKOLLE 12. MAALISKUUTA 2014</p> <p>KOTIMAA Huostaan otettujen lasten vanhempien kokemuksista julkaistaan kirja. Kuvaaja paikalla. Itsemurhayrityksistä kertova Kourallinen tabuja -kirja julkistetaan. Kuvituskuva arkistosta. Rikos ja rangaistus -iltapäivä medialle Vantaan vankilassa. Kuvaaja paikalla. Kynttilämielenilmaus perinteisen avioliiton ja voimassaolevan avioliittolain puolesta Helsingissä. Kuvaaja paikalla.</p> <p>POLITIikka Eduskunta pääsee käsittelemään kattavasti Ukrainan tilannetta. Kuvaaja paikalla. Juha Sipilä linjaa Keskustan talous- ja veropolitiikkaa Vero 2014 -tapahtumassa. Kuvaaja paikalla. Paavo Väyrysen Suomen linja -kirjan julkistus. Kuvaaja paikalla. EMBARGOLLA /// Leena Sharman Ne-kirja on etsintäretki uuden isänmaallisuuden juurille. Kuvituskuva arkistosta jutun mukaan.</p> <p>TALOUS Nordea julkistaa talousennusteensa. Kuvaaja paikalla.</p> <p>ULKOMAAT Miten Viron poliittinen johto kommentoi Ukrainan kriisiä. Kuvaaja paikalla. Ulkoministeriön ilmoittaa humanitaarisen avun jakamisesta. Kv. kuvaa arkistosta. Krimin tilanne. Kv. Kuvaa. Kiina laajentaa, Vietnam supistaa kadonneen koneen etsintöjä. Kv. kuvaa.</p> <p>KULTTUURI JA VIIHDE MTV3:n kevään lifestyle-ohjelmat esittelyssä. Kuvaaja paikalla.</p> <p>URHEILU Formula 1: Mitä sanovat kuljettajat ja muu F1-väki kauden avausviikonvaihteesta? Kv. kuvaa. Jalkapallo: Mestarien liigassa Sami Hyypiän luotsaama Leverkusenin yrittää paikata mainettaan PSG:n vieraana. Kv. kuvaa. Ralliautoilu: Neste Oil Ralli Helsinki Battle -yleisötapahtuman lehdistötilaisuus. Kuvaaja paikalla. Ampumahiihdo: Mitä sanoo Kaisa Mäkäräinen MM-kotikisoista 2015. Arkistokuva. Alppihiihto: Maaillmancupin finaaleissa syöksyt. Kv. kuvaa. Paralympialaiset: Sotshin kisat jatkuvat. Handoutkuva. Salibandyssä puolivälieräottelu SSV vs NST. Kuvaaja paikalla. Koripallo: NBA. Kv. kuvaa. Jääkiekko: NHL:ssä. Kv. kuvaa.</p> |
|--|

Figure 2. A photo promise list contains the day's news stories for which photos will be provided in the news photo stream. This example is the final promise on March 12, 2014.

The purpose of the photo production process at STT-Lehtikuva is to produce timely, topical news photos alongside with illustrative photos that interest a variety of media clients. To guide the process, three types of meet-

ings discuss photo plans during the week. A daily photo planning meeting takes place each morning. The meeting is held by the day shift of the photo desk and photographers present at the time. In the meeting, the participants discuss the photo promise list of the day and review the photo stream from the previous day. On Tuesdays, a weekly meeting for photo planning is held. The participants include the effective photo planner and the heads of news, news photos, and graphics desks. During this meeting, the photo promise list of the whole week is discussed. Finally, photo planning is briefly handled also in the daily editorial office meeting, which covers the news story promise list of each day and both streams for the previous day.

Figure 3 presents the photo production process at STT-Lehtikuva once the photo plan has been created. A photographer assigned to the case goes on the gig and shoots a set of photos based on the plan. The photographer then returns to desk and selects a subset of the photos to edit and forward in the process. The edited photos appear in the photo stream that is being handled by the photo editors. First a news photo editor reviews the stream for the photos that will be offered for the news photo clients. The rest of the feed is then reviewed by a photo editor from photo sales, who considers the remaining photos and their sales potential in the Image Store.

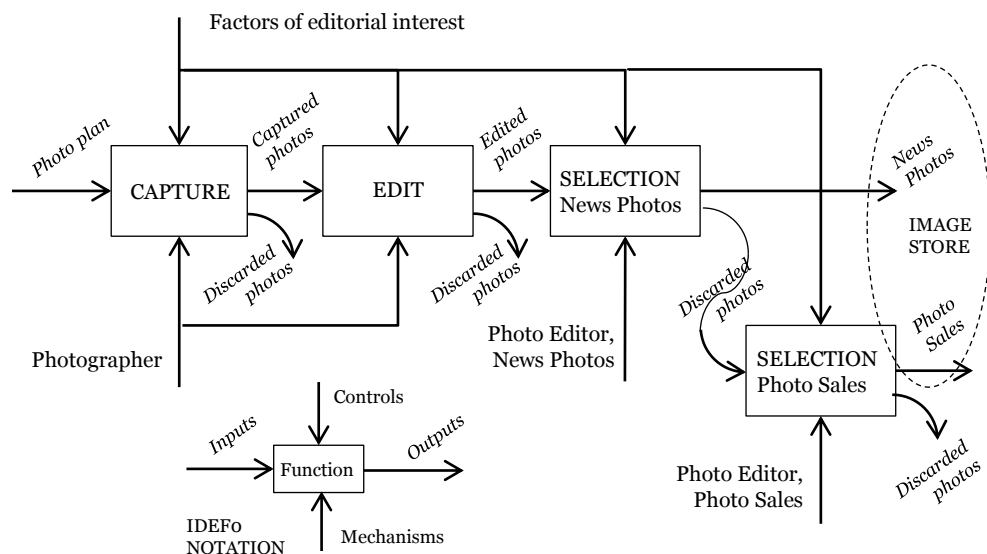


Figure 3. Photo production process at STT-Lehtikuva. Following the IDEF0 notation⁷, the figure portrays the inputs, controls, outputs, and mechanisms that characterize the process. Here, controls are considered same as the criteria for the editorial interest of the photos.

While STT-Lehtikuva offers the news photo stream to its clients primarily via the publishing system, the stream can also be viewed in the Image Store (Figure 4). This means that all photos created and selected in the photo production process are viewable for the customers in a single location.

⁷ www.idef.com/IDEF0.htm

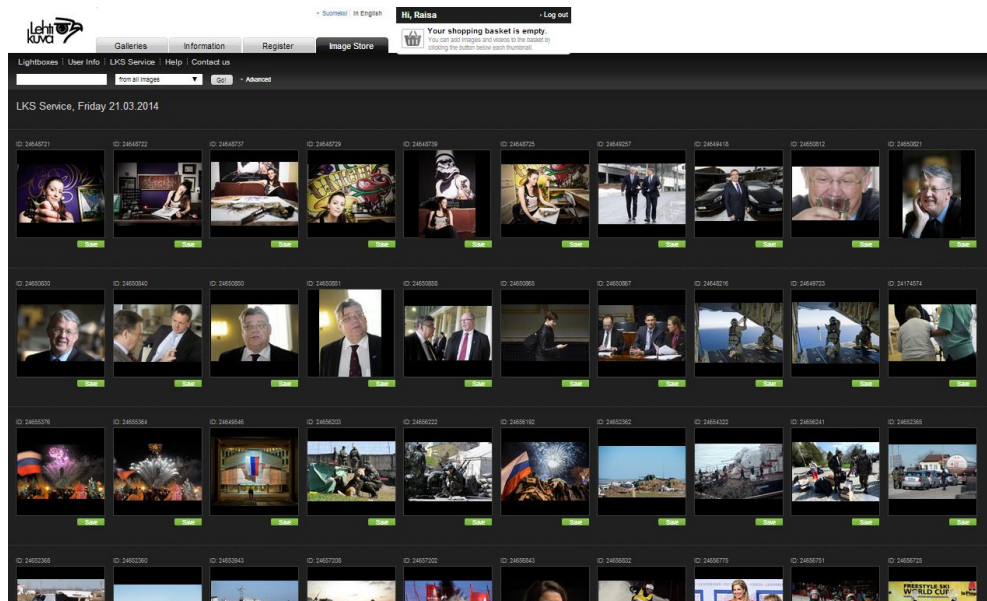


Figure 4. STT-Lehtikuva's news photo stream viewed online via Image Store

4.2.3 Participants

Altogether seven people were observed in their daily activities at the news photo desk. Two of these were photo planners (one from news photos, the other from photo sales), two photographers, and three photo editors (two from news photos, the third from photo sales). In addition, a web news editor from the news desk was observed in his work. This was done to observe photo selection for a final product, i.e. choosing representative photos for the web news feed of STT-Lehtikuva. All observed personnel from the news photo desk were experienced in their work (from 2.5 to 26 years on the job). Representation of different roles and desks in the observations are summarized in Table 5.

Table 5. Desks and roles of STT-Lehtikuva represented in the observations

| Desks Represented in Observed Meetings | | | | |
|---|--------------------|--------------------|-------------|-----------------|
| Meeting | News Photos | Photo Sales | News | Graphics |
| Daily meeting for photo planning | X | X | | |
| Weekly meeting of photo planning | X | X | X | X |
| Daily meeting of news office | X | | X | X |
| Roles Represented in Desk Observations | | | | |
| Role | News Photos | Photo Sales | News | Graphics |
| Photo planner | 1 | 1 | | |
| Photographer | 2 | | | |
| Photo editor | 2 | 1 | | |
| News editor | | | 1 | |

4.2.4 Material

The material of the case comprised of photos in the production process on the days of observation. Figure 5 shows examples of photos handled on the latter observation day. Altogether, we observed the handling of over 400 photos in the process.

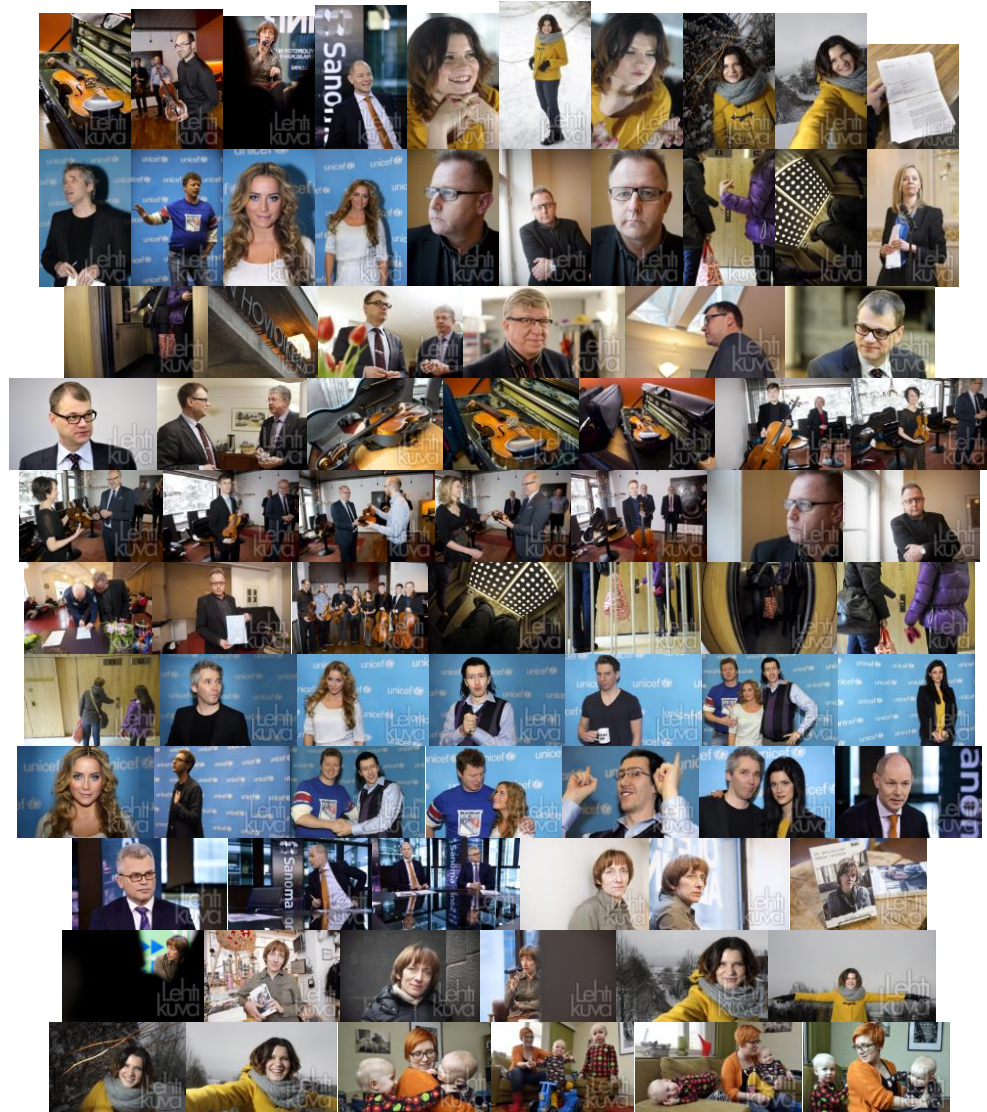


Figure 5. Examples of photos handled in the production process during the observations

4.2.5 Procedure

The observations combined participant think-aloud and informal interviews. The participants carried out their normal duties at the news photo desk, while they were observed. The observations were direct and casual by nature (Yin, 2003). The participants were asked to think aloud while committing tasks. The observer posed clarifying questions if in doubt.

The photographers were first observed at a photo shoot and then at the desk editing and selecting photos. All other participants were observed at

their desks. The two photographers were the only participants who were left momentarily alone during the observations. This took place during the photo shoots, as the photographers needed time to complete the shots. The considerations by the photographers during that time were collected right after to ensure correct remembrance of the details. The purpose was not to influence or obstruct the natural course of events during the observations.

The news photo desk is in an open office space with approximately 10 active workstations between news and graphics desks. As two photo shoots were observed, the photographers were accompanied in the car on the way to the respective events and back. Informal interview continued during travel.

4.2.6 Analysis

The observations were recorded and transcribed verbatim. Notes were also kept in order to clarify details and to keep track of photos and background processes discussed. Written remarks were analyzed alongside the transcribing process to ensure correct interpretation of meanings. The notes and interview transcriptions were coded manually.

The codes represented the attributes of editorial interest. The number of quotes per attribute or factor is not analyzed for this particular case as the data was collected with the purpose of revealing all criteria relevant related to editorial interest. Frequency analysis would require a higher number of quotes to be meaningful in the case.

4.3 Case II: Editorial Interest at Newsroom

To collect criteria of editorial interest from a final photo selection perspective, a survey was conducted in four Finnish newspapers that subscribe the news and news photo streams of STT-Lehtikuva.

4.3.1 Case Companies' Overview

The participating companies were Etelä-Suomen Sanomat⁸, Karjalainen⁹, Keskisuomalainen¹⁰, and Savon Sanomat¹¹. The survey was conducted in cooperation with Anygraaf¹² whose publishing system Neo is used in all case companies. Table 6 presents the circulation information of the newspapers.

⁸ www.ess.fi

⁹ www.karjalainen.fi

¹⁰ www.ksml.fi

¹¹ www.savonsanomat.fi

¹² www.anygraaf.fi

Table 6. Case newspapers, their locations, and circulations

| Newspaper | Circulation Area | Circulation (2013)¹³ |
|----------------------|-------------------------|--|
| Etelä-Suomen Sanomat | Päijät-Häme | 51 444 |
| Karjalainen | North Karelia | 41 244 |
| Keskisuomalainen | Central Finland | 61 163 |
| Savon Sanomat | Northern Savonia | 57 235 |

4.3.2 Participants

Altogether, 35 news editors and associate editors in the editorial offices of the newspapers answered the survey. The survey was short and voluntary. For minimal obtrusion, the survey was integrated in the everyday workflow of the editorial offices. After the two-week survey period ended, every participant was sent a background questionnaire. Answering the questionnaire was rewarded with two movie tickets or an equitable amount of Virikeseteli vouchers. The permits for the survey were cleared with the editors-in-chief.

Twenty-seven participants answered the background questionnaire. For these participants, the average experience was 12 years (min = 2, max = 34, SD = 9). The actual years of experience were higher, as some participants replied the question by rounding down to closest ten, e.g. “over 20 years”. Eighty-nine percent of the participants who replied to the background questionnaire engaged in photography during their free time.

4.3.3 Material

The material of the case comprised of photos from the news photo stream of STT-Lehtikuva from three weeks in November – December 2013. Via the survey, we received 105 statements describing editorial interest on the photos. As some of the selected photographs had been replaced later during the day, the data corpus for analysis was less. 75 statements for 73 different photos were traced without doubt from digital originals to newspapers. Sixty-one of the selected photos portrayed people, 50 as main subjects. Majority of the photos (40) were indoor photos.

¹³ www.levikintarkastus.fi/levikintarkastus/tilastot/Levikkitilasto2013.pdf

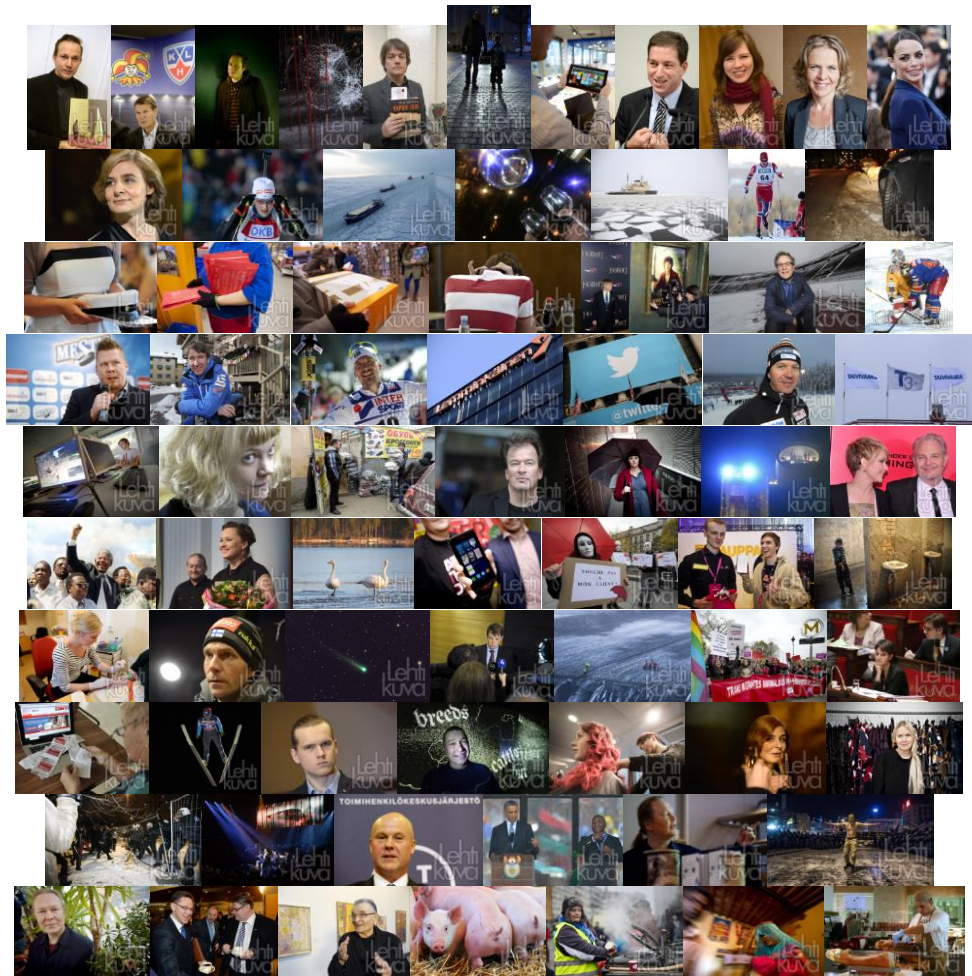


Figure 6. Photos for which selection criteria was collected (n = 73)

4.3.4 Procedure

The survey was integrated into Neo for the period of investigation, which was two weeks. Etelä-Suomen Sanomat acted as the pilot newspaper for the study and their time period started a week before others.

The survey consisted of two questions:

1. What were the criteria related to the content and look of the photo that lead you to select it?
2. How could the photos offered in the feed have been better for your purpose?

The questions were prompted whenever a user selected a photo from the STT-Lehtikuva news photo stream in Neo and attached the photo to a news story. In the normal dialogue window for photo attachment, the two questions appeared. This is illustrated in Figure 7.

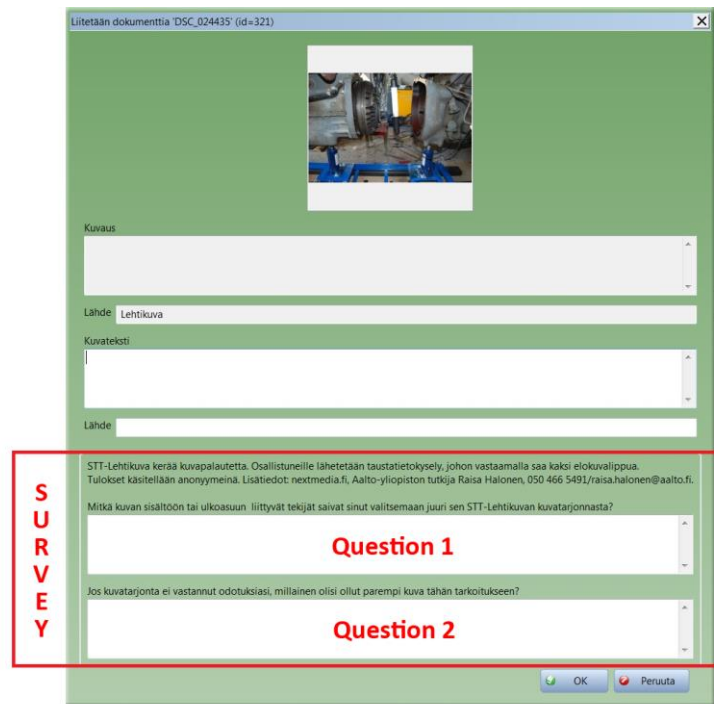


Figure 7. Dialogue window of Neo publishing system containing the survey questions

4.3.5 Analysis

We collected the survey answers in a tab-delimited text file, then printed, and manually coded them for reoccurring attributes. Frequencies of the attributes were calculated and the attributes grouped to study their hierarchy.

4.4 Case III: Interestingness of Editorial Photos to Viewers

In the third case study, we conducted a series of subjective experiments with non-professional viewers to investigate the factors of interestingness in the context of editorial photos. Each experiment consisted of three tasks: a sorting of printed photos, an interview, and an appraisal of interestingness factors on a display. A detailed description of the experiments follows.

4.4.1 Participants

We recruited 24 participants (12 female) through university newsgroups and mailing lists. The participants were undergraduate and graduate students in engineering and economics. Their average age was 24 years (min = 20, max = 33). All participants had normal or corrected-to-normal visual acuity, and normal color vision. The participants were non-experts in photography. We rewarded the participants either with a movie ticket or with a lunch voucher, based on their choice.

images were 61 mm x 86 mm, and the largest 213 mm x 280 mm. We attached the prints to gray cardboard and marked a random ID number in the corner of the cardboard to denote photo orientation and facilitate communication. For the third task, digital originals of the photos were also adjusted to the same display size as the prints. All photo preparation processes were color-managed.

4.4.3 Test Environment

We controlled illumination in the experiment room with halogen lamps and dichroic glass filters. The lighting was uniform and reflected indirectly from the ceiling. Participants performed the first two tasks—sorting task with prints and interview—on a light gray tabletop with an illumination of 300 lux (5000K). The experimenter sat beside another table and entered the sorting data into Excel. The interview was recorded on a digital voice recorder. In the third task, the participant evaluated photos on an Eizo ColorEdge CG241W display¹⁴, calibrated to 6500K and its recommended brightness 120 cd/m². Gray curtains covered the walls both behind the tabletop and behind the display. We used a Matlab script to show the photos and to record the evaluation data.

4.4.4 Procedure

At the beginning of each task, the experimenter gave a written instruction to the participants. The first task was category scaling based on the overall interestingness of the photos. The participants received the pile of 50 printed photos in random order and browsed it to develop an understanding of the interestingness of the set, as recommended by Edinger (2000). Next, the participants evaluated each photo according to their perception of its interestingness on a category scale from 1 (very uninteresting) to 7 (very interesting). Essentially, the participants sorted the photos into piles on a paper scale with notations of the endpoints visible. The participants were not required to employ all seven categories in their sorting. A similar seven-point scale has been used e.g., by Berlyne (1963) in his ground-setting work.

The second task was a form-based photo elicitation interview (Harper, 2002; Hurworth, 2003; van Leeuwen & Jewitt, 2001). In photo elicitation, a photograph is incorporated into a research interview to facilitate the elicitation of thoughts on the subject (Harper, 2002). In the course of the interview, participants went through one photo category at a time (starting from the lowest category employed), read aloud the numbers of the photos therein, and were then asked the following questions about the category:

1. How would you describe the interestingness of the photos in this category?

¹⁴ www.eizo.com

2. What about the photos is interesting / uninteresting?
3. How does the category differ from the previous category in terms of interestingness?

Participants were encouraged to give examples through particular photos. If the participant mentioned a particular content detail, we further asked what about that particular detail was interesting or uninteresting. As suggested by van Leeuwen and Jewitt (2001), we kept the interview open-ended in order not to lead or restrict the commentary of the participants. The interview continued to the next category until all categories employed by the participant had been covered.

The last task of the experiment was an appraisal of different interestingness factors. Figure 9 illustrates the user interface employed in the task.

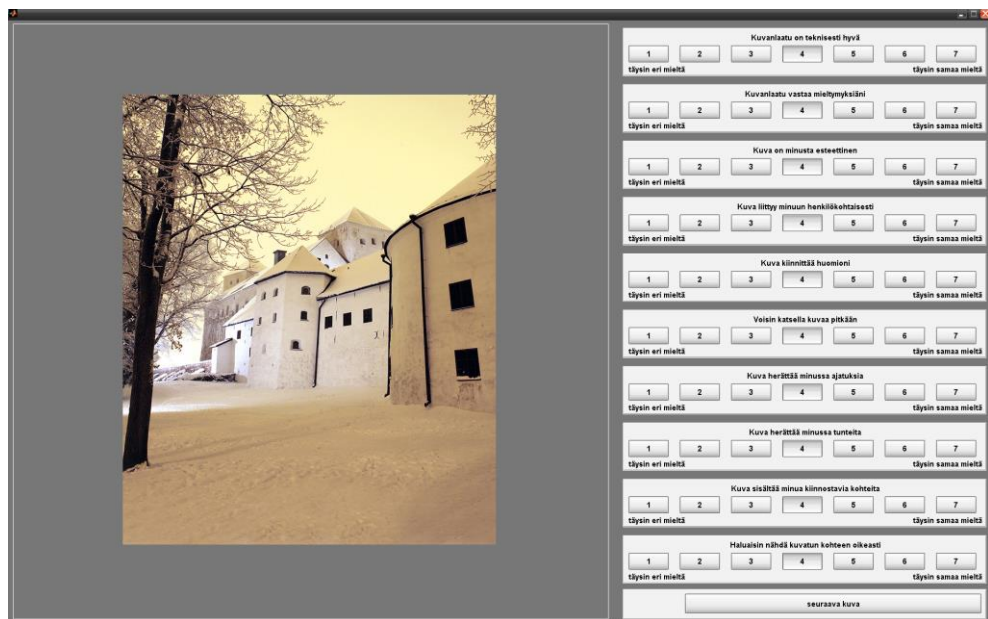


Figure 9. Matlab interface used in Case III's final task

The photos were shown on a display one at a time in random order, and for each photo, the participants evaluated seven statements on a Likert scale from 1 (strongly disagree) to 7 (strongly agree). The statements were based on literature on photo quality attributes (Keelan, 2002) and on earlier research on the interestingness of test images by Halonen et al. (2011). The statements were:

1. Photo quality is technically good.
2. Photo quality meets my preferences.
3. I find the photo aesthetic.
4. I have a personal connection to the photo.
5. The photo draws my attention.
6. I could view the photo for a long time.
7. The photo provokes thoughts in me.
8. The photo provokes emotions in me.

9. The photo contains objects that are of interest to me.
10. I would like to see the scene for real.

After having evaluated the statements for all photos, the participants were handed an exit questionnaire. The questions (Likert scale 1-7) concerned the difficulty of all three tasks, the overall length of the experiment, and the participants' ability to concentrate. We instructed the participants to evaluate samples based on first impression, but there was no time limit for any of the tasks. According to Cupchik and Gebotys (1988), exposure duration has no effect on perceived interestingness.

4.4.5 Task Difficulty and Completion

On average the experiment took 59 minutes (min = 40 min, max = 104 min, sd = 15 min) from the first instructions to the completion of the exit questionnaire. Individual differences arose in task completion. After sorting the photos, some participants reviewed the photo piles once more to validate the categorization. Participants could also reassign photos during the interview. The time elapsed in the interview (mean = 21, min = 13, max = 42, sd = 8) fluctuated depending on how articulate the participant was. Wordy responses were, however, not always indicative of rich argumentation, but could embody substantial repetition. Furthermore, some participants were extremely concise, yet thorough in their arguments. We addressed the repetition in the analysis by normalizing the data (see 4.4.6 Analysis).

Responses to the exit questionnaire revealed inter-task differences in the perceived difficulty. Whereas photo sorting and appraisal of interestingness factors were found somewhat easy (on a scale of 1-7, 2.8 and 3.5, respectively), participants considered the interview slightly difficult (5.0). Nevertheless, the overall difficulty of the experiment remained slightly easy (3.1). The participants found the length of the experiment reasonable (4.1) and were able to concentrate well (5.4).

4.4.6 Analysis

We transcribed the recorded interviews verbatim and qualitatively coded the transcriptions in ATLAS.ti¹⁵, a qualitative data analysis software package. For statistical purposes, we defined a unit of analysis for the interviews: one interestingness category of a participant. This resulted in 24×7-11=157 interview units, as we did not oblige participants to use the whole scale, and a category was left empty 11 times. We assigned a distinct code to each separate attribute related to interestingness. Two experimenters participated in coding the data: the author covered all 157 interview units and another coder 17 (10.8% of the units).

¹⁵ www.atlasti.com

To quantify agreement between coders, we calculated a Jaccard index (P.-N. Tan, Steinbach, & Kumar, 2005). Typically, an acceptable intercoder agreement for qualitative researchers is .85-.90 (Saldana, 2009). We coded the data twice: after the preliminary round (Jaccard .78), we discussed and further refined the code definitions. The second round with the finalized coding scheme resulted in a Jaccard index of .94 between coders.

For the quantitative analysis of the interview data, we first cross-tabulated the frequencies of each attribute for each interestingness category per participant. Subsequently, we normalized the data to binary form: either the participant had mentioned an attribute for a category or not. Further analysis we performed on a contingency table (attributes×categories) generated from the individual participants' binary data tables.

In our analysis, we treated the category scale as an interval scale, enabling the presentation of average values of interestingness and its factors for each photo. This procedure was in line with Edinger (2000), as we employed category terms with minimal ambiguity (1-7) and can therefore assume equal intervals between categories. To investigate the relationship between overall interestingness and distinct interestingness factors, we calculated Pearson product-moment correlation coefficients. Furthermore, to evaluate participant agreement on the interestingness of the photos, we calculated an intraclass correlation coefficient (Shrout & Fleiss, 1979) equaling to average kappa with quadratic weights (Fleiss & Cohen, 1973).

5 Results

The three cases provided us rich data on several aspects of editorial interest. The following sections present case-wise results starting from production processes and ending in the viewing of published photos.

5.1 Case I: Editorial Interest at Photo Agency

Attributes of editorial interest from the photo production point of view were collected through observations at a photo agency. The genres of both news and magazine photos were present in the case. Participatory observation combined with informal theme interviews with eight actors in the photo production process lead to a solid coverage of the relevant factors of editorial interest guiding photo creation and selection.

5.1.1 Attributes of Editorial Interest

Attributes collected from photographers and photo editors (news photos and photo sales) are shown in Table 7, grouped to factors of editorial interest: aesthetics, affect, novelty-complexity, semantics, and utility. Furthermore, we found some additional attributes specific for photo production. We discovered altogether 34 attributes with approximately one third related to aesthetics and one third to semantics. A quote count for each attribute is not reported for the case, as the data was collected during observations and interviews, and aimed at revealing all relevant attributes rather than comparing their relative proportions.

From an aesthetic point of view, especially attributes related to form contributed to interestingness of the photos. Quality-wise the most important thing was the natural reproduction of color. Photographers were the only to consider colors and photo editors the level of photography. Attributes of semantics related to objects, people, scene, story, and theme, were used by all actors with minor exceptions, such as logos being considered mainly for news photos and eye-contact for magazine photos.

Utility was an important factor of editorial interest for the photo editors. While the photographers did not pay attention to utility, the photo editors elaborated on various aspects related to it. Easily croppable photos were

selected to the news photo stream, whereas easy extraction from background was valued for both news and magazine photos.

Table 7. Factors of editorial interest considered by photographers and photo editors in a professional photo production process

| Factor | | Photographer | Photo editor, News Photos | Photo editor, Photo Sales |
|--------------------|---------|---|---|--|
| Aesthetics | Color | Colors, naturalness | | |
| | Form | Contrast, cropping, distance, lighting, lightness, orientation, perspective | Composition, distance, lighting, orientation | Composition, cropping, distance, orientation, sharpness |
| | Style | | Photography | |
| Affect | | | Atmosphere | Affective, atmosphere |
| Novelty-Complexity | | Fresh | Fresh, unpublished | |
| Semantics | Objects | Logos, particular detail | Logos, particular detail | Particular detail |
| | People | Facial expression, gesture, posing, several people | Eye-contact facial expression, gesture, posing, several people | Eye-contact, facial expression, several people |
| | Scene | Setting | Setting | Setting |
| | Story | Action, event, storyline | Action, storyline | Event, storyline |
| | Theme | Theme | Theme | Theme |
| Utility | | | Duplicate, easy cropping, easy extraction from background, timeliness, versatile utility | Easy extraction from background, versatile utility |
| Other | | | Availability | |

The interviews with the photographers ended with elaboration of perfect editorial photographs. Both photographers aimed at conveying a story with simplicity. Preparation and prior information on the topic were key in taking successful photos, as exemplified by the following quote:

In a successful photo you have everything right, even the lighting. I managed to get a decent photo yesterday (Figure 10). There is everything in the photo, all necessary, nothing extra, brilliant lighting. The angles need to be thought through in advance. You have to take time for the photoshoot. You have to know in advance who to photograph and related to what topic. I will take photos of 14 people if necessary, but the photos will not be good.



Figure 10. A perfect photo according to its photographer

The topic of the photoshoot also affected the outcome and set different criteria for success:

A perfect photo depends on the topic of the shoot. In a news photo situation, where you cannot influence the course of action [...] to get a photo that tells you everything essential from the situation and that is technically good. Then it has all the elements. If it is an illustrative shoot of a person, for which you have time... you get her to pose naturally and relaxed, get the lighting just right, and everything is technically good. As said, it depends on the topic.

The photo editor of news photos sought to create photo sets with versatility and variation. He would search for objects that could be easily extracted from background, photos that would function as small indexes in the front cover of a newspaper, or as large at the inner sections. Only clear duplicate photos were discarded from the news photo stream.

This is now a duplicate photo of the same instrument, but this has a better lighting of the two. This is now my subjective opinion that the lighting is better, someone else might like the other one better.

Duplicates were not always a bad thing. In case of photography of people or on a setting unseen before—such as a newly launched cruise ship—the photo set captured could include several similar photos to address future photo needs. When searching for archive photos, the timeliness of the content was important. Wrong time of year or otherwise outdated content lead to photos not being selected.

For breaking news, archive photos from the Image Store were selected for the stream to satisfy immediate photo needs of online services. These photos would typically be landscape for easier croppability. Special emphasis was put on photos, which had not been offered in the news photo stream earlier and would therefore more likely be unseen photos to the customers.

Overall, versatile utility was appreciated. For news photos, the timeliness of the content was extremely important. Photographers did not consider the affect raised by the photos. Atmosphere and the ability to evoke emotion were, however, valued by the photo editors.

The factor related to novelty and complexity of the photos was also considered by the photo professionals. The emphasis was on the freshness of the photos, complexity was not discussed as a criterion for editorial interest. In addition to the five factors presented above, three attributes specific for editorial photo production were found. These were related to duplicates, availability, and timeliness of content.

Photos often preceded the story, so the photo editor might not know anything what has been discussed at the scene, and he has no topic or headline to support his selection. This restricted the hands of the photo editors considerably:

At this point, I don't want to limit the photo set too much. And should it happen that I'd accidentally archive the photo with the best depiction of the story or press event of which I had no clue in the morning, I can always send the photo later in the stream.

Also the variety of media clients at the receiving end of news photo service prevented the photo editors from doing drastic cuts in the set. Each customer can have a different preference for the photo, different angle on the story, or they could even have their own story for the photo instead of using the one offered by the news service.

I don't like logos. I always prefer a person doing something.

The photo editor from the photo sales desk appreciated clarity and clean composition. Spacious photos were considered easy to use:

This has a nice eye contact and if someone wanted to use text around the photo, it'd be possible due to the loose space left here.

It has a nice sense of situation. An intimate situation of some sort, but the expression is that incomplete that I wouldn't take it.

The interview with a news editor responsible for STT-Lehtikuva's web news feed shed light on the criteria leading to selection of photos for an end use.

Approximately two thirds of the photos chosen for the news feed were from the news photo stream and a third was fetched from the archives. Archive photos were searched in a hurry, typically the web feed responsible had no time to wait for the news photo stream. Availability was considered the most important criterion in selecting photos for online use.

From the news photo stream, clear photos with landscape orientation were most often chosen. The news editor preferred photos that functioned in a small publishing size, such as close-ups. Also symbolic photos were used in the web feed. Photos with logos were chosen only in absolute necessity. In case of choosing archive photos, special attention was paid to having a topically relevant photo which would not mislead the reader. The photo

would need to explain itself and be clearly from another situation. For photos of people, cropping tight portraits of only faces was also considered a good option.

5.1.2 Strategies for Photo Selection

Two strategies for selecting photos from STT-Lehtikuva's own production were observed at the news photo desk. When the photo editor considered the photoshoot better suited for news photos than the photo sales desk, he applied a strategy of exclusive selection.

This meant that by default he chose all photos to the stream, but reviewed the set to find single photos which would be excluded and directed to the photo sales desk instead. Photos were discarded from the stream mainly for being duplicates. Figure 11 illustrates an example of exclusive photo selection.



Figure 11. Example of exclusive photo selection by a photo editor

The photo set was taken in a morning coffee event with the Centre Party of Finland. At the event, the photographer took 178 photos, 10 of which he forwarded to the news photo editor. As this was an event inclined to news, all photos were considered chosen for the news photo stream and the set was reviewed to spot uninteresting candidates in the set. As can be seen from the figure, a duplicate was removed from the set along with a photo that was described as “the odd one out”. First, the photo editor assessed the two photos that appeared to be duplicates:

Personally, I prefer this one. [...] It's more assertive. It goes together with a number of headlines unlike the other one. [...] Of course, if we come up with a headline saying that 'The Centre Party is completely baffled', I can add the other to the feed later on.

After resolving the issue with two similar photos, the photo editor reviewed the photo that he considered to be completely off the set:

I don't see any idea in this photo. It's the odd one out of the set. [...] The background is messy and there's a lamp that disturbs. Everything in this photo feels disconnected.

The other strategy applied was the opposite: inclusive photo selection. In this strategy, the photoshoot was considered to better serve the needs of photo sales desk and all photos were by default excluded from the news photo stream. The set was reviewed for photos that would be interesting from a news perspective. Figure 12 exemplifies inclusive photo selection.



Figure 12. Example of inclusive photo selection by a photo editor

This photoshoot was related to a book-publishing event by an exile Russian journalist, Oksana Tshelysheva. The photographer took 118 photos at the gig, and forwarded 12 to the news photo editor. As the photos were all excluded in the beginning and photos reviewed one by one, the photo editor sought for a cohesive set:

The photographer has brilliantly produced the dark edges, as the book is titled “They followed me on the street”. That is the vision of the photographer [chooses both orientations], then to balance a little, a lighter photo with the person posing. [...] A straight news photo with the writer talking to a microphone [...] And of course, we will choose the book. These six photos are now ready for the news photo stream; the other photos are directed to photo sales, where they wait for upcoming news—so to speak.

The key actors in combining the interests of news photos and photo sales were the photographers. From each photoshoot a large variety of photos

were expected: ideally, the photos would cover the event, portraits of relevant persons posing and not posing, details of the venue, and anything extra that the photographer came up with.

The direction of the gaze was considered important: while for news photos eye contact was not appreciated, for photo sales direct gaze was seen as elementary. Non-posing people were also indicative of news photos. Non-posed photos with several people and action were more likely chosen for the news photo stream.

The photo format requirements for magazine photos directed the work of the photo editor at the photo sales desk: large portraits with cover photo potential and wide landscape photos for full-spread use were especially sought for. Again, spaciousness was appreciated as it provided more possibilities for the text layout. Suitable candidates for these types of photos were at times hard to find as news photos traditionally are tightly cropped.

5.2 Case II: Editorial Interest at Newsroom

The attributes of editorial interest at four newspapers were collected through a survey integrated in their daily workflow. During the course of the survey, 35 people filled in the selection criteria for a total of 105 photos. Of these, 75 replies from 30 people could be later traced back to the photos published in the newspapers. These statements served as the basis for further analysis.

The analysis revealed 154 quotes for 36 different attributes. Table 8 presents the attributes grouped into the respective factors of editorial interest.

Table 8. Factors of editorial interest and related attributes (n=36) revealed by 154 quotes from four newspapers selecting photos from STT-Lehtikuva's news photo feed. The number of quotes per attribute and factor are shown in brackets after each element.

| Factor | | Attribute |
|------------------------|-----------------|---------------------------|
| Aesthetics (30) | Color (1) | Colors (1) |
| | | Form (23) |
| | Distance (4) | |
| | Composition (3) | |
| | Perspective (1) | |
| | Sharpness (1) | |
| | Cropping (1) | |
| | Style (6) | |
| | | Beauty (2) |
| | | Clarity (1) |
| Affect (12) | | Atmosphere (6) |
| | | Positive affect (3) |
| | | Exciting (2) |
| | | Neutral (1) |
| Novelty-Complexity (4) | | Fresh (4) |
| Semantics (69) | People (28) | Person of the story (15) |
| | | Unidentifiable people (5) |
| | | Eye-contact (3) |
| | | Several people (2) |
| | | People (2) |
| | | Gesture (1) |
| | | |
| | Story (13) | Subject matter (17) |
| | | Storyline (6) |
| | | Event (4) |
| | | Action (3) |
| | Objects (8) | Particular detail (8) |
| | Scene (3) | Setting (3) |
| Utility (31) | | Functions small (12) |
| | | Place in layout (11) |
| | | Versatile utility (4) |
| | | Timeliness (2) |
| | | Functions large (1) |
| | | Matches another photo (1) |
| Other (8) | | Little or no option (6) |
| | | Availability (1) |
| | | Readers' interest (1) |

At the newsrooms, the most prominent factor of editorial interest was semantics with nearly half of the mentions. The two most important attributes were both semantic: theme and photo portraying a person of the story. Overall, people-related attributes dominated the selection. In addition, the story behind the photo was important. Interesting storyline, event, and action were likely to lead to the photo being selected.

The photo (Figure 13) shows the scale of the device and we get a person on the page.



Figure 13. Example of a photo in which semantics was appreciated.

Aesthetics and utility received the same amount of mentions, both reaching a fifth of the overall score. Aesthetics was mainly evaluated through the form of the photo, especially its orientation. Shooting distance and composition received also several mentions. Style was also considered, but to a lesser extent than form. Only one person reported to have used colors as a criterion.

I was looking for a landscape photo that functions in a large size– here (Figure 14) is a nice angle, the most pleasing of the set. There is action in the photo.

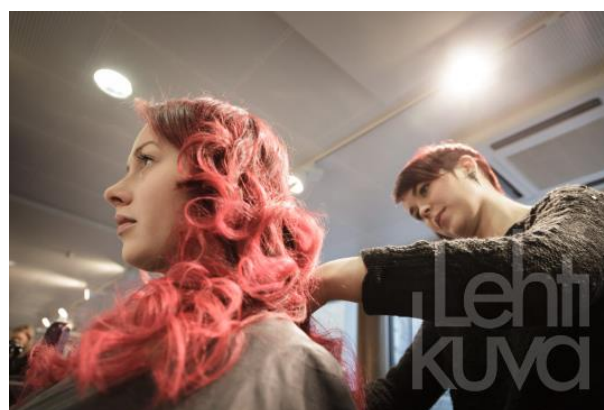


Figure 14. Example of a photo in which aesthetics was appreciated.

Utility was brought upon several attributes, but two of them dominated clearly. Photos that functioned in a small publishing size were found inter-

esting. Almost as frequently the deciding criteria was related to a pre-fixed place in the layout. Versatile utility was also an advantage.

I needed a smallish landscape of the interviewee: you need to be able to distinguish the face even with two columns, and this photo, where she looks at the camera, functions better than the others do. In addition, the darkened edges of the photo (or accidentally framed like this) match the dark cloth and make the photo (Figure 15) quite balanced and finished – even as small.



Figure 15. Example of a photo in which utility was appreciated.

Affect was the fourth largest factor in influencing the selection of a photo. Either the atmosphere of the photo was appreciated or positive emotions were evoked. Novelty-complexity of the photos as also considered, though only through freshness of the photos.

Good atmosphere, exciting glance, composition (the whole world seems to raise the glass to the author). (Figure 16)



Figure 16. Example of a photo in which affect was appreciated.

Three attributes outside the above-mentioned factors were also found. These were related to having little or no options to choose from, timeliness of content, and readers' special interests.

5.3 Case III: Interestingness of Editorial Photos to Viewers

We collected attributes of interestingness for editorial photographs by conducting a laboratory experiment with magazine photos. The set proved to have reasonable variation in interestingness. Figure 17 presents the mean values and standard deviations for each photo. Average interestingness of the editorial photos varied between 2.0 and 5.8 (scale 1-7), while standard deviations ranged from 1.0 to 2.1. The intracorrelation coefficient between the ratings was .19, reflecting a slight agreement between the participants (Landis & Koch, 1977). The coefficient was statistically significant ($F(49, 1127) = 7.106, p < 0.001$).

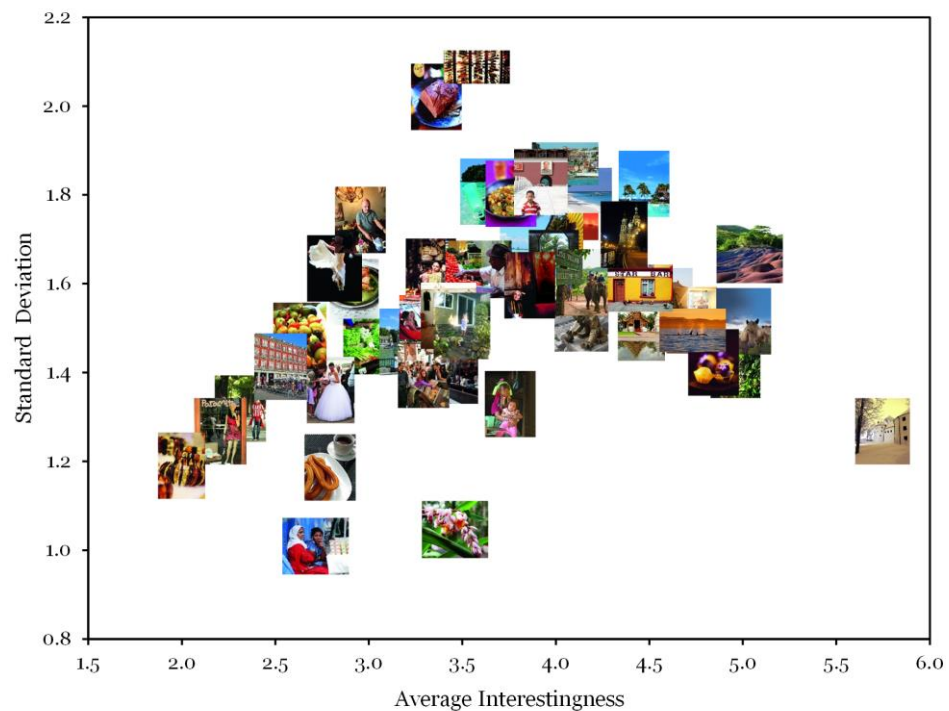


Figure 17. Standard deviation as a function of average interestingness for the samples

5.3.1 Factors of Interestingness for Editorial Photos

We collected 1130 quotes describing the interestingness of photos across all participants and interestingness categories. The quotes entailed 51 distinctive attributes that influenced the perceived interestingness either positively ($n = 28$) or negatively ($n = 23$). By grouping the attributes, seven factors of interestingness were revealed (Figure 18).

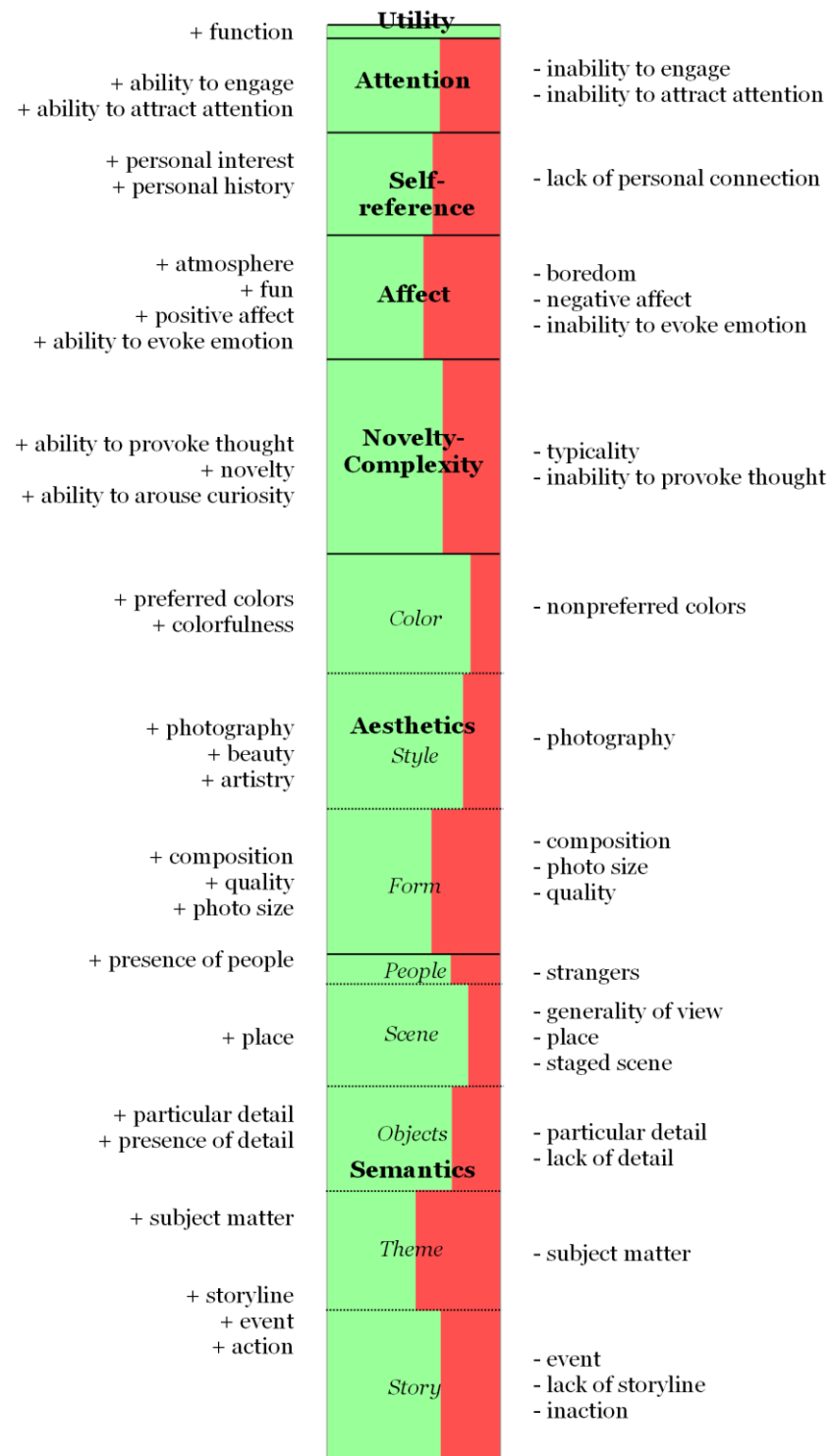


Figure 18. Factors of interestingness with associated positive and negative attributes

The largest factor of interestingness was Semantics (35%). Attributes related to Semantics addressed story (11%), theme (8%), objects (7%), scene (7%), and people (2%). Thematic interest in the subject and the presence of detail raised perceived interestingness of a photo, but especially appreciated was the portrayal of a meaningful storyline. The interestingness of the event and setting were thoroughly considered when rating the photos. Presence of

people typically raised interestingness; however, some participants found photos of unknown people uninteresting (similarly to Obrador et al., 2009).

Attributes related to Aesthetics (28%) dealt with form (10%), style (9%), and color (8%). Form covered composition, quality, and photo size. Better composition, higher quality, and bigger photos lead to better interestingness scores. Positive style attributes appreciated the photographer's skill and aesthetic eye, along with the artistry and beauty of the photos. Negative style attributes described the photos as ordinarily photographed. Color-related attributes did not cover the technical quality of color, but rather the participants' preferences. In addition, colorfulness was appreciated.

Attributes related to novelty-complexity (14%) addressed the degree to which thought was provoked, something novel was portrayed to the viewer or curiosity was aroused. Negative attributes related to related to this factor handled the typicality of photos and the inability to provoke thought.

The five remaining factors were substantially smaller. Affect (9%) dealt with the image's ability to convey atmosphere and emotions. Self-reference (7%) referred to the attributes that dealt with personal connection to the photo either through own interests or past. Attributes related to Attention (7%) covered both the image's ability to draw attention as well as to hold it. Utility (1%) was the smallest class with one attribute, but formed even though no context was given for the photos. The attribute described the desire to use the photo for something, such as use as decoration.

5.3.2 Uninterestingness

While the attributes contributing to the interestingness or uninterestingness of photos differed substantially for the different categories, some patterns could be revealed. Interestingness was brought upon by good colors, interesting places, and the ability to provoke thoughts throughout the scale. At the uninteresting end of the scale, even single objects and action were found interesting, while at the interesting end the attributes dealt with aesthetics, novelty, and personal connection.

Uninterestingness was linked to the level of photography throughout the scale: either the photo appeared too familiar (typicality), or the photography was considered ordinary. At the uninteresting end, photos were typically found to portray content that was non-personal, thematically uninteresting, or even annoying. Photos that were considered interesting had few negative attributes associated to them.

5.3.3 Relative Importance of Image Interestingness Factors

The ratings for the ten statements related to distinct interestingness factors are presented in Table 9. Pearson correlations between the statements and the overall interestingness are also shown.

All the statements correlated significantly ($p < 0.001$) with photo interestingness. The highest correlations were related to attracting and holding attention ($r > .70$ for both). Statements concerning Semantics, Aesthetics and Cognition all reached a correlation of over .60. The lowest correlations were found for photo quality ($r = .34$ for technical and $r = .41$ for preferential quality).

Table 9. Ratings for the statements and their correlations with overall interestingness

| Factor of interestingness | M | SD | r |
|--|----------|-----------|----------|
| Attention | | | |
| S6. "I could view the image for a long time." | 3.4 | 1.9 | .761 |
| S5. "The image draws my attention." | 4.0 | 1.9 | .730 |
| Semantics | | | |
| S9. "The image contains objects that are of interest to me." | 3.8 | 2.0 | .695 |
| Other | | | |
| S10. "I would like to see the scene for real." | 3.7 | 2.2 | .662 |
| Aesthetics | | | |
| S3. "I find the image aesthetic." | 4.2 | 1.8 | .640 |
| S2. "Image quality meets my preferences." | 4.8 | 1.8 | .411 |
| S1. "Image quality is technically good." | 4.8 | 1.7 | .339 |
| Novelty-Complexity | | | |
| S7. "The image provokes thoughts in me." | 3.7 | 1.9 | .629 |
| Affect | | | |
| S8. "The image provokes emotions in me." | 3.4 | 1.8 | .581 |
| Self-reference | | | |
| S6. "I have a personal connection to the image." | 2.6 | 1.8 | .436 |

6 Discussion

Grounded theory was built on three case studies to investigate the factors of editorial interest from the viewpoint of photo professionals, who create and select photos, and amateurs, who view the final products. The results are discussed in the following sections: first from photo production perspective, then from viewer perspective, and lastly covering the whole process from beginning to end. The chapter ends in a reliability analysis of the results.

6.1 *From Photographers ... – Interestingness of Photos in Editorial Workflows*

The experimental part of the thesis was divided in two parts. The first part aimed at investigating the attribute space of editorial interestingness from the production point of view and answering the research question:

1. What factors influence the editorial interestingness of photos during
 - a) editorial photo production, and
 - b) editorial photo selection?

To answer this, two case studies were designed. Case I was carried out at a photo agency, where the processes of photo planning, creation, edit, and selection were observed. In the course of observations, eight people with three different roles (photographers, photo editors, and a news editor) were observed and interviewed. Photo editors from both photo desks (news photo desk and photo sales) were involved in the study. The case included both news and magazine photos as they were created parallel in the workflow.

Case II was conducted as a survey in four newspapers that subscribe to the news photo service of the photo agency. The survey lasted for two weeks and was integrated in the publishing system operated by the newspapers. When attaching a photo from the news photo stream to a news story, the system launched the regular dialogue window with two survey questions. In total 35 news editors and associate editors answered the survey and explicated their selection criteria for the respective 105 photos. Of the answers, we were able to trace 75 quotes for 73 different photos without doubt. These quotes formed the data corpus for the analysis.

The results from Case I revealed that attributes related to five factors: Aesthetics, Affect, Novelty-Complexity, Semantics, and Utility influenced the editorial interestingness of photos during editorial photo production. Furthermore, Case II employed the exactly same factors. Aesthetics was brought upon by attributes of color, form, and style. Of these, attributes related to form—such as orientation, distance, and composition—were most dominant. Semantic attributes influencing the editorial interest linked to people, theme, story, objects, and scene. Most attributes described people in the photos, also the thematic connection to the story was important.

The biggest difference in Cases I and II were the aims of photo selection. While the photo editors at the photo agency thrived to select as large a variety as possible to serve the needs of all sorts of media clients, the editors at the newspapers had very specific photo needs and exact knowledge of the use context.

6.2 ... to Viewers – Interestingness of Editorial Photos to Non-professional Viewers

The second experimental part aimed at analyzing the attributes of editorial interest from the viewer perspective. The second research question addressed the viewing experience of published photos:

2. What factors affect the interestingness of published editorial photos according to non-professional viewers?

A third case study was conducted to find out the answer to this. Case III was a laboratory experiment with 50 magazine photos and 24 participants, who were non-professionals in photography. The experiments included tasks for category scaling, participating in semi-structured interviews, and rating interestingness statements.

The qualitative and quantitative analysis of the interview data revealed seven factors of interestingness and 51 associated attributes that influenced the overall interestingness either positively ($n = 28$) or negatively ($n = 23$). The seven image interestingness factors were (in order of decreasing magnitude): Semantics, Aesthetics, Novelty-Complexity, Affect, Self-reference, Attention, and Utility.

Roughly one third of the attributes was related to Semantics, one fourth to Aesthetics, and one sixth to Novelty-Complexity, while the other four factors took up the remaining fourth. Semantic attributes dealt with story, theme, objects, scene, and people, whereas aesthetic attributes addressed form, style, and color. Overall, roughly two thirds of all the quotes describing interestingness were positive.

Although the attributes contributing to the interestingness of images varied along the interestingness scale, some consistencies were observed. Good colors, interesting places, and the ability to provoke thought were indicative of interestingness throughout the scale. A particular detail or action was

deemed sufficient for increasing interestingness at the low end of the scale, whereas the high end called for novelty, aesthetics and self-reference. Uninteresting photos typically portrayed non-personal, uninteresting, or even annoying content. Overall, uninterestingness linked strongly to ordinary photography.

Correlations were calculated between the photo interestingness factors and overall interestingness. While all factors correlated significantly with interestingness, the highest correlations were achieved for Attention. The agreement between participants on the interestingness rating was, however, low (.19), which underlines the subjective nature of the evaluation. Individual differences between participants were beyond the scope of the thesis.

6.3 What Makes Editorial Photographs Interesting? – General Discussion

The third and final research question was set to combine the first two questions and analyze the findings of all three case studies:

3. What are the themes of interestingness that surface in all case studies, i.e., the factors of editorial interest that are overarching independent of test setting, photo genre, and role of participant?

Figure 19 summarizes the factors that emerged in the literature review and case studies.

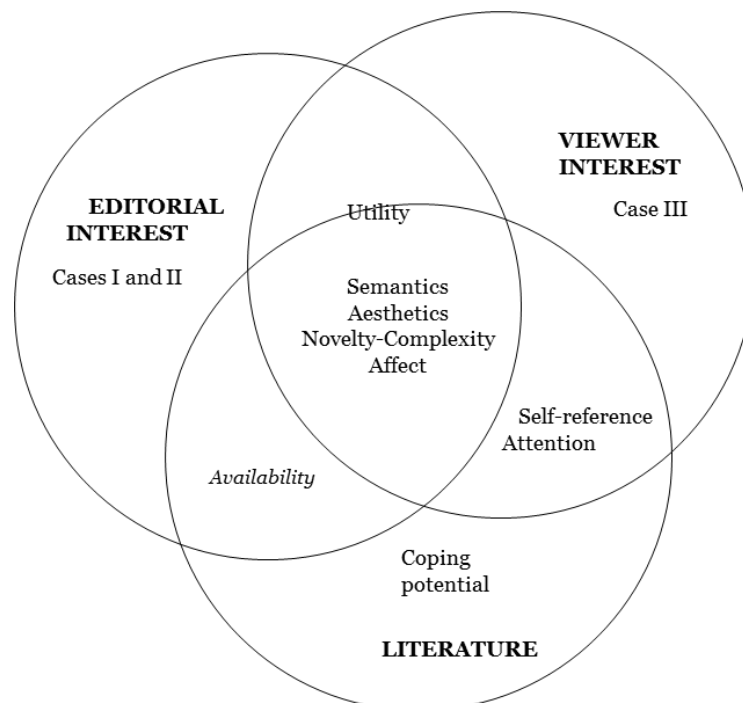


Figure 19. Diagram of the factors of editorial interestingness that emerged from case studies and literature review. Availability (*in italics*) was the only attribute outside the seven factors to emerge in at least two cases (both cases of editorial interest) and literature. Coping potential on the other hand was the only factor to arise from literature, and not from cases.

The overarching themes of editorial interestingness independent of test setting, photo genre, or viewer expertise were Semantics, Aesthetics, Novelty-Complexity, Utility, and Affect.

Editorial interest (Cases I and II) had one attribute similar to literature that did not emerge in Viewer interest (Case III): availability. This relates to hurry in the newsrooms, and the convenience of having an available photo right away. Viewer interest, on the other hand, had two factors common with literature that did not surface in Editorial interest: Self-reference and Attention. Understandably, the strong professional context prevented the consideration of personal reference, but why Attention was not covered is unclear. The ability of a photo to attract and hold attention is an important function of a photo, especially in the news context (Mendelson, 2001; Rössler et al., 2011).

Furthermore, there was one factor that surfaced in all cases, but not in literature related to Viewer interest; even though Utility is a prominent factor of photos and was introduced by the amateur participants also, there were no prior reports of it been linked to interestingness of photos in a non-workflow context. At the same time, the literature review brought up one factor that did not emerge in any of the cases: Coping potential. This can most likely be explained by the fact that editorial photos are typically informational by nature and thus rather easily understood. They rarely challenge people in the sense that coping potential would be consciously stretched.

Even though the theory on the interestingness factors was built separately from existing literature, the three case studies provided a good coverage of attributes discussed in literature and beyond. The material also backed up reviewed theories on interest. The results suggested that interest indeed has an affective and a cognitive component, which was in concordance with the findings of e.g., Harp and Mayer (1997), and Izard (1991, 1992). To the discussion on the relation between aesthetics and interestingness, these results add a solid stand on that various aesthetic criteria are considered when the interestingness of editorial photographs is evaluated.

From a computational point of view, it is encouraging that the common factors included Semantics, Aesthetics, and Novelty-complexity, as several computational features related to these already exist. The computation of Utility and Affect will be more challenging. However, according to the attributes of Utility—that was more important from the perspective of Editorial Interest—a clear emphasis was put on place in layout, and “functions as small”, which are both rather simple to solve computationally.

6.4 Reliability Analysis

Methodologically, we consider the results reliable. A significant strength in a case study design is the multiple sources of evidence produced (Yin, 2003); here photo material, observations, interviews, ratings, and a survey

back up the findings. The methods used in the studies have longstanding histories in social sciences and image quality research, yet some reliability considerations are in place.

Firstly, while research designs with multiple case studies have their advantages, covering all necessary cases can be difficult or even impossible (Gomm, Hammersley, & Foster, 2000). However, we feel to have succeeded in selecting three naturally occurring cases that complement each other and provide the necessary comparative leverage.

Secondly, during observation the natural course of events might alter, as the person is conscious about being under observation. In our case, the participants were, however, experienced professionals carrying out their everyday tasks, which decreased the risk of changed behavior.

Thirdly, the number of photos in the studies was limited. The photo sets were of sufficient size for the purposes of the cases, but they are not and cannot be considered as full representatives of their photo genres (news and magazine photos, respectively). Nevertheless, our main priority was to dig overarching themes of editorial interest from the data, and the material did not compromise this aim.

Lastly, a question we cannot fully dust off. The photos in Case III (Viewer interest) were shown detached from the original context, for which we had a valid reasoning: to ensure participant focus on the interestingness of the photos instead of the stories. There is yet another viewpoint on this, as Mendelson (2001) found novelty of news photos to increase interestingness only for photos shown without a context. Some attributes of interestingness might depend on the presence of context. This we would need to examine in future work.

7 Conclusions

In this thesis, we coined the term editorial interest by which we refer to all factors that contribute in making a photograph editorially interesting in a professional workflow from photo creation to selection. While e.g., the concept of situational relevance is well-applicable in the context of editorial photo selection, it does not apply to the earlier stages of photo production where photo needs are less specific, but evidently evaluation based on versatile criteria takes place. Traditional terms such as situational relevance can therefore be seen as partial judgment of editorial interest.

The thesis aimed at investigating the attribute space of editorial interest, and determining the overarching factors independent of photo genre, test setting, or evaluator role. To meet the aims, three case studies and a thorough literature review were carried out. The first case study took place at a photo agency, where eight actors of the photo production process were observed. The second case was executed as a survey integrated in the publishing system of four newspapers. The last of the cases was a laboratory experiment probing the viewer interest on editorial photos.

Overall, the cases provided us with rich qualitative data and built much-needed grounded theory on editorial interest. The primary contribution of the thesis is the attribute space of editorial interestingness that has not been previously explored to the same extent. In addition we provide a hierarchy for the attributes, also unseen before. There were five factors common for all cases: Semantics, Aesthetics, Novelty-Complexity, Utility, and Affect. Semantics—related to theme, story, objects, scene, and people—and Aesthetics—brought upon by form, style, and color—covered together nearly two thirds of the attributes. This is promising from a computational perspective, as features for their computation exist.

Single photos on a news page compete hard on the attention of the viewers with other elements on the page. A news photo's role seems to have diminished to that of a second headline, an entry point to an article. As media gets more visual by the minute, editorial photographs also need to take the next step. This could be done by incorporating attention and coping potential as criteria of editorial interest in a workflow. Both criteria have been shown to affect viewer interest in photos, but—as revealed by this thesis—are neglected in the photo production processes by tradition.

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