Tables:

Yes, they count as visualizations, too.

Cuneiform table of Pythagorean triplets, ca. 1800 BCE.

Jackie Wirz & Steven Bedrick

CONJ 610, 10/30/14

http://en.wikipedia.org/wiki/File:Plimpton_322.jpg

Plan for today:

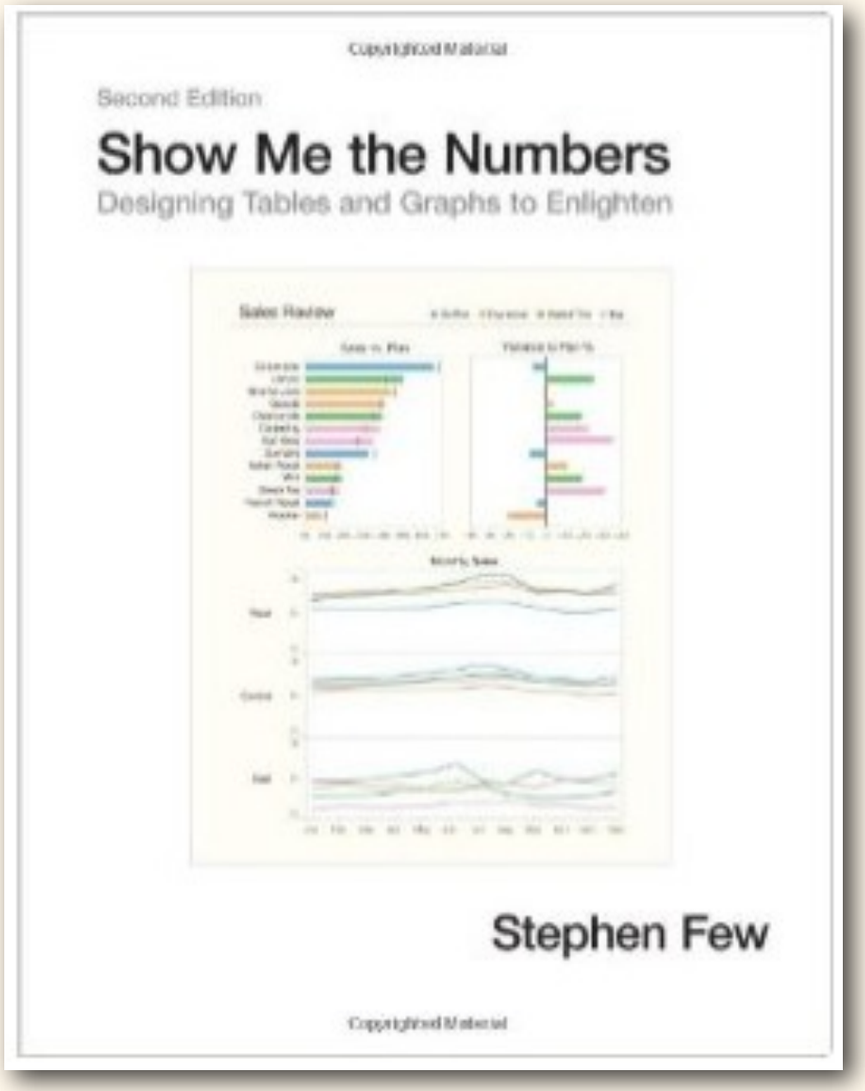
What is a table?

When should we use tables (vs. graphs, etc.)?

What can we do with tables?

Considerations in table design

What is a table?



A structure for organizing information in which:

1. Information is arranged in columns and rows...

2. Information is encoded as text.

Note: “columns and rows” does not imply anything about grid lines (or lack thereof).

Tables are not necessarily quantitative:

Time	Topic	Speaker
09:30	Welcome	Steven
10:00	Introductions	Group
10:30	Vampire defense strategies	Jackie
11:30	Werefolf taxonomy & phylogenetics	Alison
12:30	Cthuloid informatics	Steven

When should we use tables?

Tables...

... make it easy to look up individual values.

... make it easy to compare pairs of related values.

... already have their data encoded as text.

When should we use tables?

How will your information be used?

Will you be looking up and comparing individual values? ***Table***

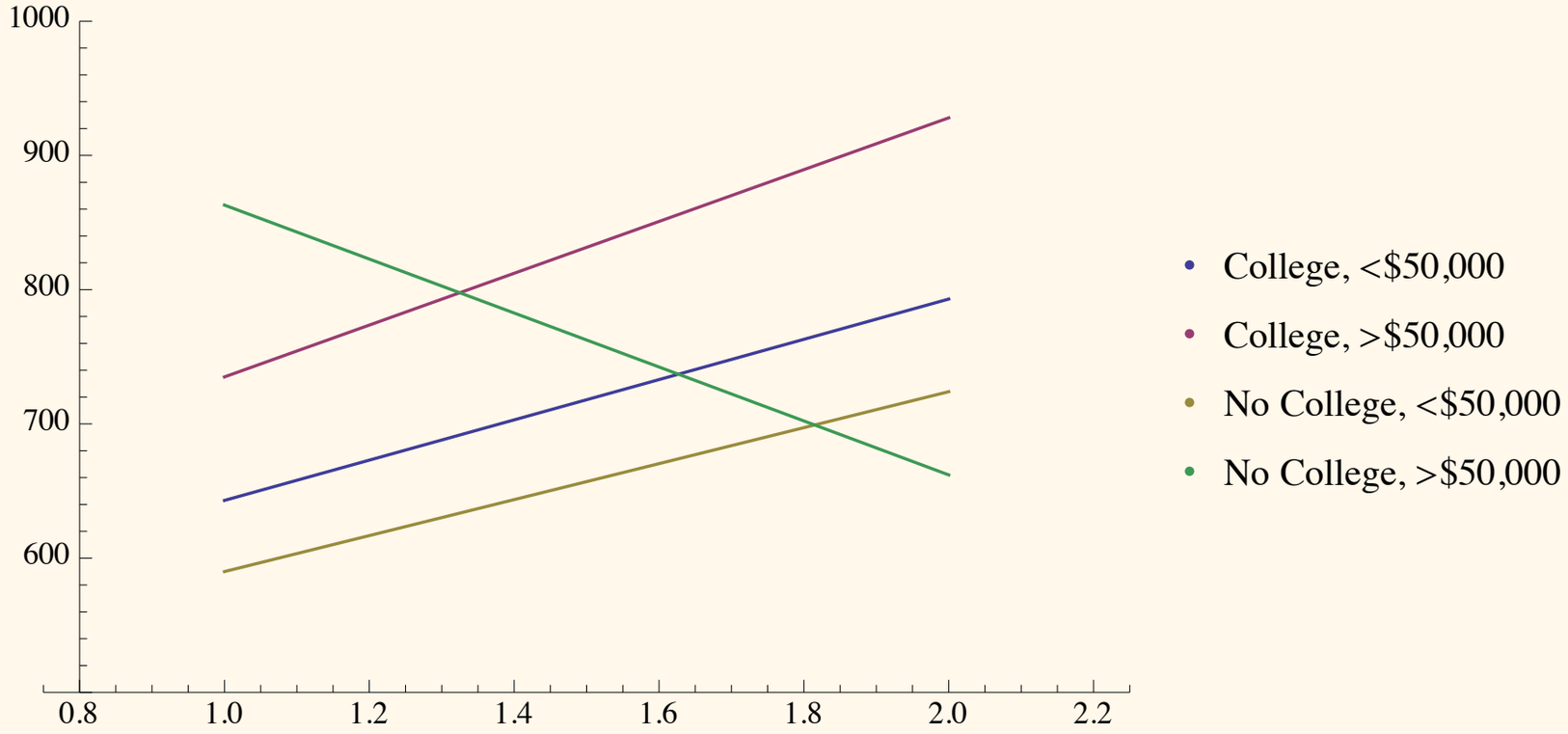
Do you want people to be able to identify patterns, or compare large numbers of values? ***Graph***

Note: It's OK to present both!

Job Satisfaction by Income, Education, and Age

	College degree		No college degree	
Income	Under 50	50 & Over	Under 50	50 & Over
Up to $50,000	643	793	590	724
Over $50,000	735	928	863	662

Single-value lookup, and two-value comparison is easy.



Patterns in the data become apparent, but details are lost.

Tables have many strengths:

Look up individual values...

Compare pairs of related values...

Display & access precise values...

Include multiple sets of quantitative values that use different units or on different scales...

Communicate both detail and summary information in one display...

All of these are hard/impossible to do in a graph!

In order to design a table, we must know what relationship we're trying to show.

The key to a table is the *relationship* between the rows and the columns.

Time	Topic	Speaker
09:30	Welcome	Steven
10:00	Introductions	Group
10:30	Vampire defense strategies	Jackie
11:30	Werefolf taxonomy & phylogenetics	Alison
12:30	Cthuloid informatics	Steven

Quantitative-to-categorical, between:

- One quantitative and one categorical variable
- One quantitative and the *intersection* of multiple categories
- One quantitative and the *intersection* of hierarchical categories

Quantitative-to-quantitative:

- One quantitative and multiple categorical items
- Multiple quantitative sets and a single categorical item

Quantitative-to-categorical, between:

One quantitative and one categorical variable

Session	Enrollment
Vampire defense strategies	12
Werefolf taxonomy & phylogenetics	14
Cthuloid informatics	4
Computational demonology	5
$AgNO_3$ synthesis lab	28
Post-apocalyptic grantwriting	2
Total	65

Quantitative-to-categorical, between:

One quantitative and one categorical variable

Session	Enrollment
Vampire defense strategies	12
Werefolf taxonomy & phylogenetics	14
Cthuloid informatics	4
Computational demonology	5
$AgNO_3$ synthesis lab	28
Post-apocalyptic grantwriting	2
Total	65

Quantitative-to-categorical, between:

One quantitative and the intersection of multiple categories:

Session	AM	PM
Vampire defense strategies	12	30
Werefolf taxonomy & phylogenetics	14	28
Cthuloid informatics	4	14
Computational demonology	5	10
$AgNO_3$ synthesis lab	28	5
Post-apocalyptic grantwriting	2	4
Total	65	91

Quantitative-to-categorical, between:

One quantitative and the intersection of multiple categories:

Session	AM	PM
Vampire defense strategies	12	30
Werefolf taxonomy & phylogenetics	14	28
Cthuloid informatics	4	14
Computational demonology	5	10
$AgNO_3$ synthesis lab	28	5
Post-apocalyptic grantwriting	2	4
Total	65	91

Quantitative-to-categorical, between:

One quantitative and the intersection of *hierarchical* categories

Track	Session	AM	PM
Labs	Vampire defense strategies	12	30
	$AgNO_3$ synthesis lab	28	5
	Cthuloid informatics	4	14
Theory	Computational demonology	5	10
	Werefolf taxonomy & phylogenetics	14	28
Administrative	Post-apocalyptic grantwriting	2	4
	Lab management for zombies	0	3
	Total	65	94

Quantitative-to-quantitative:

One set of quantitative value associated with multiple categorical items:

Session	AM	PM
Vampire defense strategies	12	30
Werefolf taxonomy & phylogenetics	14	28
Cthuloid informatics	4	14
Computational demonology	5	10
$AgNO_3$ synthesis lab	28	5
Post-apocalyptic grantwriting	2	4
Total	65	91

Quantitative-to-quantitative:

One set of quantitative value associated with multiple categorical items:

Session	AM	PM
Vampire defense strategies	12	30
Werefolf taxonomy & phylogenetics	14	28
Cthuloid informatics	4	14
Computational demonology	5	10
$AgNO_3$ synthesis lab	28	5
Post-apocalyptic grantwriting	2	4
Total	65	91

Quantitative-to-quantitative:

Multiple quantitative sets and a single categorical item:

Session	AM	PM
Vampire defense strategies	12	30
Werefolf taxonomy & phylogenetics	14	28
Cthuloid informatics	4	14
Computational demonology	5	10
$AgNO_3$ synthesis lab	28	5
Post-apocalyptic grantwriting	2	4
Total	65	91

Why is this important?

Different layouts prioritize different activities.

Another important consideration:

Unidirectional vs. Bidirectional

In a unidirectional table, categorical items vary across *either* rows *or* columns:

Department	Headcount	Expenses
Finance	26	202,202
Sales	93	983,393
Operations	107	948,216
Total	226	$2,133,811

Department	Finance	Sales	Ops	Total
Headcount	26	93	107	226
Expenses	202202	983,393	948,216	2,133,811

Note: “Headcount” and “Expenses” are two *distinct sets* of quantitative information, not levels of a categorical variable!

Unidirectional tables can be more complex:

Department	Expense Type	Expenses
Finance	Compensation	160,383
	Supplies	5,038
	Travel	10,385
Sales	Compensation	683,879
	Supplies	193,378
	Travel	125,705
Total		$1,178,768

Even though there's multiple categorical variables, they are still only vertically-oriented.

Bidirectional tables display more than one categorical set, and do so across both rows and columns:

	Dept		
Expense Type	Finance	Sales	Total
Compensation	160,383	683,879	844,262
Supplies	5,038	193,375	198,413
Travel	10,385	125,705	136,090
Total	$175,806	$1,002,959	$1,178,765

Plan for today:

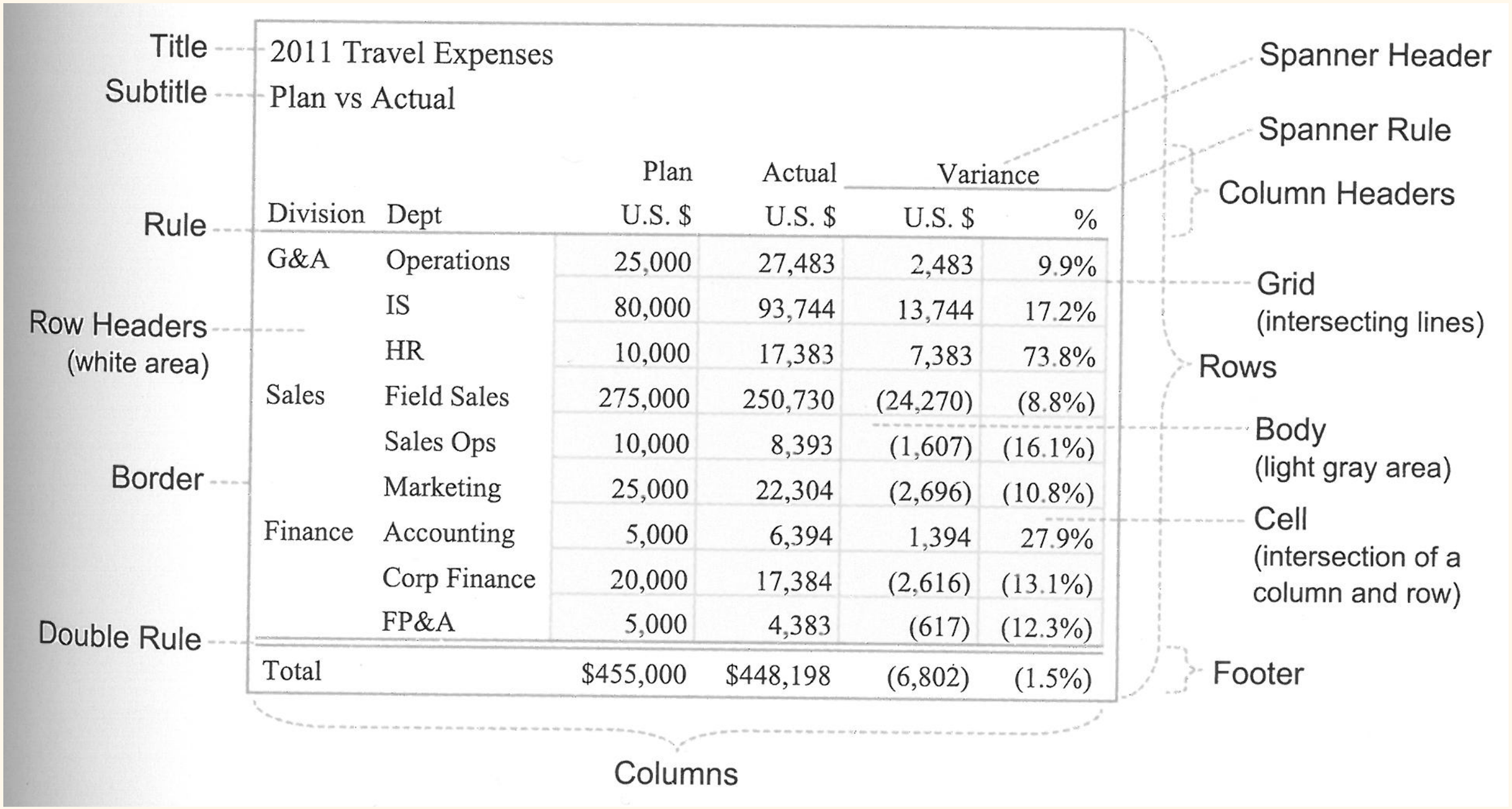
What is a table?

When should we use tables (vs. graphs, etc.)?

What can we do with tables?

Considerations in table design

Anatomy of a table:



2011 Travel Expenses

Plan vs Actual

Division	Dept	Plan U.S. $	Actual U.S. $	Variance U.S. $	Variance %
G&A	Operations	25,000	27,483	2,483	9.9%
	IS	80,000	93,744	13,744	17.2%
	HR	10,000	17,383	7,383	73.8%
Sales	Field Sales	275,000	250,730	(24,270)	(8.8%)
	Sales Ops	10,000	8,393	(1,607)	(16.1%)
	Marketing	25,000	22,304	(2,696)	(10.8%)
Finance	Accounting	5,000	6,394	1,394	27.9%
	Corp Finance	20,000	17,384	(2,616)	(13.1%)
	FP&A	5,000	4,383	(617)	(12.3%)
Total		$455,000	$448,198	(6,802)	(1.5%)

Few, S. 2012. “Show me the numbers”, p. 157

Design considerations:

Delineating columns and rows

Arranging data

Formatting text

Delineating columns and rows:

The basic table activities involve *scanning* along rows and columns...

... our goal is to make that as easy as possible.

Question: which is more important: rows, or columns?

Answer: it depends!

We can control which is easier using white space.

Product	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Product 01	93,993	84,773	88,833	95,838	93,874	83,994	84,759	92,738	93,728	93,972	93,772	99,837
Product 02	87,413	78,839	82,615	89,129	87,303	78,114	78,826	86,246	87,167	87,394	87,208	92,848
Product 03	90,036	81,204	85,093	91,803	89,922	80,458	81,191	88,834	89,782	90,016	89,824	95,634
Product 04	92,737	83,640	87,646	94,557	92,620	82,872	83,626	91,499	92,476	92,716	92,519	98,503
Product 05	86,245	77,785	81,511	87,938	86,136	77,071	77,773	85,094	86,002	86,226	86,043	91,608
Product 06	88,833	80,119	83,956	90,576	88,720	79,383	80,106	87,647	88,582	88,813	88,624	94,356
Product 07	82,614	74,511	78,079	84,236	82,510	73,826	74,498	81,511	82,382	82,596	82,420	87,751
Product 08	85,093	76,746	80,421	86,763	84,985	76,041	76,733	83,957	84,853	85,074	84,893	90,384
Product 09	87,646	79,048	82,834	89,366	87,535	78,322	79,035	86,475	87,399	87,626	87,440	93,095
Product 10	90,275	81,420	85,319	92,047	90,161	80,672	81,406	89,070	90,021	90,255	90,063	95,888

In this example, column scanning is *much* easier.

Pop quiz: Why?

Product	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Product 01	93,993	84,773	88,833	95,838	93,874	83,994	84,759	92,738	93,728	93,972	93,772	99,837
Product 02	87,413	78,839	82,615	89,129	87,303	78,114	78,826	86,246	87,167	87,394	87,208	92,848
Product 03	90,036	81,204	85,093	91,803	89,922	80,458	81,191	88,834	89,782	90,016	89,824	95,634
Product 04	92,737	83,640	87,646	94,557	92,620	82,872	83,626	91,499	92,476	92,716	92,519	98,503
Product 05	86,245	77,785	81,511	87,938	86,136	77,071	77,773	85,094	86,002	86,226	86,043	91,608
Product 06	88,833	80,119	83,956	90,576	88,720	79,383	80,106	87,647	88,582	88,813	88,624	94,356
Product 07	82,614	74,511	78,079	84,236	82,510	73,826	74,498	81,511	82,382	82,596	82,420	87,751
Product 08	85,093	76,746	80,421	86,763	84,985	76,041	76,733	83,957	84,853	85,074	84,893	90,384
Product 09	87,646	79,048	82,834	89,366	87,535	78,322	79,035	86,475	87,399	87,626	87,440	93,095
Product 10	90,275	81,420	85,319	92,047	90,161	80,672	81,406	89,070	90,021	90,255	90,063	95,888

Adding white space between rows makes row-scanning easier.

Rule of thumb:

To optimize vertical scanning, put more space between columns than between rows...

To optimize horizontal scanning, put more space between rows than between columns.

Rules and grids:

Remember the Gestalt principle of enclosure!

Having too many rules/grids breaks up the data, and inhibits scanning.

Use them sparingly and intentionally!

Product	Jan	Feb	Mar	Apr	May	Jun
Product 01	93,993	84,773	88,833	95,838	93,874	83,994
Product 02	87,413	78,839	82,615	89,129	87,303	78,114
Product 03	90,036	81,204	85,093	91,803	89,922	80,458
Product 04	92,737	83,640	87,646	94,557	92,620	82,872
Product 05	83,733	75,520	79,137	85,377	83,627	74,826
Total	447,913	403,976	423,323	456,705	447,346	400,264

Product	Jan	Feb	Mar	Apr	May	Jun
Product 01	93,993	84,773	88,833	95,838	93,874	83,994
Product 02	87,413	78,839	82,615	89,129	87,303	78,114
Product 03	90,036	81,204	85,093	91,803	89,922	80,458
Product 04	92,737	83,640	87,646	94,557	92,620	82,872
Product 05	86,245	77,785	81,511	87,938	86,136	77,071
Total	450,425	406,241	425,697	459,266	449,854	402,508

Product	Jan	Feb	Mar	Apr	May	Jun
Product 01	93,993	84,773	88,833	95,838	93,874	83,994
Product 02	87,413	78,839	82,615	89,129	87,303	78,114
Product 03	90,036	81,204	85,093	91,803	89,922	80,458
Product 04	92,737	83,640	87,646	94,557	92,620	82,872
Product 05	83,733	75,520	79,137	85,377	83,627	74,826
Total	447,913	403,976	423,323	456,705	447,346	400,264

Product	Jan	Feb	Mar	Apr	May	Jun
Product 01	93,993	84,773	88,833	95,838	93,874	83,994
Product 02	87,413	78,839	82,615	89,129	87,303	78,114
Product 03	90,036	81,204	85,093	91,803	89,922	80,458
Product 04	92,737	83,640	87,646	94,557	92,620	82,872
Product 05	83,733	75,520	79,137	85,377	83,627	74,826
Total	447,913	403,976	423,323	456,705	447,346	400,264

Product	Jan	Feb	Mar	Apr	May	Jun
Product 01	93,993	84,773	88,833	95,838	93,874	83,994
Product 02	87,413	78,839	82,615	89,129	87,303	78,114
Product 03	90,036	81,204	85,093	91,803	89,922	80,458
Product 04	92,737	83,640	87,646	94,557	92,620	82,872
Product 05	83,733	75,520	79,137	85,377	83,627	74,826
Total	447,913	403,976	423,323	456,705	447,346	400,264

Fill colors *can* be a better choice than rules...

... but must be used with caution!

A little bit of visual contrast on a row can help guide the eye...

... too much *constrains* the eye.

Session	AM	PM
Vampire defense strategies	12	30
Werefolf taxonomy & phylogenetics	14	28
Cthuloid informatics	4	14
Computational demonology	5	10
$AgNO_3$ synthesis lab	28	5
Post-apocalyptic grantwriting	2	4
Total	65	91

Session	AM	PM
Vampire defense strategies	12	30
Werefolf taxonomy & phylogenetics	14	28
Cthuloid informatics	4	14
Computational demonology	5	10
$AgNO_3$ synthesis lab	28	5
Post-apocalyptic grantwriting	2	4
Total	65	91

Vertical scanning is inhibited by too much contrast!

Arranging data:

Which categorical elements should be rows, and which should be columns?

	2010				2011	
Region	Q1	Q2	Q3	Q4	Q1	Q2
North	393	473	539	639	439	538
East	326	393	447	530	364	447
South	401	483	550	652	448	549
West	538	647	737	874	601	736
Total	1,658	1,996	2,274	2,696	1,852	2,270

		Region				
Year	Qtr	North	East	South	West	Total
2010	1	393	326	401	538	1,658
	2	473	393	483	647	1,996
	3	539	447	550	737	2,273
	4	639	530	652	874	2,695
2011	1	439	364	448	601	1,852
	2	538	447	549	736	2,270

Questions to ask:

1. How many elements are in each category?

2. How long are their labels?

3. Is there a logical ordering of some kind?

3a. If so, what?

1. How many elements are in each category?

	Regions			
Product	North	East	South	West
Product 01	94	152	174	87
Product 02	122	198	226	113
Product 03	101	164	188	94
Product 04	142	230	263	131
Product 05	132	214	244	122
Product 06	174	282	323	161
Product 07	401	648	742	371
Product 08	281	454	519	260
Product 09	112	182	208	104
Product 10	584	944	1,081	540
Product 11	543	878	1,005	502
Product 12	163	263	301	151
Product 13	489	790	904	452
Product 14	327	529	606	303
Product 15	295	476	545	273
Total	3,960	6,403	7,330	3,665

2. How long are their labels?

3. Is there a logical ordering of some kind?

Region	2010 Q1	Q2	Q3	Q4	2011 Q1	Q2
North	393	473	539	639	439	538
East	326	393	447	530	364	447
South	401	483	550	652	448	549
West	538	647	737	874	601	736
Total	1,658	1,996	2,274	2,696	1,852	2,270

Time goes from left to right...

"Ranks" go from top to bottom...

Rank	Product	Sales (U.S. $)
1	Product J	1,939,993
2	Product E	1,784,794
3	Product G	1,642,010
4	Product A	1,510,649
5	Product D	1,389,797
6	Product C	1,278,614
7	Product B	1,176,324
8	Product H	1,082,219
9	Product F	995,641
10	Product I	915,990

As always, the guiding principle:

What lookups and comparisons do you want to emphasize?

Formatting text

Watch out for fonts that affect number width!

Region	Revenue
Americas	639,453,661
Europe	413,874,773
Asia	199,393,922
Australia	67,802,333
Middle East	10,349,381
Africa	7,011,159

Helvetica

Region	Revenue
Americas	639,453,661
Europe	413,874,773
Asia	199,393,922
Australia	67,802,333
Middle East	10,349,381
Africa	7,011,159

Big Caslon

Table 1. Concussion Group and Control Group Characteristics and Baseline Test Results

Characteristics	Concussion Group (n = 94)*	Control Group (n = 56)*	Mean Difference (95% CI)
Demographics			
Age, y	20.04 (1.36)	19.20 (1.45)	0.84 (0.37 to 1.32)
Academic year (collegiate)	2.78 (1.18)	2.02 (1.23)	0.76 (0.35 to 1.16)
Height, in	73.50 (2.94)	72.75 (3.23)	0.75 (–0.28 to 1.78)
Body weight, kg	105.87 (21.10)	98.33 (20.79)	7.54 (0.47 to 14.62)
Self-reported history			
No. of previous concussions in past 7 y	0.58 (0.78)	0.39 (0.68)	0.19 (–0.07 to 0.44)
Concussion (lifetime), No. (%)	41 (43.2)	17 (30.4)	12.8 (0.0 to 28.9)
ADHD, No. (%)	2 (2.30)	1 (1.80)	0.5 (0.0 to 59.2)
Learning disability, No. (%)	2 (2.30)	1 (1.80)	0.5 (0.0 to 58.8)
Baseline test results†			
GSC total score[17]	1.95 (4.94)	0.99 (3.26)	0.96 (–0.49 to 2.43)
SAC total score[42]	27.40 (2.17)	27.43 (1.77)	–0.03 (–0.68 to 0.61)
BESS total score[41]	11.89 (8.09)	12.73 (7.57)	–0.84 (–3.47 to 1.80)
HVLT Immediate Memory[43]	25.03 (4.36)	25.31 (4.05)	–0.28 (–1.70 to 1.13)
HVLT Delayed Recall[43]	8.61 (2.18)	9.15 (2.13)	–0.54 (–1.27 to 0.18)
HVLT Recognition[43]	22.60 (1.97)	22.94 (1.26)	–0.34 (–0.92 to 0.24)
Trail-Making Test Part B[44]	64.42 (22.22)	57.30 (18.69)	7.12 (0.12 to 14.11)
SDMT[45]	55.56 (11.61)	58.90 (12.19)	–3.34 (–7.29 to 0.60)
Stroop Color-Word Test[46]	47.21 (9.23)	48.66 (9.75)	–1.45 (–4.59 to 1.70)
COWAT[47]	40.46 (12.36)	37.15 (10.61)	3.31 (–0.61 to 7.23)

Abbreviations: ADHD, attention-deficit/hyperactivity disorder; BESS, Balance Error Scoring System; CI, confidence interval; COWAT, Controlled Oral Word Association Test; GSC, Graded Symptom Checklist; HVLT, Hopkins Verbal Learning Test; SAC, Standardized Assessment of Concussion; SDMT, Symbol Digit Modalities Test.
*Data are expressed as mean (SD) unless otherwise specified.
†See Table 2 for explanation of total possible range of scores.

McCrea M, Guskiewicz KM, Marshall SW, et al. Acute Effects and Recovery Time Following Concussion in Collegiate Football Players: The NCAA Concussion Study. *JAMA*. 2003;290(19):2556-2563. doi:10.1001/jama.290.19.2556.

Table 3. Model-Based Adjusted Estimates of Mean Differences Between Concussion and Control Groups in Symptoms, Cognitive Functioning, and Postural Stability*

Assessment Point	Mean Difference (95% Confidence Interval)		
	Symptoms (GSC)	Cognitive Functioning (SAC)	Postural Stability (BESS)
Time of concussion	20.93 (15.65 to 26.21)	–2.94 (–4.38 to –1.50)	5.81 (–0.67 to 12.30)
Postgame/postpractice	16.97 (12.61 to 21.33)	–2.15 (–3.26 to –1.04)	5.66 (1.27 to 10.06)
Postinjury day			
1	11.53 (8.37 to 14.69)	–1.59 (–2.43 to –0.75)	2.72 (–0.14 to 5.57)
2	6.88 (4.17 to 9.59)	–0.72 (–1.51 to 0.08)	2.33 (–0.30 to 4.95)
3	5.08 (2.27 to 7.88)	–0.46 (–1.25 to 0.32)	1.46 (–1.22 to 4.14)
5	2.02 (–0.03 to 4.06)	–0.52 (–1.28 to 0.25)	–0.31 (–3.02 to 2.40)
7	0.33 (–1.41 to 2.06)	–0.03 (–1.33 to 1.26)	–0.55 (–3.19 to 2.09)
90	0.62 (–0.90 to 2.14)	–0.51 (–1.41 to 0.39)	–2.45 (–5.09 to 0.18)

Abbreviations: BESS, Balance Error Scoring System, GSC, Graded Symptom Checklist; SAC, Standardized Assessment of Concussion.

*Estimated mean differences for the GSC are adjusted for baseline GSC score and number of previous concussions; SAC estimates are adjusted for baseline SAC score, academic year, number of previous concussions, history of learning disability and attention-deficit/hyperactivity disorder, and institution; BESS estimates are adjusted for baseline BESS score, height, body weight, number of previous concussions, and institution. Positive mean differences indicate more severe symptoms reported on the GSC and poorer performance on the BESS in the concussion group relative to baseline; negative mean differences indicate poorer performance in the concussion group on the SAC relative to baseline.

McCrea M, Guskiewicz KM, Marshall SW, et al. Acute Effects and Recovery Time Following Concussion in Collegiate Football Players: The NCAA Concussion Study. *JAMA*. 2003;290(19):2556-2563. doi:10.1001/jama.290.19.2556.

Table 1. Concussion and control group characteristics

	Concussion ($n = 94$)		Control ($n = 56$)		Mean Diff.	t	p
	Mean	*SD*	*Mean*	*SD*			
Demographics:	73.50	2.94	72.75	3.23	.75	1.44	.151
Weight (lbs.)	235.26	46.88	218.50	46.19	16.76	2.11	.037*
Age (years)	20.04	1.36	19.20	1.45	.84	3.51	.001*
Academic year (collegiate)	2.78	1.18	2.02	1.23	.76	3.71	.001*
Self-reported history of:							
No. of previous concussions (past 7 years)	.58	.78	.39	.68	.19	1.47	.145
Range	0–5		0–3				
Any concussion (lifetime) (%)	43.2		30.4		$\chi^2 = 2.78$		.123
ADHD (%)	2.30		1.80		$\chi^2 = .034$		.854
Learning disability (%)	2.30		1.80		$\chi^2 = 1.64$		.440

Notes. *Statistically significant. ADHD = Attention Deficit Hyperactivity Disorder. LD = Learning Disability.

McCrea M, BARR WB, Guskiewicz K, Randolph C, MARSHALL SW, Cantu R, et al. Standard regression-based methods for measuring recovery after sport-related concussion. Journal of the International Neuropsychological Society. 2005 Jan;11:58–69.

Table 3. GSC, SAC, and BESS data for concussion and control groups at baseline and postinjury assessment points

	GSC				SAC				BESS			
	Concussion		Control		Concussion		Control		Concussion		Control	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Baseline	1.97	4.94	.99	3.26	27.37	2.16	27.43	1.77	11.95	8.09	12.73	7.57
Time of concussion	20.60	10.58	.20	2.54	24.94	3.07	27.69	1.91	19.46	9.48	12.34	9.06
Postgame/ postpractice	16.73	11.86	.18	1.96	25.58	3.03	27.76	1.85	16.70	9.16	12.49	9.32
Day 1	12.25	12.52	.18	.69	26.25	2.79	27.96	1.65	14.18	8.04	11.96	8.11
Day 2	7.63	10.55	.06	.45	27.44	2.32	28.02	1.51	12.96	7.26	11.20	9.40
Day 3	6.03	10.26	.04	.44	27.57	2.46	27.96	1.64	12.31	7.80	11.29	7.71
Day 5	3.06	5.95	.04	.47	28.02	3.24	28.73	1.40	10.97	6.78	11.69	7.95
Day 7	1.27	3.37	.02	.46	28.41	1.85	28.37	3.39	9.67	6.88	10.93	8.21

GSC = Graded Symptom Checklist (Lovell & Collins, 1998); SAC = Standardized Assessment of Concussion (McCrea et al., 2000); BESS = Balance Error Scoring System (Guskiewicz et al., 2001).

Assessment Point	Symptoms (GSC)	Functioning (SAC)	Stability (BESS)
Time of concussion	20.93 (15.65 to 26.21)	–2.94 (–4.38 to –1.50)	5.81 (–0.67 to 12.30)
Postgame/postpractice	16.97 (12.61 to 21.33)	–2.15 (–3.26 to –1.04)	5.66 (1.27 to 10.06)
Postinjury day			
1	11.53 (8.37 to 14.69)	–1.59 (–2.43 to –0.75)	2.72 (–0.14 to 5.57)
2	6.88 (4.17 to 9.59)	–0.72 (–1.51 to 0.08)	2.33 (–0.30 to 4.95)
3	5.08 (2.27 to 7.88)	–0.46 (–1.25 to 0.32)	1.46 (–1.22 to 4.14)
5	2.02 (–0.03 to 4.06)	–0.52 (–1.28 to 0.25)	–0.31 (–3.02 to 2.40)
7	0.33 (–1.41 to 2.06)	–0.03 (–1.33 to 1.26)	–0.55 (–3.19 to 2.09)
90	0.62 (–0.90 to 2.14)	–0.51 (–1.41 to 0.39)	–2.45 (–5.09 to 0.18)

Abbreviations: BESS, Balance Error Scoring System; GSC, Graded Symptom Checklist; SAC, Standardized Assess-

McCrea M, BARR WB, Guskiewicz K, Randolph C, MARSHALL SW, Cantu R, et al. Standard regression-based methods for measuring recovery after sport-related concussion. Journal of the International Neuropsychological Society. 2005 Jan;11:58–69.