Journal of Forensic and Investigative Accounting
Volume 14: Issue 2, July–December 2022

Is a Picture Worth a Thousand Words … or Lies?
The Impression Management Gimmicks that Forensic Accountants Must Know

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I. Introduction

Data visualization describes the process of displaying abstract information to facilitate communication, enhance sense-making, and support decision-making. Often rich in colors, symbols, animations, or other visual cues, data visualization uses charts, graphs, and maps to provide an accessible, efficient, and effective way for users to visualize and understand trends, patterns, and outliers in data. Forensic accountants may use data visualization as demonstrative evidence in court room to explain or demonstrate findings. However, data visualization benefits users only when the underlying story is best told graphically rather than verbally and when the graphics are well-designed (Tufte, 2001; Shen et al., 2021)

Data visualization has been highlighted by educators and practitioners, integrated into various accounting and management courses, and required by business accreditation organizations. For example, the Accreditation Standard A5 of the Association to Advance Collegiate Schools of Business International (AACSB), *Information Technology Skills and Knowledge for Accounting Graduates*, requires accredited accounting programs to integrate current and emerging accounting and business practices within the curricula, including data analytics and its component data visualization (Association to Advance Collegiate Schools of Business International, 2021). In addition to facilitating communication, various interactive data visualization techniques have been developed to allow forensic accountants to change the representation of data from text to graphics or filter out subsets of transactions to detect fraudulent transactions (Dilla and Raschke, 2015; Aldhizer III, 2017; Crumbley and Fenton, 2021). As a core member of the investigative team, forensic accountants contribute to acquiring, organizing, analyzing, and reporting financial data to support business valuation, fraud examination, and litigation services. As such, in addition to the accounting and investigative skills, forensic accountants need a working knowledge of the legal system, data analytics, and communication skills to present expert testimony in the courtroom and facilitate other litigation support engagement (Crumbley and Fenton, 2021). Effective data visualization helps team members see the overall big picture of the case and communicate the findings internally and externally.

Most prior research and training on data visualization assume the rational approach and concentrate primarily on the cognitive efficacy of information presentation and improving decision-making. Nevertheless, Tractinsky and Meyer (1999) find evidence that when the main objective of data visualization is to convince viewers and create desired impressions, presenters exhibit different preferences and use various visual cues to lead/mislead viewers to a more favorable understanding. Such a tendency is particularly strong when the underlying information is undesirable for the presenter. Furthermore, Arunachalam et al. (2002) review corporate annual reports and find four common types of improperly designed data visualization, such as omitting the negative values or reversing the year order on the x-axis of column charts. Their experimental results show that such improperly designed graphs can successfully manipulate viewers' impressions and alter their decisions. In other words, most extant literature or education focuses on how to use data visualization to convey underlying information effectively and efficiently, but rarely sheds light on how-to see-through presenters' disguises or potential manipulations, especially when the presenters might have been motivated to mislead or cover-up.

By using financial graphs from corporate annual reports as examples of purposeful data visualization, this teaching case purports to illustrate impression management gimmicks by using "real-world" data, provide opportunities for students to prepare data visualizations using Microsoft Excel, and highlight the potential for data visualization to distract from, rather than focus on, financial performance. This teaching case is of particular interest and importance to forensic accountants because they are the presenters and users of data visualization when investigating corporate frauds, gathering evidence,

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examining personal and business records, and communicating findings. More importantly, their opponents frequently have incentives to bias, convince, or deceive via calibrated/manipulated financial representations or data visualization. Moreover, the heart of litigation cases is the presentation of evidence. When testifying as expert witnesses, forensic accountants must understand how to visualize evidence in the courtrooms to improve comprehension, facilitate communication, and avoid overwhelming the jury.

Noteworthy is that corporate annual reports are the official communications between management and its stakeholders requited by the U.S. SEC. While the U.S. SEC has provided "A plain English Handbook" to help reporting companies to create narrative disclosures and data visualizations in 1998 (Securities and Exchange Commission, 1998), corporate annual reports are still plagued with misleading, inappropriate, decorative, or purposeful graphical representations containing superfluous depth cues, disproportionate scales, or reversed year-orders to beautify firm performance (Arunachalam et al., 2002; Shen et al., 2021). Not to mention other unofficial data or communications that forensic accountants must deal with when collecting or analyzing evidence. Thus, when encountering misleading or purposeful graphs, forensic accountants and other users should view those inappropriate data visualization as the tip of the iceberg, maintain professionally skeptical, and investigate the much larger part that is yet seen or known about.

II. Part I—Data Visualization

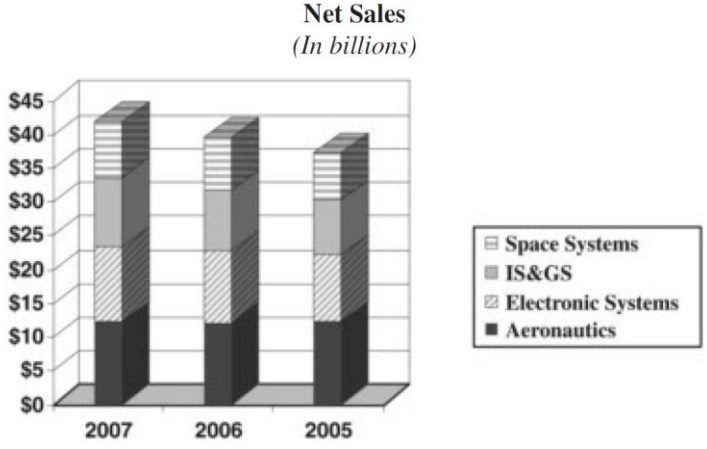
Data visualization is the graphical representation of data and information to support decision-making because many people are visual, in contrast to auditory, learners. For example, corporate managers frequently visualize their firm performance while communicating with their shareholders and other stakeholders. Likewise, forensic accounting experts often use data visualization to capture the attention and improve the comprehension of a judge, jury, or opposing party. However, data visualizations facilitate decision-making only when they are appropriately created.

Part I Requirements

1. Figure 1 shows a stacked 3-dimensional (3D) column chart from the 2007 annual report of Company X, an American aerospace, defense, information security, and technology company. If used in isolation, how useful is the graph to evaluate the company's net sales and operating results? Use the table below, or construct your own, to identify potential design issues with the 3D graph, either features that should be added for clarification or flaws that could be detrimental to clear interpretation. For example, the title of the graph seems insufficient and potentially confusing.

Design Issues	Remedy or Suggestion
The title of the graph is vague and uninformative.	The title should specify the graph is comparing net sales annually across major business segments. Ex. Annual Net Sales by Business Segment

Figure 1: Net Sales and Operating Results



2. Table 1 shows the 2005–2007 net sales by segments for Company X. Use the data provided in Table 1 to create the following graphs. Make sure to incorporate the suggestions that you developed in Question 1 above.
   A. Create a **2D stacked column** chart, where total net sales of each year appear as a value on the top of each column, not as separate stacked columns. (Hint: In a stacked column chart, stacking total values above their components is confusing and meaningless. Instead, you must create a combo chart to show the totals as values above each stacked column).
   B. Create a **cluster 2D column** chart to show net segment sales, whose columns are grouped by segment.
   C. Create a **cluster 2D column** chart to show net segment sales, whose columns are grouped by year.
   D. Create a **2D 100% stacked** column chart. Ignore total net sales in this chart.
   E. Create a **line chart** with five lines to depict four net segment sales and their total, respectively.
   F. Based on ease of use and clarity/effectiveness of communication, evaluate the original 3D stacked column chart and each of the five charts you have created. Which one(s) is the most/least successful in communication? Justify your answers. After creating and analyzing these five graphs, are there any additional comments or opinions related to the original 3D stacked column chart? If so, add them to your table.

Table 1: Net Sales by Segment

(In millions)	***2007***	*2006*	*2005*
Net sales			
Aeronautics	**$12,303**	$12,188	$12,349
Electronic Systems	**11,143**	10,519	9,811
Information Systems & Global Services	**10,213**	8,990	8,233
Space Systems	**8,203**	7,923	6,820
Total	**$41,862**	$39,620	$37,213

III. Part II—Impression Management

U.S. public companies must file their audited financial statements and other detailed information about their financial condition to the SEC annually. This annual filing is known as Form 10-K. In addition, reporting companies must send reports to their shareholders when they hold annual meetings to elect directors. The format and content of 10-K filings are specified in Regulation S-K, focusing on financial performance and resembling registration statements for a public offering. However, mandatory disclosures in the 10-K tend to be lengthy, complex, and thus challenging for less-sophisticated or non-professional users to comprehend (Loughran and McDonald, 2014; Dyer et al., 2016). Thus, reporting companies are encouraged by the SEC to provide separate annual reports to disclose financial and non-financial information to their shareholders.

Some managers view annual reports as a routine "get-the-box-checked" obligation and thus elect to send only a 10-K to their shareholders, providing no new content or format. Other managers view annual reports as an opportunity to officially communicate financial and non-financial performance, just like making a "state-of-the-company" address to their shareholders and stakeholders. Those annual reports are thick, glossy, colorful, decorative, and comprehensive (Pethokoukis, 2008). Besides audited financial statements, additional supplementary or voluntary disclosures are frequently provided, such as an opening letter from the Chief Executive Officer, market segment information, new product plans, and engagement in environmental, social, or governance activities. In addition to sending printed or electronic copies of annual reports to their stockholders, most companies provide their annual reports to the public via their corporate websites or other social media.

Company Y is a multinational corporation engaged in hydrocarbon exploration. Headquartered in Texas, the public company's global operations involve the exploration, production, transportation, and marketing of crude oil, bitumen, natural gas, liquefied natural gas, and natural gas liquids. During 2010–2015, Company Y provided separate annual reports to its stockholders. Table 2 shows firm performance and other ratios from the section "Financial and Operating Highlights." Note that in 2011, Company Y separated its upstream and downstream businesses into two standalones, publicly traded corporations. Because of the change in the reporting entity, Company Y must restate financial information of prior periods

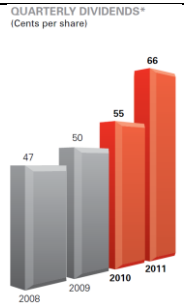
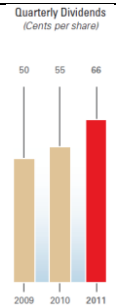
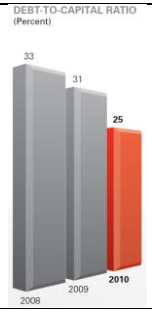
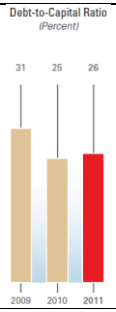
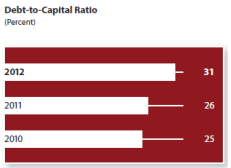
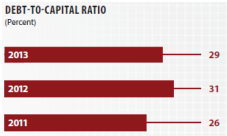
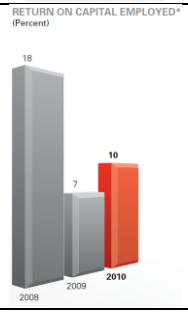
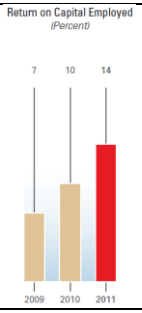
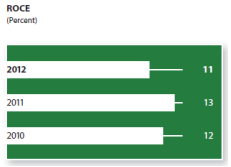
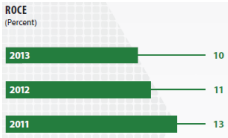
to allow meaningful comparisons across reporting periods. Figure 3 shows the data visualization to supplement the section "Financial and Operating Highlights."

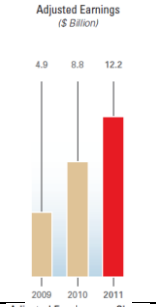
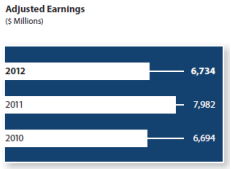
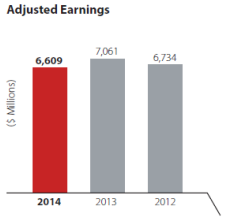
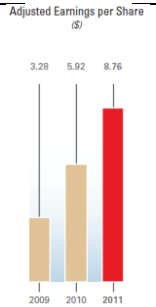
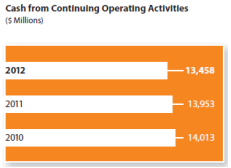
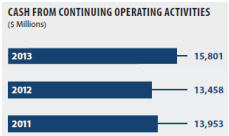
Table 2: Selected Financial Statement Numbers and Ratios

Financial and Operating Highlights (in millions)	2010	2011	2012	2013	2014	2015
Total Revenue and Other Income	$198,655 <63,335>	$251,226 <66,069>	$62,004	$58,248	$55,517	$30,935
Net income	11,358	12,436	8,428	9,156	6,869	(4,428)
Dividends paid on company common stock	3,175	3,632	3,278	3,334	3,525	3,664
Net cash provided by operating activities	17,045 <14,013>	19,646 <13,953>	13,458	15,801	16,592	$7,572
Diluted earnings per share of common stock	7.62	8.97	6.72	7.38	5.51	(3.58)
Return on Capital Employed	10% <12%>	14% <13%>	11%	10%	9%	Not provided

Numbers in angle brackets were restated in 2012

Figure 3: Selected Data Visualization

2010	2011	2012	2013	2014	2015
		Not Provided	Not Provided	Not Provided	Not Provided
				Not Provided	Not Provided
				Not Provided	Not Provided

2010	2011	2012	2013	2014	2015
Not Provided					Not Provided
Not Provided		Not Provided	Not Provided	Not Provided	Not Provided
Not Provided	Not Provided				Not Provided

Part II Requirements

1. In sociology, impression management is a conscious/subconscious process or effort where people attempt to influence others' perceptions about a person, object, or event by regulating and controlling information in social interactions. For example, people photoshop their pictures before posting them on social media. Politicians or salespersons "dress for success" to demonstrate their confidence and professionalism. In the business world, companies may attempt to influence stakeholders' feelings or perceptions in several ways. Can you think of any circumstances when you sought to manage other people's impressions of you? Assuming companies in the business world do exercise impression management, what are some examples of impression management tactics?
2. In the professional accounting literature, you will find the following terms: error, earnings management, and fraudulent financial reporting. Please define these terms. Based on the definitions found, how would you distinguish between these ideas ? Can you give an example of each? Finally, use the table below to compare these terms across the provided characteristics.

	Error	Earnings Management	Fraudulent Financial Reporting
Consequence	Misinformed decision making		
Intentional?			
Ethical?			
Legal?			

3. Currently, the only data visualization required by the U.S. Securities and Exchange Commission (SEC) is the performance graph—a line graph comparing the yearly percentage change in the registrant's cumulative total shareholder return with various benchmarks (Item 201[e] of Regulation S-K). Thus, reporting companies have full discretion on whether and how to provide other data visualization in their annual reports. However, prior empirical research shows that public companies selectively provided data visualization to highlight/exaggerate their favorable firm performance. Examine Table 2 and Figure 3 to determine if such selectivity existed in the annual reports of Company Y. When collecting evidence to support your forensic cases, what mindsets should you have while seeing data visualizations are appearing or disappearing?
4. Compare the 3D and 2D data visualization in the 2010 and 2011 annual reports. What were the purposes of adding the third dimension and rotating data bars in 2010 annual reports?
5. Company Y used column charts to show its 2010–2011 firm performance, bar charts for 2012–2013, and then again column charts for 2014. Which format of data visualization can better visualize the trend over time? Pay extra attention to the order of years.
6. According to PCAOB AS2710, data visualizations provided in annual reports are categorized as "Other Information in Documents Containing Audited Financial Statements." Accordingly, the auditor has no obligation to perform any procedures to corroborate other information contained in a document. Instead, the auditor should read the other information and consider whether such information, or the manner of its presentation, is materially inconsistent with information, or the manner of its presentation, appearing in the financial statements. In other words, data visualizations in annual reports have been read by independent auditors. Considering the discretion that management can exercise on data visualization and the limited responsibilities of the auditor, what attitude should a forensic accountant have when viewing graphical representations in annual reports or other written communications? Write a passage to summarize your takeaways.

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