The Impact of Color Inaccuracies on E-Commerce Sites

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ABSTRACT

Although the number of purchases over the Internet increases each year, the problem of inaccurate color representation on e-commerce sites persists. Color inaccuracy has many negative consequences, including loss of sales, increased returns and complaints, and customer defections. This research paper reports the findings of a survey conducted as part of an initial investigation into consumer opinions about the purchase of color-critical items over the Internet. Results indicate that consumers are aware of the color inaccuracies on e-commerce sites and that they are likely to react in ways that will negatively impact retailers. Consumer dissatisfaction leads to greater costs in both customer service and reverse logistics. The paper concludes with suggestions for future research.

INTRODUCTION

Global B2C e-commerce sales for 2003 are estimated to range from $144 to $380 billion, according to a report by OECD. The report is based on a variety of sources including Boston Consulting Group, Giga Information Group, Forrester Research, Dataquest, Gartner Group, Warburg Dillon Read, and Pro Active (OECD, 2001). Global B2C e-commerce is expected to hit $562 billion by 2006 (Sharrard, 2001). Internet sales of non-travel related products in the United States have reached $988 million a week, with apparel and home items experiencing a greater increase than other items (Puente, 2002). According to one study, the Internet will influence $400 billion in U.S. retail sales in 2003 and as much as $1 trillion by 2006, and the study indicates that half of the online shoppers report that they first researched goods on the Internet and then purchased the items over the telephone (IMRG.org, 2003). Apparel, which is often color-critical, has been one of the top eight industries involved in Internet shopping in the United States (Krantz, 1998). According to a 2002 UCLA study, 48.2% of new users (less than one year Internet experience) and 41.8% of experienced users (greater than six years of Internet experience) reported making online clothing purchases (Lebo, 2003).

E-commerce transactions generally require that detailed product information be provided to potential consumers before they are comfortable with making a purchase. A critical component of that information is the color of the products being considered for purchase. Color information can consist of both verbal information (e.g., a description of a product as being royal blue) and graphical information (e.g., a jpeg or other graphic format showing the product in royal blue). Purchasers can use the web to see the entire selection of colors in which a product is available. This study focused on color-critical items such as clothing and accessories for people, and fashion items for the home, such as indoor and outdoor furniture and home decor.

Anyone who has shopped or merely browsed at e-commerce sites may have noticed that color representation is often inaccurate. These inaccuracies can prompt several possible reactions from consumers. First, the consumer may not trust the colors that are depicted on the monitor and decide not order the product, thus leading to a lost e-sale. Second, the consumer may decide to order the product with the hope that the actual product matches the color depicted. If it does not match, the consumer may return the product, again resulting in a lost sale, but in this case the loss is compounded by the added costs of reverse logistics and restocking. Third, the consumer may order the product and keep it even though they may not be completely satisfied. In this case and the previous case, the unhappy consumer may not only complain to the company about the lack of quality control, but may also complain to friends. Not only does the retailer lose future business from the dissatisfied customer, but also from others who may be repelled by hearing such negative word of mouth. This paper examines the consumers' perception of color inaccuracies on the web and outlines an approach through which the problem can be researched.

It is important to note that consumers who utilize the Internet may proceed in any one of four purchase scenarios. These scenarios include (1) visiting stores to evaluate a product or to gather information prior to purchasing on-line, (2) using the Internet to locate the product and/or a local retailer, and then going to the store to

make the purchase, (3) using a catalog in conjunction with the Internet website for making the purchase decision, and (4) making both the purchase decision and the actual purchase using only on-line resources. According to a UCLA study, 64.7% of Internet purchasers surveyed in 2002 said they sometimes or often follow the first scenario and browse in traditional retail locations and then buy online (Lebo, 2003). In this scenario, the consumer makes a color selection based on the actual item, rather than an online representation of the colors. In such cases online color inaccuracies become relatively insignificant. The same UCLA study reports that 70.9% of 2002 Internet buyers said they sometimes or often follow the second scenario and look online for products and then buy in stores (Lebo, 2003). Consumers may follow that second scenario in order to avoid paying shipping and handling charges, or to experience more immediate gratification. While the item's color may be initially selected on-line, the actual color can be confirmed or rejected upon examination of the item in the store prior to purchase, making any online color inaccuracies largely irrelevant. In the third scenario, consumers may refer to a catalog to help with color selection prior to making an on-line purchase. Here, the color selection may be influenced more by the catalog than by the web site representation, since the color of products in catalogs may be perceived to be fairly accurate due to sophisticated color correction techniques available in print media. In the fourth scenario, the web site representation provides the sole basis for product selection. This research focuses on the last scenario because it is the purest form of e-commerce and because the e-commerce site provides the sole frame of reference for color selection.

INFORMATION ON COLOR

According to Stone (2001, p. 1), color perception is problematic for a variety of reasons:

- Color is subjective: It's perfectly obvious that color is an intrinsic feature of an object: Grass is green, the sky is blue, the paint on your living room wall is peach, and so on. As obvious as this may be, however, it's not so. Color is actually a sensation, just like touch. And the colors you see are purely subjective, as interpreted by your visual system and your brain.
- Lighting affects color: The color of an item--including, for example, a printout--will vary depending on the light, so it will look different under incandescent light, florescent light, and daylight, for example.
- Identical colors can be metameric pairs: Two items that are the same color under one light can be different colors under another light.
- Colors affect colors: Your perception of a color will change, depending on the colors around it, an effect called simultaneous contrast. Paint a small square of green on a blue background, and the green will have a yellowish tinge. Change the background to yellow, and the green will have a blue tinge.
- The human eye is different from a scanner or camera: The sensors in scanners and cameras are sensitive to specific frequencies of light in different proportions than the color sensitive cones in the human eye.
- Different devices have different color gamuts: Monitors can show colors that printers can't print, and printers can print colors that monitors can't show. Cameras and scanner sensors can register colors that neither monitors nor printers can produce.
- Different devices use different color models: A color model is simply a mathematical way to represent colors. When different devices use different color models they have to translate colors from one model to another, which often introduces errors. This is a particular problem for device-dependent models, meaning models defined strictly in terms of a specific printer, monitor, scanner, or camera.

The factors noted above indicate that the adverse effects of inaccurate color representation afflict not only on-line shopping sites, but also more traditional means of shopping, such as retail stores and printed catalogs. The problem is actually more a matter of perception than representation and this gives rise to the difficulty in accurately portraying the color to the consumer. Color is a sensory perception related to the frequency of the light waves being reflected from the item being viewed and not an intrinsic property of that item. This is why it is entirely possible that two items viewed in a retail store, say under fluorescent lighting, may appear to be the same color yet when viewed outside, under natural sunlight, may appear to be different colors.

Printed catalogs introduce yet another set of lighting factors that impact the consumer’s perception of a product’s color. An image of the item appearing in the catalog is created under one set of lighting conditions, yet

may be viewed under an entirely different set of lighting conditions. Even though the image may be painstakingly color corrected to match the original item, the catalog producer has no control over the lighting conditions under which that image will ultimately be viewed. An additional problem associated with catalogs is that the colors represented in the printing process are a close approximation produced by color composites. Most printers utilize the CMYK color model, which approximates colors in terms of the amounts of each color of ink—cyan, magenta, yellow, and black. The color gamut that a printer is able to represent is much smaller than the entire range of colors that the human eye can perceive, thus the approximation is often lacking in precision.

Images of products presented on the web are subject to the same lighting issues as catalog images during their creation and viewing, as well as to a host of hardware and software factors. Some of these factors include the graphic file format in which the image is stored, the type, brand, and age of the monitor on which the image is viewed, the graphics card to which the monitor is attached, and operating system settings for number of colors to be displayed and the resolution of the display. Personal computers owned by consumers vary in image presentation due to differences in graphics cards and monitor resolution capabilities (Imation.com, 2001; Business Wire, 1999).

INACCURATE COLOR REPRESENTATION

This study focuses on color because industry studies have shown that color is a critical factor in the selection of many products, such as apparel (Business Wire, 1999), and because color is one of a few basic product features that can be visually depicted on a monitor for Internet purchases. While some features, such as style, do not vary when viewed on different monitors, color is the only basic product feature that does vary from monitor to monitor.

Industry research has shown that while color is a critical factor in the selection of many products, customers have come to distrust color accuracy on the web (Business Wire, 1999). Although 76% of web users shopping for color-related items indicate that color accuracy is an important characteristic, 60% of the users do not trust the item color as displayed in the product image (Business Wire, 1999). As a result, approximately 30% of e-consumers will not purchase color-critical products because they doubt its actual color (Business Wire, 1999). This is especially true for those who shop for clothing and accessories, since color is often a critical factor in the selection of such items.

Not only can color inaccuracy discourage purchases, but it may also have post-purchase consequences. When the color of an item that is received does not match what the consumer expects, there is a likelihood that the item will be returned. Bunn (1999) estimates that 40% to 50% of items ordered over the Internet are returned. He also states these returns are estimated to constitute up to approximately 5% of the overall logistics costs within organizations, costs eventually passed on to consumers. According to one industry survey, 15% of color-critical items are returned (Business Wire, 1999). In addition, many consumers are dissatisfied but do not return the item for various reasons. According to industry surveys, between 66% (Imation.com, 2001) and 85% (Business Wire, 1999) of consumers who received products with an unsatisfactory color did not return the products in spite of their dissatisfaction. Quick (2000) reports that concerns over the ease of returning merchandise are among the main reasons for not shopping on-line.

Customer retention is another critical issue. Dissatisfied customers may simply stop shopping at an e-commerce site. Reibstein (2002) found that product representation, which by nature must include color, was the third highest factor affecting likelihood to buy again from a particular on-line merchant. Another study found that 95% of dissatisfied customers don't complain, but simply stop buying from a merchant (TARP, 1986). Industry studies show that over 50% of on-line shoppers would not make future purchases from an on-line merchant that delivered an item in a color that was not what they expected (Imation.com, 2001). If e-commerce web sites do depict color inaccurately, and if the problem can be corrected, there will be fewer customer defections attributed to incorrect colors. This is significant because Reichheld (1996) reports that even a 5% reduction in the customer defection rate can increase profits by 25% to 85%, depending on the industry.

In summary, these academic and industry studies indicate that a substantial color inaccuracy problem does exist and does impact on-line purchasing behavior. When on-line customers are conditioned to distrust what they see on e-commerce sites, they may make complaints about unsatisfactory items, return those items, or even stop making on-line purchases altogether. The full effect of this problem needs to be investigated further and the nature

of the problem validated. This study is an initial investigation into the pre- and post-sale ramifications of inaccurate color representation on the Internet.

RESEARCH METHODOLOGY

This investigation involved a survey structured to investigate respondents' assessments of color accuracy on the web. The data collection process involved multiple steps. First, a series of e-mail messages and telephone interviews were utilized to determine whether industry leaders agree that the problem of accurate color representation on the web actually exists. The information gathered in this phase of the study revealed that a problem exists but that only some Internet marketers are aware of it.

Next, the questionnaire was developed to assess the level of color accuracy depicted in a digital image with the color of the actual swatch of cloth used to generate the image. A seven-point scale was used to capture the perceived level of accuracy of the digital image. Two other areas of interest – return behavior and complaint behavior – were also included on the questionnaire. One question asks of the respondent would return an item if the color of the actual product differed from its representation on the Internet. Those indicating that they would return the item were then asked to indicate the likelihood, on a four-point scale, that they would return the item. Another item on the questionnaire was designed to assess whether the respondents would complain about color discrepancies to the merchant. Again, for those indicating that they would complain, a four-point scale captures the likelihood that they would do so.

Respondents answered these questions for each of the eleven swatches of colored fabric used in the study. The eleven swatches were selected from a fabric store using a simple criterion that limited the selection to bold colors, plain fabric without design or heavy texturing, and commonly accepted colors. The selection included red, navy blue, light blue, orange, black, yellow, grey, light green, dark green, purple, and rust swatches.

The survey was administered in a computer lab. Each respondent was given an instruction sheet and a packet of eleven folders, each of which was numbered and contained a swatch of cloth. The respondents logged into the survey site with their unique student identification number and a password that was provided on the instruction sheet. The identification number was used to prevent the respondent from participating in the survey multiple times. Respondents compared the colored swatches to the digital image on the screen, and rated the accuracy of the image on a seven-point scale, with one being very different and seven being identical. Standard demographic questions were included in the questionnaire for classification purposes.

The questionnaire was administered to university students because of the availability of a large number of subjects and because students represent a cross section of both experienced and inexperienced Internet shoppers. It is critical to involve experienced users, because their familiarity provides them with a more realistic perspective of Internet shopping than inexperienced users. Other research dealing with Internet purchases uses a similar sample (Griffith, et al., 2001). Three hundred questionnaires were collected from the students who participated in this study.

A majority of the respondents (84.6%) are attending full time, and 71.5% were between the ages of 18 and 26. The gender distribution includes 58.4% males and 41.6% females. Income level was on the lower end (56.8% under $20,000), as was expected due to the age distribution and the fact that most are full-time students. The student population was deemed acceptable since the demographics of the school are not traditional, with an older than normal student body. In our sample, 20.1% of the subjects were over the age of 30, and 53.6% were over the age of 23. In addition, almost half of the subjects (46.2%) are married, and about a third (36.7%) have children. Thus, the sample does not suffer from homogeneity to the degree found in many student samples. Only the 97.8% of the respondents who were not colorblind were considered in the analysis of color accuracy.

DATA ANALYSIS AND FINDINGS

The computer-based web survey was carefully constructed so that only acceptable answers are available to the respondents, and as a result the data is all within the appropriate ranges for the answer sets. Any missing data is automatically captured and coded accordingly.

Table 1 lists the mean value of the perceived level of color accuracy for each of the eleven colors. In this seven-point scale a score of 7 is an identical match, a score of 4.0 is neutral, and anything above that indicates a close match. Only five of the eleven colors – navy blue, black, grey, light green and light blue – scored above the mid-point. Black scored the highest with a mean of 5.88. Of the non-accurate colors, purple scored the lowest with a mean of 1.71.

TABLE 1
Color Accuracy
Mean Value of Color Swatches
(1=very different to 7=identical match)

Swatch# & Color	Mean (n=268)
SW 1 -- Navy Blue	4.31
SW 2 -- Black	5.88
SW 3 -- Yellow	1.96
SW 4 -- Grey	4.18
SW 5 -- Orange	2.29
SW 6 -- Light Green	4.11
SW 7 -- Rust	3.84
SW 8 -- Light Blue	5.30
SW 9 -- Dark Green	3.09
SW 10 - Purple	1.71
SW 11 - Red	3.03

Table 1 indicates that there is clearly a problem with colors as they are depicted on computer monitors. The next step is to determine the ramifications of those problems. For some colors the likelihood is very high that a respondent will complain about color discrepancies. Generally the percentage of respondents who indicated that they would complain closely corresponds to the mean of the likelihood of complaining. Table 2 shows the percentage of respondents who indicated that they would complain (column two) and the mean from a four-point likelihood to complain scale (column three). The table shows that not only were Yellow and Purple the colors that respondents would most likely complain about, but they also had the highest likelihood mean score, since a 1 corresponds to very likely to complain.. Black and Light Blue had the least number of potential complaints, although the respondents who would complain about those colors have a higher likelihood of complaining than do those who would complain about several other colors, including Navy Blue and Grey.

TABLE 2
Likelihood of Complaining
Mean Value of Color Swatches
(1=very likely to 4=very unlikely)

Swatch# & Color	Percent	Mean
SW 1 -- Navy Blue	42.9	2.25
SW 2 -- Black	8.0	1.76
SW 3 -- Yellow	85.1	1.62
SW 4 -- Grey	35.2	2.13
SW 5 -- Orange	78.2	1.80
SW 6 -- Light Green	37.5	1.94
SW 7 -- Rust	41.0	1.99
SW 8 -- Light Blue	9.6	1.96
SW 9 -- Dark Green	58.2	1.67
SW 10 - Purple	83.9	1.41
SW 11 - Red	62.8	1.85

Again, for some colors the likelihood is very high that a respondent will return an item because of color discrepancies. Generally, the percentage of respondents who indicated that they would return and the mean of the likelihood of returning correspond. Table 3 shows the percentage of respondents who indicated that they would return and the mean from a four-point likelihood to return scale. Here the respondents indicated that Purple and Yellow are the colors that they would most likely return, and they also had the highest likelihood mean score. Black and Light Blue again had the least number of potential returns, although the respondents who would return items in the color black are more likely to do so than those returning items in several other colors. Light Blue had the second lowest number of returns and the least likelihood of being returned by those who indicated that they would return the item.

TABLE 3
Likelihood of Returning Item
Mean Value of Color Swatches
(1=very likely to 4=very unlikely)

Swatch# & Color	Percent	Mean
SW 1 -- Navy Blue	33.1	1.92
SW 2 -- Black	9.6	1.87
SW 3 -- Yellow	83.1	1.51
SW 4 -- Grey	34.5	2.00
SW 5 -- Orange	77.4	1.47
SW 6 -- Light Green	39.1	1.99
SW 7 -- Rust	40.6	1.88
SW 8 -- Light Blue	10.0	2.08
SW 9 -- Dark Green	63.2	1.62
SW 10 - Purple	83.9	1.31
SW 11 - Red	65.1	1.83

We found no significant differences with regard to gender, age or income with regard to the perception of color inaccuracies using computer displays.

CONCLUSION AND DISCUSSION

Internet marketers must be more aware of the consequences of color inaccuracies on an e-commerce site. Conversations with Internet marketers during the initial stages of this undertaking revealed that many think a vast majority of e-shoppers are not concerned with color accuracy on e-commerce sites. These e-tailers indicated that they assume that their customers normally refer to catalogs when they shop on-line. Although this may have been a valid assumption in the early days of Internet marketing, this study found that it is no longer the case, with only 6.8% of the respondents indicating that they always use a catalog in conjunction with the computer monitor when ordering, as opposed to 28.8% who never use a catalog when shopping on-line. This would support research by Griffith et al. (2001) and Elliot and Fowell (2000) in that marketers must design their websites to independently appeal to users and not rely on other forms of product representation, since users are moving away from using catalogs in conjunction with the Internet.

Shoppers must trust that the product they order will closely resemble what they receive. However, in this study only 34.7% of the respondents indicated that they trusted the color accuracy displayed on their monitor. When asked about purchase intention, 23% of the respondents indicated that they would not purchase the item of interest if the color were in doubt. This supports the concept that reliability is the most critical dimension to service quality as proposed by Berry, Zeithaml and Parasuraman (1990) and Parasuraman and Grewal (2000).

Increased dissatisfaction on the part of consumers leads to greater costs in both customer service and reverse logistics. With 22.1% of the respondents indicating that they have had personal experience with inaccurate color on the web, approximately half either complained or returned the item. For those respondents who made an on-line purchase in the last year, 11.8% complained to on-line merchants about unsatisfactory colors. Further, 12.7% of those same respondents returned an item that was delivered in a color different from what was expected.

This confirms that companies will incur additional costs if the colors of items on the web are not accurately represented. Further, these results clearly support the research conducted by Imation (2001) and Business Wire (1999), as well as complaint behavior research by Singh (1988) and return behavior research by Bunn (1999).

Another area of grave concern is customer retention. Many respondents indicated that they neither complain (88.2%) nor return (87%) unsatisfactory items, but simply keep the product and refrain from making future purchases from that web site (58%), which again supports Imation (2001) and Business Wire (1999). As discussed earlier, the impact of poor customer retention can be substantial, so much so that the issue must be addressed.

This research will lead to better management of e-commerce through better understanding of the benefits and drawbacks of presenting goods via computer display. This research spotlights the necessity of collaboration between departments within organizations such as information systems, marketing, and operations. This will allow organizations to work more efficiently, leading to improved customer satisfaction and ultimately allowing e-commerce to be more competitive. E-tailers who can offer better color representation on their web portal can gain a competitive advantage since they will offer a better value to on-line shoppers.

FUTURE RESEARCH

Is there a solution for the problem of color inaccuracies? While it is the topic of future research on our part, some commercial services are being marketed to provide accurate color. The two major forms are color correction on the client and color correction on the server. Color correction on the client is generally based on plug-ins or downloads on the user's computer. One of the best known was True Internet Color by eColor, which has since ceased operations.

Color correction on the server is controlled by software running on the e-commerce site and requires no plug-ins. Verifi Accurate Web Color, originally developed by Imation but recently purchased by Kodak Polychrome Graphics, provides a web site that guides users through a series of monitor adjustments. Users profile their computer monitor by making adjustments based on a sequence of instructions. No plug-ins or downloads are required. After completing the adjustments, the user will be able to view color-corrected images from those web sites that offer the Verifi Accurate Web Color technology. Verifi is a server-based software system that dynamically corrects images to compensate for color display variables within individual monitors.

eColorChart.com markets the eColorChart, which it touts as a low-tech solution to the color problem. The chart contains 90 color samples referenced by both name and number. Sellers reference the eColorChart name or number on their offerings, and buyers can then reference those colors on their copy of the eColorChart to learn the product's true color.

There is a need for future research in multiple directions. With respect to technology, there are several avenues that need exploration:

- Determine the causes of color inaccuracy when images are viewed.
- Determine the causes of color inaccuracy when images are captured.
- Investigate the impact of computer monitors, video cards, image file types, and other technical factors that may influence the delivery and display of color on the Internet.

With respect to marketing, there are several avenues that need exploration:

- Determine the significance of color accuracy on the overall purchase and post-purchase satisfaction.
- Further examine consumer complaint behavior in terms of personal values and propensity to complain.
- Determine the extent to which color inaccuracy contributes to reverse logistics costs.
- Investigate purchasing behavior in a multi-channel environment, especially in cases where a catalog is used in conjunction with the Internet website for making the purchase decision.
- Determine the extent of the correlation between risk aversion and a customer's unwillingness to purchase color-critical products from an e-commerce site if color accuracy is in question.

REFERENCES

Berry, L.L., Zeithaml, V.A. and Parasuraman, A. (1990), "Five Imperatives for Improving Service Quality", Sloan Management Review, summer, pp. 29-38.

Bunn, J. (1999), "Centralizing Reverse Logistics: How to Understand if It Will Work for You," Consumer Markets, August, pp.11-12.

Business Wire (1999), "Study Finds Lack of Color Consistency Hampers Electronic Commerce; Cyber Dialogue Reports Consumer Awareness of Monitor Color Variance", April 06, 1999. Available http://www.businesswire.com/webbox/bw.040699/ 190960050.htm

Elliot, S. and Fowell, S. (2000), "Expectations Versus Reality: A Snapshot of Consumer Experiences with Internet Retailing", International Journal of Information Management, 20, pp. 323-336.

Griffith, D.A., Krampf, R.F., and Palmer, J.W. (2001), "The Role of Interface in Electronic Commerce: Consumer Involvement with Print Versus On-Line Catalogs," International Journal of Electronic Commerce, 5(4), pp. 135-153.

Imation (2001), "Imation Tames Unruly Web Color With Verifi Technology", March 14, 2001. Available http://www.verifi.net/HeadLines/ press_releases3.asp

IMRG.org (2001) "An e-Retailing Odyssey, Jan 2001" Available http://www.imrg.org/IMRG/copystore.nsf/(httpFAQs)/ DF3DE0B7E661B2D6802569E400347EC1

Krantz, M. (1998), "Click Till You Drop", Time Magazine, 152(3), 34-39.

Lebo, H. (2003), "The UCLA Internet Report: Surveying the Digital Future- Year Three", UCLA Center for Communication Policy, February, 2003, Available http://ccp.ucla.edu/pdf/UCLA-Internet-Report-Year-Three.pdf

Organization for Economic Co-operation and Development (OECD) (2001, March). Business-to-consumer e-commerce statistics. Paper presented at the Consumers in the online marketplace OECD workshop on the guidelines: One year later, Berlin, Germany. Available http://www.oecd.org/dataoecd/36/59/1887351.pdf

Parasuraman, A. and Grewal D. (2000), "The Impact of Technology on the Quality-Value-Loyalty Chain: A Research Agenda", Journal of the Academy of Marketing Science, 28 (1), pp. 168-174.

Puente, M. (2002), "On-line Experience is Now a Much Better Fit", USA Today, December 4, p. 2e.

Quick, R. (2000), "Return to Sender", Wall Street Journal, July 17, p R8.

Reibstein, D.J. (2002), "What Attracts Customers to On-line Stores, and What Keeps Them Coming Back?", Journal of the Academy of Marketing Science, 30 (4), pp. 465-473.

Reichheld, F.F. (1996), The Loyalty Effect, Harvard Business School Press, Boston.

Sharrard, J. (2001), "Expand Globally, Comply Locally", Forrester Research, December 2001, Available http://www.forrester.com/go?docid=11947&bin=20511

Singh, J. (1988), "Consumer Complaint Intentions and Behavior: Definitional and Taxonomical Issues", Journal of Marketing, 52 (January), pp. 93-107.

Stone, M. D. (2001), "Color Matching: Color (Mis)Matching, and Why Colors are Matching Better Than Ever", ExtremeTech, June 11, 2001. Available http://www.extremetech.com/article/0,3396,s=1011&a=1701,00.asp

Technical Assistance Research Programs (TARP) (1986), US Office of Consumer Affairs Study on Complaint Handling in America.