PART I

THE RULES

CHAPTER 1

Numerals Matter

A facial expression of total astonishment.

—How a tribe in South America expresses numbers greater than 3, since their language has no word for those numbers (*1963 Guinness Book of World Records*)

You never know where a great idea will come from. That's why I'd like to start this chapter with a heartfelt thank-you to the Arabs. Let's consider what this summary of Vaporware and Software Technologies Corp.'s six-year financials might have looked like if history had been a little different (Report 1-1).

Report 1-1
VASTCo -- MCMXCVIII-MMIII Financial Highlights

(in $M)	MCMXCVIII	MCMXCIX	MM	MMI	MMII	MMIII
Revenues	DCXCIX	CML	MCDXCIII	MMCXXXVIII	MMCMX	MMMCMXCVIII
Expenses	DCLXII	DCCC	MCCVII	MDCXXXIX	MMCCCXLVIII	MMMCCCXLIII
Operating Profit	XXXVII	CL	CCLXXXVI	CDXCIX	DLXII	DCLV

REPORT 1-1: VASTCo MCMXCVIII–MMIII Financial Highlights

So, is VASTCo doing well? Would you buy their stock? Do you have any idea what this table is saying?

Let's try this again with a slightly different look at the same set of VASTCo financials (Report 1-2).

Report 1-2
VASTCo -- 1998-2003 Financial Highlights

(in $000)	1998	1999	2000	2001	2002	2003
Revenues	699	950	1,493	2,138	2,910	3,998
Expenses	662	800	1,207	1,639	2,348	3,343
Operating Profit	37	150	286	499	562	655

REPORT 1-2: VASTCo 1998–2003 Financial Highlights

Now *this* table is a lot easier to understand. As it turns out, VASTCo is one hot company, with revenues growing and profit growing even faster. And the reason this table is so much more comprehensible is *because of the Arabic numerals*. So what makes Arabic numerals so special?

- **You need to know only ten symbols.** In the Arabic numeral system, you need to know only the numerals 0 through 9 to recognize every single number, no matter how big or small. These ten symbols are also simple to learn, even for a child.
- **It's easy to spot the biggest (or the smallest) numbers.** More digits always means larger, and if two numbers have the same number of digits, you simply compare the leftmost digit.
- **A quick glance can tell you everything you need to know.** By taking advantage of these two features *together*, you can pick out key information in the blink of an eye.

The point here is that our number system is an immensely powerful communications tool when we take full advantage of it. Thank you, Arabs![1] To understand just how effectively you can communicate when you present numbers correctly—and how *ineffectively* you communicate if you don't—let's look at some more examples.

Lining Up the Numbers

Report 1-3 shows a company's sales by product. The three columns (Versions A, B, and C) contain identical numbers, but differ in presentation. Look at each version by itself, covering up the other two, and try to pick out at a glance which products have the highest and which have the lowest sales.

Almost everyone will say that getting the essence of the information in the table in Report 1-3 is much easier in Version A than Versions B or C. Why is that?

- **The largest numbers** (Charlie, Echo, Hotel) **stand out visually.** In the Arabic numeral system, numbers with more digits always have a larger absolute value than those with fewer digits, so Charlie, Echo, and Hotel have the

Report 1-3
Corporate Sales, by Product

	Version A	Version B	Version C
Product	Sales	Sales	Sales
Alpha	1,163	1,163	1,163
Bravo	500	500	500
Charlie	15,695	15,695	15,695
Delta	7,863	7,863	7,863
Echo	37,638	37,638	37,638
Foxtrot	3,550	3,550	3,550
Golf	645	645	645
Hotel	22,500	22,500	22,500
India	10	10	10
Juliet	5,007	5,007	5,007

REPORT 1-3, VERSIONS A,B,C: Corporate Sales by Product

most digits. The same goes for the smallest number (India) but in reverse. The visual discrimination is harder in Version B, because half of the length difference in the numbers shows up on the left side and half on the right.

- **The numerals visually sticking out are the *important* numerals.** In Version A, it's easy to see that Echo has the biggest sales, followed by Hotel, and then Charlie, simply by looking at the leftmost digits: a *3*, a *2*, and a *1*, respectively. In Version C, the rightmost digits stick out, and these rightmost digits are the least significant.
- **The commas line up vertically only in Version A.** If the commas (or the decimal points, for that matter) line up, that also means the 1's digits all line up, and the 10's, and the 100's, and so on.[2] Also, when the commas don't line up, it simply looks strange to the eye.
- **The format mirrors the way we were taught.** Think back to how we've been taught to add a column of numbers, or multiply two numbers together. How were you taught? Do you line up the numbers at the left edge or at the right?

These observations bring us to the first Deadly Sin of Presenting Numbers:

Deadly Sin #1

Not right-justifying a column of numbers

You might think this mistake is too obvious to mention, but alas, it isn't. I see this particular error in board meetings, financial reports, and sales presentations all the time. As you've just experienced, making a point *always* to right-justify is one

of those small formatting choices that has a powerful impact on the readability of your information, and on your audience's ability to comprehend it quickly.

The Units of Measure

As long as we're talking about how the placement of your numbers on the page can affect audience understanding (and speed of comprehension), let's take a look at different ways to present the units your numbers are measuring, such as dollars, or square inches, or miles per hour. Here's Report 1-3 again, with three new versions. This time, all three have right-justified numbers, but they show different ways of presenting the units of measure. As with the previous presentation of this report, look at each version by itself, covering up the other two, and form an opinion about which is the easiest to read.

Report 1-3
Corporate Sales, by Product

	Version D	Version E	Version F
Product	Sales	Sales	Sales ($)
Alpha	$1,163	$ 1,163	1,163
Bravo	$500	500	500
Charlie	$15,695	15,695	15,695
Delta	$7,863	7,863	7,863
Echo	$37,638	37,638	37,638
Foxtrot	$3,550	3,550	3,550
Golf	$645	645	645
Hotel	$22,500	22,500	22,500
India	$10	10	10
Juliet	$5,007	5,007	5,007
TOTAL	$94,571	$ 94,571	94,571

REPORT 1-3, VERSIONS D,E,F: Corporate Sales by Product

Almost everyone will say that Version D is by far the hardest to read, because it takes extra effort to separate visually the numeric digits from the currency symbol. Moreover, the currency symbol is obscuring the leftmost digit, which is the single most important digit in the number. It would help a little if there were a space or two between the currency symbol and the digits, but not much, and furthermore you should ask yourself: Is the dollar sign really necessary for each number? [3]

Version E addresses these issues with the convention commonly used in formal accounting reports, which is to (1) put the currency symbol at the left edge of the column, far from the digits, and (2) include the currency symbol only next to the number at the top of the column and with the total at the bottom. This approach works fine visually, but it involves some extra effort by the presenter because it means formatting two cells—the one at the top of the column and the total at the bottom—differently from the other cells in the column.

Personally, I prefer the approach in Version F, which completely omits the currency symbol from the numbers in the body of the report, and includes it in the column heading instead. I like this approach because it's clean, minimizes extraneous characters, and requires a little less column width, which may come in handy in reports where space is a concern. (And frankly, you can usually assume that everyone in your audience knows the national currency of your financials!) But even when you use a minimalist approach, it's important to remember:

Strong Advice

Always make sure that your audience has a way to determine the **unit of measure** for *all* of the numbers in your reports. You can never be certain who will look at your reports, and what they do and don't know.

This discussion of how to identify the units of measure, especially currency notation, can sound like nitpicking, but it illustrates two larger points. First, small differences in formatting can have a large enough impact on the readability of your information to be worth considering carefully. Failing to get this right can alienate your audience, if only subconsciously. Second, *you have choices*. This will be a recurring theme in this chapter and throughout this book. Even with something as mundane as formatting spreadsheet cells, the choices you make will enable you to make information clearer and your presentations more effective.

Note

The choices you make will enable you to **put your own personal stamp** on the way you present numbers. You should never make presentation choices solely to make your reports unnaturally distinctive, but you still have an opportunity to create a "personal brand identity" by generating reports that are always well-organized and easy-to-read (an opportunity we discuss extensively in *Painting with Numbers*). Ideally, you could become one of those people who gets comments like "I always enjoy getting your reports; the news is not always good, but I can always understand what the numbers mean!"

Precision

But wait, there's more! You also have choices as to the level of detail you offer the audience, depending on the purpose of your presentation. Let's revisit the same VASTCo financial highlights we first saw in Reports 1-1 and 1-2. Take a look at five versions of the same report (Reports 1-4A through E), and form your own conclusions about how readable each one is, and how effectively it presents information. *(There is no one right answer here, since all the reports present exactly the same data.)*

Report 1-4, Version A
VASTCo -- 1998-2003 Financial Highlights

(in $MM)	1998	1999	2000	2001	2002	2003
Revenues	1	1	1	2	3	5
Expenses	1	1	1	2	2	3
Operating Profit	0	0	0	0	1	1

Report 1-4, Version B
VASTCo -- 1998-2003 Financial Highlights

(in $MM)	1998	1999	2000	2001	2002	2003
Revenues	0.7	0.9	1.5	2.1	2.9	4.7
Expenses	0.7	0.8	1.2	1.6	2.3	3.3
Operating Profit	0.0	0.1	0.3	0.5	0.6	1.4

Report 1-4, Version C
VASTCo -- 1998-2003 Financial Highlights

(in $000)	1998	1999	2000	2001	2002	2003
Revenues	699	950	1,493	2,138	2,910	4,733
Expenses	662	800	1,207	1,639	2,348	3,343
Operating Profit	37	150	286	499	562	1,390

Report 1-4, Version D
VASTCo -- 1998-2003 Financial Highlights

(in $)	1998	1999	2000	2001	2002	2003
Revenues	699,350	949,990	1,492,858	2,138,044	2,909,750	4,733,091
Expenses	662,423	800,018	1,207,132	1,638,979	2,348,148	3,342,593
Operating Profit	36,928	149,972	285,725	499,065	561,602	1,390,498

Report 1-4, Version E
VASTCo -- 1998-2003 Financial Highlights

(in $)	1998	1999	2000	2001	2002	2003
Revenues	699,350.30	949,990.10	1,492,857.66	2,138,044.05	2,909,750.42	4,733,091.00
Expenses	662,422.57	800,017.98	1,207,132.20	1,638,979.09	2,348,148.11	3,342,593.00
Operating Profit	36,927.73	149,972.12	285,725.46	499,064.96	561,602.31	1,390,498.00

REPORT 1-4, VERSIONS A,B,C,D,E: VASTCo 1998–2003 Financial Highlights

Which ones work for you? Personally, I find Version A (in millions, with no decimal places) completely useless, because it provides no sense of year-to-year variations that might be of great interest and importance to the reader. And Version E (numbers down to the penny) is almost as bad, because the additional digits just get in the way of visual comprehension without adding any useful information whatsoever.

My own preference is the middle one, Version C (in thousands, with no decimal places), which the astute observer will notice is identical to Report 1-2, because it's a well-balanced combination of readability and precision. But remember that I was a chief financial officer for many years, and while CFOs need to have more than just a passing acquaintance with the numbers, they don't pay us the big bucks to get mired down in details. In other words, I like this report because it's at the level of detail a typical CFO needs, which just proves the adage, "Where you stand depends on where you sit."

On the other hand, a member of the board of directors might be completely satisfied with Version B (in millions, with one decimal place), because it certainly provides enough precision to enable the reader to identify significant trends. And for the same reasons this is most likely the right level of detail for a presentation to investors. Moreover, investor presentations are often slideshows or PowerPoint documents, where you don't have room for lots of digits and characters, and where you don't *want* the conversation to go down the details rat hole.[4]

At the opposite extreme is someone reconciling different financial reports to each other, or using the report to determine compensation. I say this because when you are dealing with paychecks, people can be comforted to know that amounts are being calculated exactly. For these particular purposes, the level of detail shown in Version D (to the nearest dollar) might be essential.

There are two important lessons to learn from this discussion about the number of digits:

1. **"Precision" and "accuracy" are *not* the same concept.** To illustrate this point, suppose you are holding a jar containing 6,037 jellybeans, and you ask two friends to tell you how many jellybeans are in the jar. Friend A says, "8,488," and Friend B says, "About 6,000." Friend A's answer is the more precise one, but Friend B's is the more accurate one. The various versions of Report 1-4 above are all equally accurate, but differ greatly in precision.
2. **You have choices!** The differences between the five versions of Report 1-4 are a simple matter of Excel formatting,[5] and no additional time or effort is involved. There are valid reasons for choosing at least three of the five versions (and some highly compulsive person could probably justify Version E as well). Your choice depends on factors such as how the audience is using the information, the forum for presenting the information, and how much time is available for the presentation.[6]

Note

One suggestion: An experienced and highly practical finance manager I know addresses the decision about precision with a very simple rule: **no number in a report should have more than five digits.** While this may not be the right choice if consistency is one of your presentation objectives (more on that topic later), her instincts are spot-on for what is comprehensible to an audience.

Negative Numbers: What Do They Mean?

No discussion of numbers and numerals would be complete without at least a passing mention of **negative numbers**. And here, too, you have an opportunity to add meaning and clarity to your quantation[7] *by making intelligent choices*. When you see a column of a table where the numbers could be either positive or negative, what exactly does the distinction between positive and negative mean? Here are some examples (note that the first and the last are applicable to single numbers, but the other three require a comparison of one number to another):

What the number means if it is. . .

Positive	Negative	Examples
Greater than zero	Less than zero	Profit Cash flow
More than another number	Less than another number	Comparison to a "standard" (target, quota, etc.)
Increasing over time	Decreasing over time	Comparison to the prior period (year, quarter, month, etc.)
"Good"	"Bad"	Budget variance Opinion scoring
Debit	Credit	Accounting systems[8]

Sometimes the right choice is obvious. For example, if you're presenting net income or cash flow, virtually everyone understands that positive and negative numbers discriminate between turning a profit and losing money, or generating cash and burning cash. This is an example where the distinction between "more than zero" and "less than zero" is straightforward and well understood.

To appreciate some of the distinctions in the above table, and to illustrate the choices you have, let's take a look at a couple of examples, starting with Report 1-5.

Report 1-5
VASTCo -- Results for 2001 and 2002

(in $000)	2001 Actual	2002 Actual	Y/Y Change
Revenues	2,138	2,910	772
Expenses			
Sales & Marketing	876	1,387	511
Research & Development	445	550	105
General & Administrative	318	411	93
Operating Profit	499	562	63

REPORT 1-5: VASTCo Results for 2001 and 2002

Looking at the "Y/Y Change" column, we see that VASTCo's change in Sales & Marketing expense between 2001 and 2002 was $411,000—a *positive* number. This aligns with the way we naturally think. We say to ourselves, "From 2001 to 2002, VASTCo Sales & Marketing expense increased by $411,000," and not, "2001 Sales & Marketing expense was less than the 2002 number by $411,000." In contrast, for General & Administrative expense, which *decreased* slightly from 2001 to 2002, the change shows up as a negative number.

Well, that was easy. We *always* think about year-over-year change as the later-year number minus the earlier-year number, and not the other way around. But sometimes you should stop and think about how to do the arithmetic, and the best example of that is the *budget variance*.

A budget variance is the difference between the actual result for a period and the amount that was budgeted. This is a corner of the quantation world where good and evil actually *do* exist, because the difference between actual and budget is sometimes *good* and sometimes *bad*. At the same time, consider that we have strong connotations with the words *positive* and *negative* when they are used in a nonmathematical sense. So you have a golden opportunity to merge your left brain with your right brain in a single seamless act of quantation! (See Report 1-6.)

Report 1-6
VASTCo -- 2002 Results, Actual vs. Budget

	Version A			Version B		
	←	2002	→	←	2002	→
(in $000)	Actual	Budget	Var.	Actual	Budget	Var. F(U)
Revenues	2,910	2,800	110	2,910	2,800	110
Expenses						
Sales & Marketing	1,387	1,125	262	1,387	1,125	(262)
Research & Development	550	580	(30)	550	580	30
General & Administrative	411	395	16	411	395	(16)
Operating Profit	562	700	(138)	562	700	(138)

REPORT 1-6, VERSIONS A and B: VASTCo 2002 Results, Actual versus Budget

The two versions of Report 1-6 show two ways of calculating budget variances. In Version A, the variance is calculated the same way for every line, just like "Y/Y Change" in Report 1-5: the variance is the 2002 Actual number, minus the 2002 Budget number. Now, for Revenues, we would all say that the 2002 Actual of $2,910,000 is *better* than the Budget of $2,800,000. So far, so good. But when we come to Sales & Marketing expense, we see an Actual of $1,287,000, and a Budget of $1,125,000. When you spend more than you budgeted, is that a good thing? Probably not! And yet, the variance shows up as *positive* $162,000.

Version B fixes this error (and *error* is definitely the right word to use here) by calculating the variance as Actual minus Budget for the revenue and profit line items, *but Budget minus Actual* for the expense lines. Using this method, negative variances indicate problems (that is, Actuals that are *worse* than Budget), and positive numbers indicate results that are okay (that is, Actuals that are *better* than Budget). Please note the *Var F(U)* column caption. *F(U)* is commonly used notation to indicate that positive numbers are "*F*avorable" and negative numbers are "*U*nfavorable." The notation *B(W)* is sometimes used as well, to indicate whether the Actual result is "*B*etter" or "*W*orse" than Budget. This captioning choice would have been inappropriate for Version A, since there is no subjective notion associated with whether the number is positive or negative, so the column caption is simply *Var.* instead.

I can tell you that the wrong budget variance presentation choice has provided me with many hours of cathartic irritation over the years. And I am not alone: almost every senior manager and corporate director I've talked to gets very annoyed when they see budget variances presented as in Version A of Report 1-5, because they can't pick out the "problem" variances at a glance just by looking for the negative numbers in the variance column.

What's important here is that it takes only a small amount of effort to get the spreadsheet formulas to present the variances correctly, and it's a nice thing to do for people who sometimes have to measure the time they can spend reviewing reports like this in seconds. And if you don't provide this courtesy, you risk having your audience conclude from a teensy oversight that you are *lazy*, not to mention totally unaware of how information gets used by an audience.

Let's recap the main points from this chapter:

- Our number system is based on the Arabic numeral system, which makes it incredibly easy to present numbers in a way that they can be understood visually and intuitively.
- If you want to take full advantage of the capabilities of the Arabic numeral system, *right-justify columns of numbers!*

- Be thoughtful about gunking up the numbers with units-of-measurement notations such as dollar signs. Ask yourself whether you're adding distinctions that justify making the numbers themselves harder to read.
- *Precision* and *accuracy* are not the same thing. How many digits you show your audience depends on how much space you have on the page, who your audience is, and what the report is going to be used for.
- The distinction between negative and positive numbers is important and informative. Remember that it matters, and present accordingly.
- In all aspects of quantation, *you have choices*. Making wise choices will dramatically improve the effectiveness of the information you present.

Understanding how to use numbers to do effective quantation is important. It's as important as good grammar and proper spelling are to effective writing. It's hard to be a truly effective communicator if you don't know have these skills, because grammar and spelling errors disturb the natural reading flow and may even make it harder for people to read and understand your writing. Similarly, you can't be an effective presenter if you don't know how to present numbers so that people can understand them quickly and get the maximum meaning from them.

But lest you think I am being unduly negative here, let me offer one more way to think about it: *Numbers are just words presented with a different set of characters.* And in the same way you choose your words carefully to have an impact, the choices you make in presenting numbers will make a big difference in how well your audience understands your message.

NOTES

1. To be completely fair, India deserves credit, too. Positional notation (that is, having the amount that a digit represents depend on its relative position within the number) was first developed by the Indians, and then spread throughout the western world by the Arabs. In fact, the Arabic term for this system actually translates as "Indian numerals." Originally, there were only nine numerals until the crucial addition of the zero in the ninth century, most likely by the Arabs. In any case, the invention of "Arabic numerals" is no different from any other great invention: we usually associate it with the person who sold it to us, not the one who invented it in the first place.
2. The convention in some European countries for commas and periods is the reverse of U.S. usage. They use a comma as the decimal point and a period as a separator between thousands, millions, and so forth. Don't get confused.
3. For single-character currency notations like $, €, or ¥, you have some real trade-offs. For other dimensions, such as *lbs.*, *sq. ft.*, or *units*, that's less true, because the dimension notation takes up too much space just to tell readers what they probably already know. Even if the notation is only next to a couple of the numbers in the column, the entire column has to be wider to accommodate it, which uses up space on the page you may not be able to spare.
4. If you just can't get enough of this fascinating topic, or you don't have anything better to do, I will observe that the difference between thousands and millions is subtle, but occasionally

important. Note that I use the notation *MM* to indicate millions, and *000* to indicate thousands. In the United States, *M* is also common notation for millions, and *K* for thousands. In many European countries, *M* means thousands (remember the Roman numeral *M*?) and *MM* means millions (i.e., thousand thousands). Avoiding the *M* notation for either amount eliminates any ambiguity.

5. All of the exhibits in this book are produced by the Microsoft Office® products Excel and PowerPoint. The raw numbers are identical in Reports 1-1, 1-2, and 1-4 (all five versions)—the only difference is how they are formatted (with the exception of the Roman numerals, which uses the ROMAN( ) function). You can even use Excel to truncate the last three or six or nine digits to present numbers in thousands, millions, or billions, respectively. Use the Format.Cells.Numbers command sequence. Check it out!
6. This is a book about *presenting* information, and so my focus is on the choices you can make about *precision*. But if this book were instead about *collecting* information, there might be a similar discussion about the choices around the *accuracy* of the information. Given additional time and resources, it is always possible to improve the accuracy of information. The question becomes whether the additional accuracy is worth the effort, or whether that amount of effort would have been better spent making the existing information more comprehensible. Forgive me for wearing my heart on my sleeve, but this question is central to the discussion of whether the Sarbanes-Oxley legislation actually made investors in U.S. public companies better off. I am one of many who question whether the stockholders of American public companies got good value from the roughly one-half trillion dollars (i.e., $500,000,000,000.00) of their money that has been spent on Sarbanes-Oxley compliance.
7. **quantation** (kwŏn-tā′-shən) *n.* [English, c. 2008, from QUANTitative + communicATION]. The act of presenting numbers, such as financial results, electronically or in written form for the purpose of informing an audience. (*Note: quantation* is the word I coined to describe the subject of this book, because no single word for it exists. It is not a word you will find in the dictionary, as of this writing.)
8. I include the *debit*/*credit* distinction for completeness, and not because it's likely to be relevant or interesting to you. In the world of double-entry bookkeeping, *debit* means "left" and *credit* means "right," and nothing more. (Or maybe it's the other way around—I can never remember.) In a computerized accounting system, all the debits are negative numbers and the credits are positive numbers and if the books are balanced, as they should be, the whole gigantic mess adds up to zero. There is no meaning to positive versus negative numbers other than that: there are actually accounting jokes (yes, such things exist!) about the fact that even highly experienced accountants sometimes get debits and credits confused—and this perspective tends to render professional accountants totally oblivious to the connotations that the distinction between the words "positive" and "negative" can have for normal humans.