

Color Business Document Preference Psychometric Research Business User Preferences

Results and Analysis
July 2006

spencerLAB DIGITAL COLOR LABORATORY

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Project Objectives

Print Quality – Overall Quantitative Preference

What Printer Vendor Provides the Best Overall Print Quality?

° *Print Quality preference judgment of the color business document test samples*

- Which samples they would prefer to use, receive or distribute to/from their customers

Performance Ranges

Low-end personal and High-end workgroup

° *Plain and glossy media*

Color Business Document

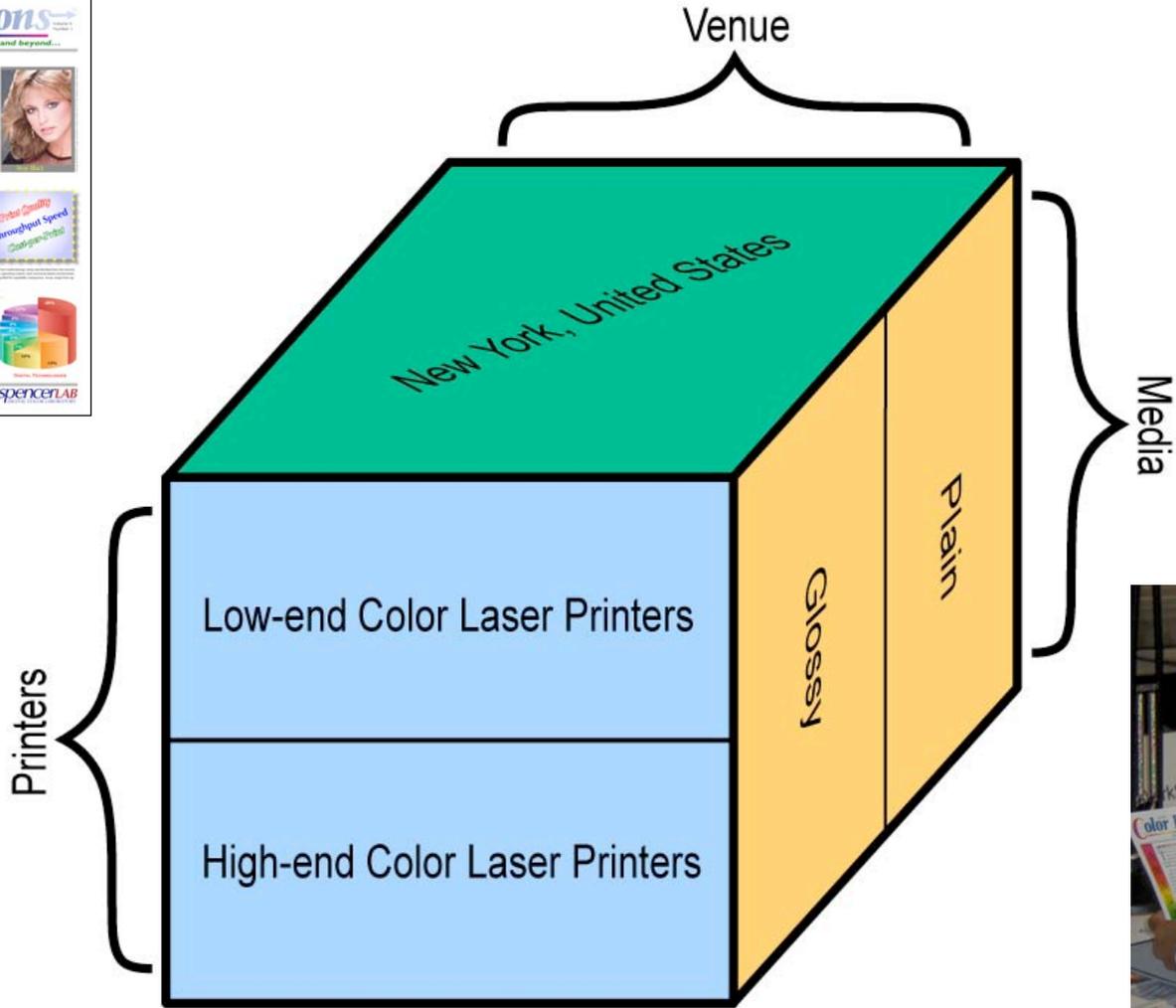
Controlled Viewing Environment

Statistical Preference Analysis

Qualitative Commentary



Project Dimensions



Print System Configurations

Vendor	Model	Low-end High-end	Media		
			Glossy	Plain	
Dell	Laser 3100cn Laser 5100cn		Hammermill Color Copy Gloss, 100# text, 90 Brightness	Hammermill Laser Print, 24#, 96 Brightness	
Epson	AcuLaser C1100 AcuLaser C4200DN				
Konica Minolta	magicolor 2400W magicolor 5450				
HP	CLJ 2600n CLJ 4700n				HP Color Laser Brochure Paper Glossy, 44#, 97 Brightness
Xerox	Phaser 6120N Phaser 6350DP				Xerox Digital Color Elite Gloss, 100# text, 94 Brightness
Oki	C3200n C7350n				Oki Premium White Gloss Paper, 32#, 90 Brightness

“Print System” — includes Printer + Driver + Toner Cartridge + Media

Driver: Latest PCL driver, Default setting for paper type

Toner Cartridge: Vendor’s OEM cartridges

Media: Glossy (manufacturer recommended, where available), Plain



Vendor Overall Preference Findings

Overall Results

- ✓ HP print quality was preferred more often than any tested competitive vendor's
- ✓ In addition, preference gaps were especially large for 3 competitors with HP being preferred more than 5 times* as often as Dell, Xerox, or Oki

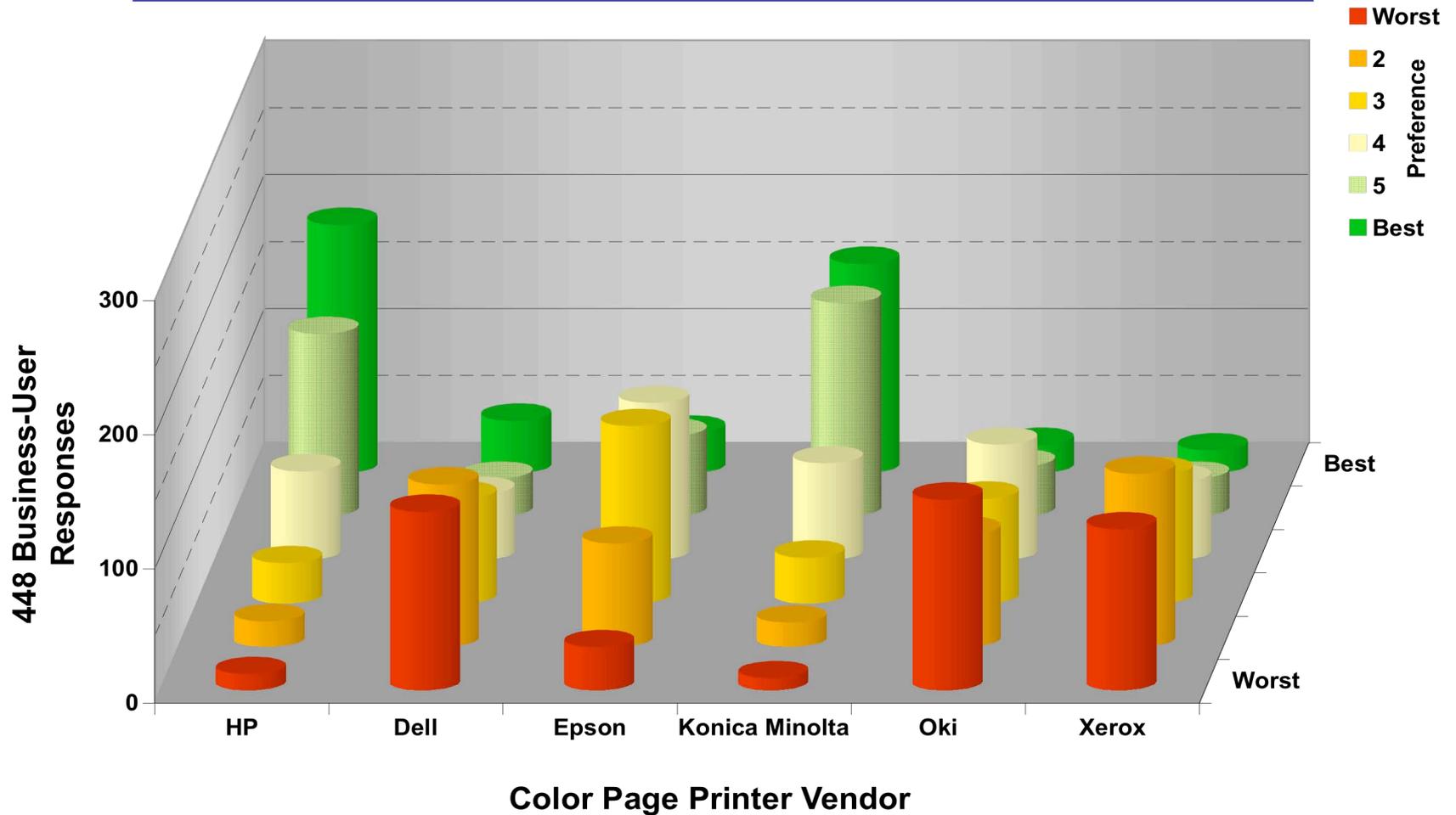
“Overall, no competitive vendor’s print quality was preferred over HP’s”
—SpencerLab

*statistically significant at the 95% confidence level



Vendor Rank Order Preference Distribution

“HP’s print quality was unsurpassed by any other competitor”



Qualitative Commentary — Overall Drivers of HP Preference

Text: crisp, clear and legible (both black and color)

- *“Clarity of text is best”*
- *“I just found it easier to read”*

Fine Lines: sharp, clear

- *“The lines on the car were sharp and clear, can see the details better”*

Blend and Gradient (glossy)

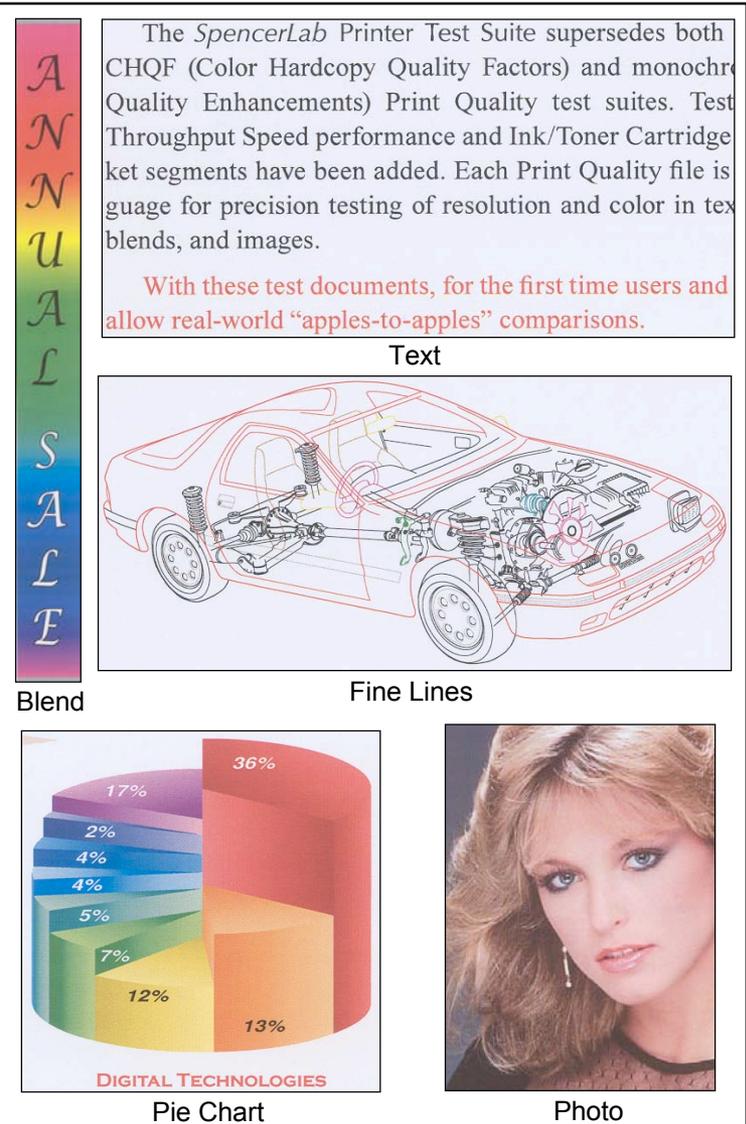
- *“Colors fade very gradually into each other”*

Pie Chart: vivid colors

- *“It was eye-catching, had vibrant colors”*

Photo: realistic colors

- *“The colors looked neutral and natural”*
- *“The woman’s face looked natural, not fake”*



Qualitative Commentary — Improvement Opportunities for All Vendors

Overall Color Lasers

- *“I don’t know if the customer would look at it with such scrutiny, but every single one had a flaw: One had great lines, next had great picture, next had great color.”*

Text

- *“Black ink was faded every other line, its just gone”*
- *“Some of the [small] text was not complete, looks smudged”*

Blend and Gradient

- *“Circle in the blue gradient”*
- *“Sort of flat”*

Pie Chart

- *“Some were just so dull, not one part of it caught my eye because it just seemed so faded”*

Photo

- *“Too much red in the face, red and grainy”*
- *“Bands on some of the photos”*

The *SpencerLab* Printer Test Suite supersedes both CHQF (Color Hardcopy Quality Factors) and monochrome (Quality Enhancements) Print Quality test suites. Test Throughput Speed performance and Ink/Toner Cartridge segments have been added. Each Print Quality file is designed for precision testing of resolution and color in text, blends, and images.

With these test documents, for the first time users can evaluate and allow real-world “apples-to-apples” comparisons.

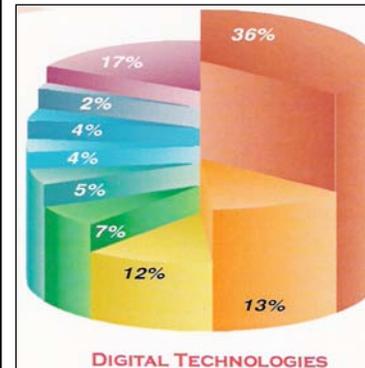
Text



and valid results when evaluating the integrity of results. This includes the evaluation of Test Methodology and the types to choices of workstation

Small Text

Gradient



Pie Chart



Photo



Research Methodology — Central Location Testing

Print Quality – Overall Quantitative Preference

Print Quality preference judgment of the color business document test samples

° *Which sample they would prefer to use, receive or distribute to/from their customers*

Participants judged pair-wise comparisons to establish rank-order

° *Best to Worst individually within each of the four sets*

Participants recorded the identification code for each print

° *On a customized survey form in their preference order*

Qualitative follow-up discussion

Controlled Viewing Environment

Neutral WorkStations

Controlled Lighting

Complete print sets at each WorkStation

° *Set sequence rotated*



Test Document

Test Document

Color business document

Letter size, single-page PDF

Derived from the *spencerLAB* PRINTER TEST SUITE

Multiple Copies of each Set of 6 Un-mounted Test Prints

High-end printer on glossy media

High-end printer on plain paper

Low-end printer on glossy media

Low-end printer on plain paper

Test Samples Printed on Each Print System

All prints from the same original PDF file

All print systems assumed to be representative



Fielding

United States

New York metropolitan area

° *Nassau County, Long Island*

Non-industry, Business-user Participant Screening

Personally use, receive, or distribute color prints as part of their employment

On average, print or receive >10 pages per month

Are familiar with color printers

Do not work in the following industries

° *Advertising, PR, market research,
designing/buying/selling color printers,
designing/using professional photographic equipment,
providing printing services*

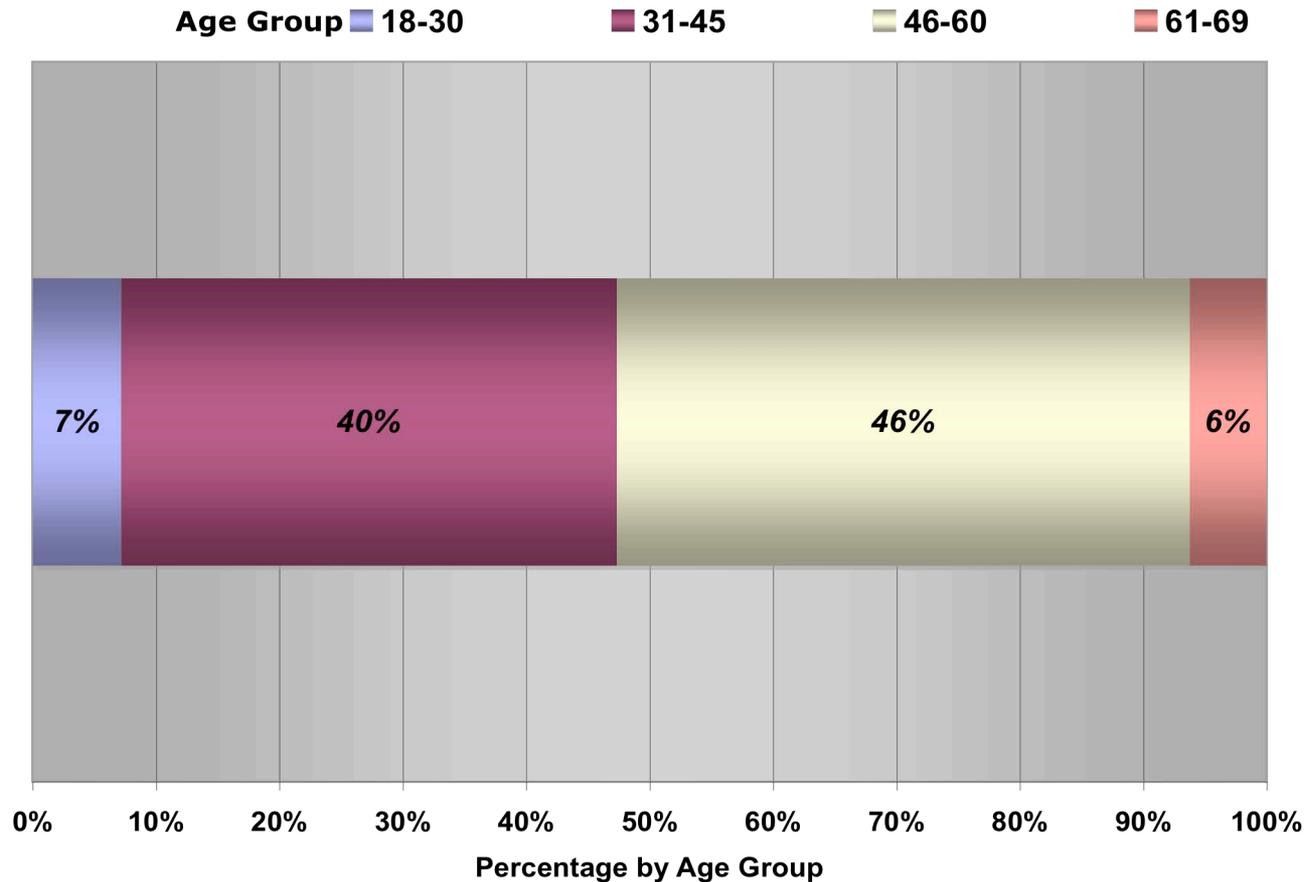


Participant Demographics

112 Participants

84% print/receive 50-1000+ pages a month

42% Male / 58% Female



Statistical Analysis

Statistical Significance – Confidence Analysis

Non-parametric statistical analysis of pair-wise rank order preference data

° *Based upon Thurston (Bartleson and Grum)*

Calculated at 2-tailed, 95% Confidence level

Participant preference responses aggregated by vendor



Qualitative Analysis

General

Overall relative importance of attributes, trade-offs

Why participants ranked prints as they did

Best to Worst preference selection

Using determinate analysis, identify closest competitors and direct questions towards head-to-head comparisons

- *"Why did you prefer (or not prefer) the X-printed documents vs. Y?"*
(manufacturers were not identified to the respondents;
documents were referred to by their identification codes)



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This research was conducted by the *SpencerLab* Digital Color Laboratory under commission by the Hewlett-Packard Company. Research results and analyses represent our best knowledge at the time of publication, and are based upon testing procedures developed and implemented by *SpencerLab* in our continuing commitment to accuracy, integrity and our broad base of industry clients. Usage of derivative works require prior permission from Spencer & Associates Publishing, Ltd.

