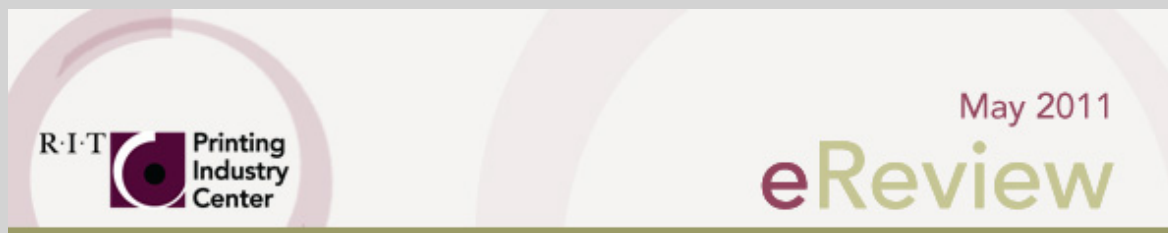


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## Center Spotlight



### Print in the Mix

Print in the Mix is "a unique site demonstrating the role of print as a viable information medium in the marketing mix." This **free** resource is published by the Printing Industry Center.

#### Sample Fast Fact:

*Traditional media advertising remains a more effective driver of online traffic than social networking, a multinational study conducted by consultants Deloitte UK and research firm YouGov has found.*

[Read the full fast fact here.](#)

Have you visited **Print in the Mix** yet? Find out how this site can help you 'make the case' for print!

[printinthemix.rit.edu](http://printinthemix.rit.edu)

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## The Perceived Image Quality of Digital Technologies for Photofinishing

With the shift from silver halide film to pixels, the possibilities for photofinishing have burgeoned as well. Not much more than a decade ago, photography was a process involving the recording of images on film and the printing of these images on silver halide paper. Today the majority of images are now captured digitally, and though digital silver halide certainly remains an important player in the photofinishing market, a great many images are printed at home on ink jet printers. Images are also being printed in forms other than 4 x 6 in. prints. Electrophotographic printing technology is being used to generate photo books, cards, and calendars. In addition, wide-format ink jet and, eventually, high-speed ink jet, afford still other opportunities. It is of interest, then, to understand the perceptual image quality being achieved using the various printing technologies today.

The primary objective of this month's research study, *Investigation into the Perceived Image Quality of Digital Technologies for Photofinishing (PICRM-2011-04)*, by Susan Farnand, Franziska Frey, Ph.D., and Mariela Rodriguez Adames, was to evaluate the perceived image quality of ink jet and electrophotographic photo finishing relative to digital silver halide. Targets generated to resemble photo album pages, along with a variety of photo books, were used in this study.

Intuitively, it seems that the representation of an image as part of a book or a photo album page, rather than a 5 x 7 in. print, may add to the perceived value of that individual image. Therefore, it



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## About the eReview

The *eReview* is a monthly publication of the Printing Industry Center at RIT for registered Affiliate companies. Articles are also published in the quarterly printed publication *PrintReview*.

was a secondary objective of this study to determine if this was indeed the case and to develop an increased understanding of the factors involved.

## Sample Population

Primarily naïve observers were surveyed. The observers seeing the 'third-person' image set included eight students from a graduate print workflow class, as well as 13 Print Manufacturers Association (PMA) 2010 trade show attendees and 15 participants in the 2010 Imagine RIT Innovation Festival. Twenty students from an undergraduate Digital Asset Management class evaluated the 'first-person' image set, which included the photos taken by the participating students. There was a total of 56 participants (28 males and 28 females). Most, though not all, were in their early twenties.

## Methodology

Two image sets were used: a 'first-person' image set which contained images from an undergraduate class at RIT, and a 'third-person' image set which included images representative of various typical consumer photographs such as children, vacation pictures, wedding pictures, and natural scenery. With the image sets established, prints made on digital silver halide, ink jet, and high-end electrophotographic equipment were collected from various sources. Several photo book formats were created as well. All of the photo books were printed using electrophotographic equipment.

Psychophysical experimentation was conducted with the collected prints to examine the effect or impact of the image and format differences on perceived quality among the prints created using the different technologies. To evaluate this question of impact, the observers were questioned regarding what they would be willing to pay for a given print set. The observers were shown two 5 x 7 in. prints made using digital silver halide technology as a reference. The observers were then shown the matching pair of prints for each of the other photofinishing technologies in random order.

The observers were told that they paid \$1.50 for the reference pair of prints and were asked to determine the relative monetary value for each of the test prints. If they believed that the quality of a given test print increased enough that it would justify paying more for the document, they were asked to specify how much

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## About the Center

Dedicated to the study of major business environment influences in the printing industry precipitated by new technologies and societal changes, the Printing Industry Center

more they would be willing to pay. On the other hand, if the quality of the print decreased enough that they felt the photos would not be worth as much the reference pair, they were asked to specify how much less they would be willing to pay. If they felt that the quality was essentially comparable—even if the prints looked quite different—they were instructed to give the same \$1.50 value as the reference.

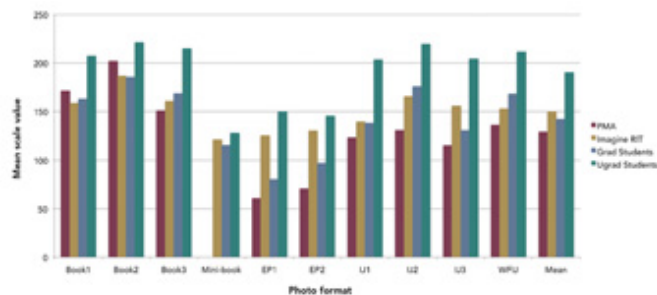
To keep the testing time manageable, each participant evaluated 3-5 image pairs. The image pairs and print sets were presented in random order, though the image pairs were selected for the “first person” set to ensure that each participant saw their own image. When the scaling of the test prints was completed, the participants were questioned regarding their decision criteria. Special attention was given to the format of the prints. The experiment was conducted under simulated D65 lighting conditions.

## Results

- **Relative Value by Observer Group:** The experimental results are summarized in the chart in Figure 1, which shows the average value assigned, in cents, to each photo print format by each of the general groups of observers: PMA attendees, Imagine RIT Festival attendees, graduate students, and undergraduate students.

**Figure 1. The mean scale values assigned to each photo print format in cents by observer group**

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- **Relative Value by Image Pair:** Figures 2 and 3 show the mean assigned value for each individual image pair, averaged across the photo print formats for the third-

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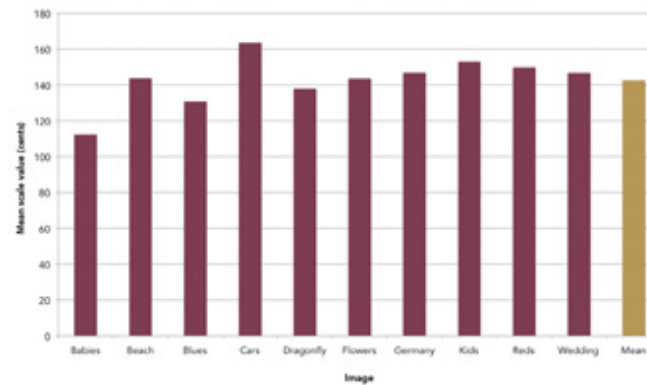
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person and first-person image sets, respectively. Relative to the data in Figure 1, these figures indicate that the photo print format has a more significant impact on the assigned value than the image content.

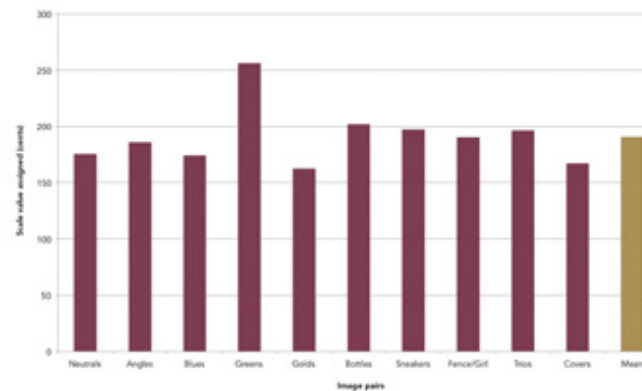
**Figure 2. The mean scale value assigned to the photo prints for each of the individual image pairs for the third-person image sets**

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**Figure 3. The mean scale value assigned to the photo prints for each of the individual image pairs for the first-person image sets**

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## Conclusions

- Observers generally assigned higher values to the full-size photo books and ink jet prints relative to the electrophotographic prints and the Pocket Portfolio mini photo book. The ink jet prints may have ranked significantly

above the electrophotographic prints due to the heavier weight and the substantially higher gloss of the substrates.

- The group of undergraduate observers rated the test prints significantly higher than the other observers, who were generally in agreement with one another. The data indicate that this difference was likely not due to the fact that the image set contained first-person images. This difference may have been the result of the undergraduates being younger and less experienced than the other observers, or it may have been that the first-person image set contained more images than the third-person set for which the digital silver halide process simply did not render as well as other print processes.
- The photo-print format had a more significant impact on the assigned value than the image content, though there were one or two image pairs that were rated significantly different among the two image sets. When this occurred, the images involved had significant levels of memory colors, including skin tones and foliage.

### Limitations

It is important to remember that prints used as stimuli in this experiment were made on a limited set of machines. Different results may be obtained using different equipment or even the same equipment run by different people or on different days. Making definitive statements based on this data would not be prudent; however, a few general statements of relative perceived quality may be made.

### Complexity Rating: 1

Rating reflects complexity level of statistical analysis: 1=none, 2=moderate, 3=difficult.

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## 2010-2011 Research Monographs

To read about this research in detail, download the monograph from: <http://print.rit.edu/pubs/picrm201104.pdf>

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