

## 2.1: Introduction and Examples

In statistics, we organize data into graphs, which (when properly created) are powerful tools to help us understand, interpret and analyze the phenomena we study.

Here is an example of raw data, the month closing stock price (adjusted for splits) of Apple Inc. from December 1999 to December 2016<sup>9</sup>:

115.82	102.97	106.17	75.50	69.86	52.70	41.97	27.42	11.11	25.77	11.04	9.35	4.19	1.39	0.93	1.42	0.97
110.52	115.73	114.39	74.83	76.83	49.73	40.49	26.01	12.06	23.71	11.93	8.82	4.36	1.36	1.01	1.39	1.07
112.96	116.40	103.43	69.93	77.80	52.67	39.16	24.53	14.00	24.72	10.55	7.49	3.41	1.49	1.05	1.14	1.27
112.47	107.44	96.49	63.79	87.18	49.62	36.92	24.12	14.79	19.97	10.02	6.98	2.52	1.35	0.94	1.01	1.68
105.56	109.84	98.16	65.19	86.93	50.07	31.63	21.89	22.06	18.02	8.83	6.10	2.24	1.47	0.96	1.21	3.96
103.12	117.62	91.10	60.15	79.47	50.81	33.47	21.26	20.68	17.14	8.84	5.55	2.10	1.37	0.99	1.22	3.31
94.60	121.63	88.56	52.71	75.99	43.68	32.73	18.53	21.79	15.88	7.45	4.79	2.12	1.24	1.15	1.51	3.41
98.81	126.33	86.17	59.78	75.17	45.26	33.43	17.67	24.56	15.77	7.78	5.17	1.83	1.17	1.52	1.30	2.73
92.20	120.85	79.89	58.47	75.99	45.56	33.97	16.37	22.63	12.99	9.16	4.69	1.68	0.93	1.58	1.66	4.04
107.20	120.15	72.66	58.45	78.01	45.35	30.58	13.68	18.67	12.09	8.16	5.42	1.76	0.92	1.54	1.44	4.42
95.10	124.05	71.24	58.28	70.58	45.96	26.63	11.62	16.27	11.01	8.91	5.84	1.56	0.98	1.41	1.19	3.73
95.22	112.69	67.37	59.80	59.40	44.15	24.99	11.73	17.61	11.16	9.83	5.00	1.47	0.93	1.61	1.41	3.38

Most people would look at this data and be unable to analyze or interpret what has happened at Apple. However a simple line graph over time is much easier to understand:



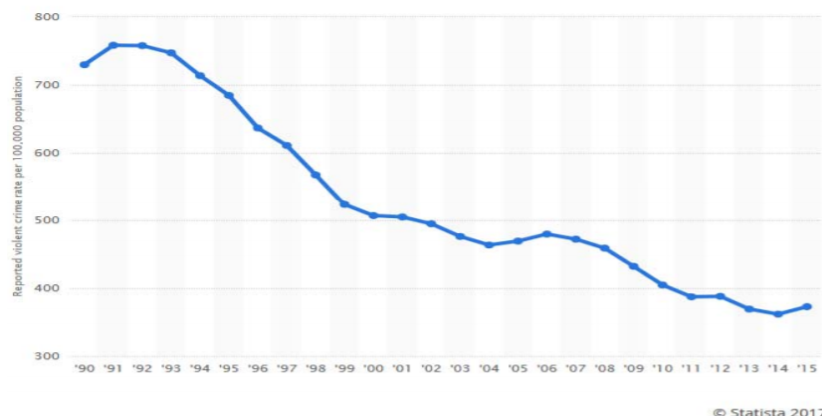
The line graph tells the story of Apple, from the dot.com crash in 2000, to the introduction of the first iPod in 2005, the first smart phone in 2007, the economic collapse of 2008, and competition from other operating systems, such as Android:



Graphs can help separate perception from reality. The polling organization Gallup has annually asked the question “Is there more crime in the U.S. then there was a year ago, or less?” In virtually every poll done, a large majority has said that crime has gone up.<sup>10</sup>

Is there more crime in the U.S. than there was a year ago, or less?				
	More	Less	Same (vol.)	No opinion
	%	%	%	%
2016 Oct 5-9	70	20	6	4
2015 Oct 7-11	70	18	8	4
2014 Oct 12-15	63	21	9	7
2013 Oct 3-6	64	19	9	7
2011 Oct 6-9	68	17	8	8
2010 Oct 7-10	66	17	8	9
2009 Oct 1-4	74	15	6	5
2008 Oct 3-5	67	15	9	9
2007 Oct 4-7	71	14	8	6
2006 Oct 9-12	68	16	8	8
2005 Oct 13-16	67	21	9	3
2004 Oct 11-14	53	28	14	5
2003 Oct 6-8	60	25	11	4
2002 Oct 14-17	62	21	11	6
2001 Oct 11-14	41	43	10	6
2000 Aug 29-Sep 5	47	41	7	5
1998 Oct 23-25	52	35	8	5
1997 Aug 22-25	64	25	6	5
1996 Jul 25-28	71	15	8	6
1993 Oct 13-18	87	4	5	4
1992 Feb 28-Mar 1	89	3	4	4
1990 Sep 10	84	3	7	6

However, actual data from the U.S. Justice Department shows that violent crime rates have actually decreased in almost every since 1990.<sup>11</sup>

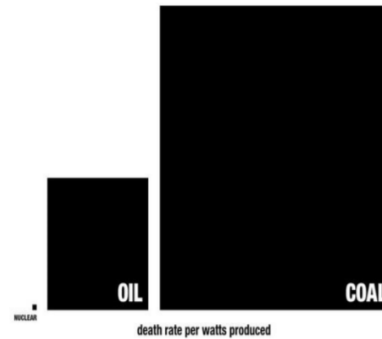
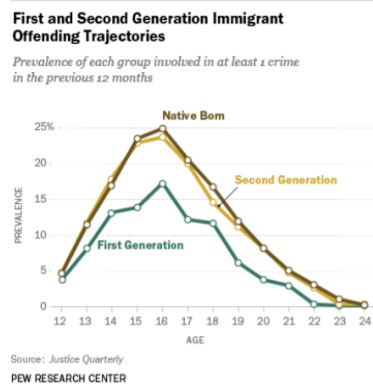


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Perhaps people are influenced by stories in the news, which may sensationalize crime, but here is an example of where we can use statistics to challenge these false perceptions.

Here are two other examples of graphs of data. Make your own interpretation:

- Pew Research conducted a study in 2013 on how First Generation immigrant crime rates compares with second generation and native born Americans.<sup>12</sup>
- The Next Big Future conducted a study comparing deaths caused by creating energy from different sources: coal, oil and nuclear.<sup>13</sup>



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