Making good plots
# with Microsoft Excel

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Microsoft Excel is used by many amateur and professional astronomers. Excel has plotting capabilities which are often used in their default settings, which create plots that are hard to read and contain many violations of good style. Based on the work of Edward Tufte, I will present examples of good plots and bad plots and demonstrate how to make a good plot with Microsoft Excel.

Key point: Just like writing has certain rules of style, so does producing plots. When it comes to plots style is not purely an issue of personal taste. Excel is a good program. This is not an anti-Microsoft rant.

Plots are awesome.

Visualizing data, even with simple drawings of lines and dots, yields great insights that would otherwise be lacking. A large amount of data can be instantly comprehended with a plot, unlike looking at a table of numbers. Plots are ubiquitous in astronomy and we owe it to each other to make good ones.

# The Visual Display of Quantitative Information
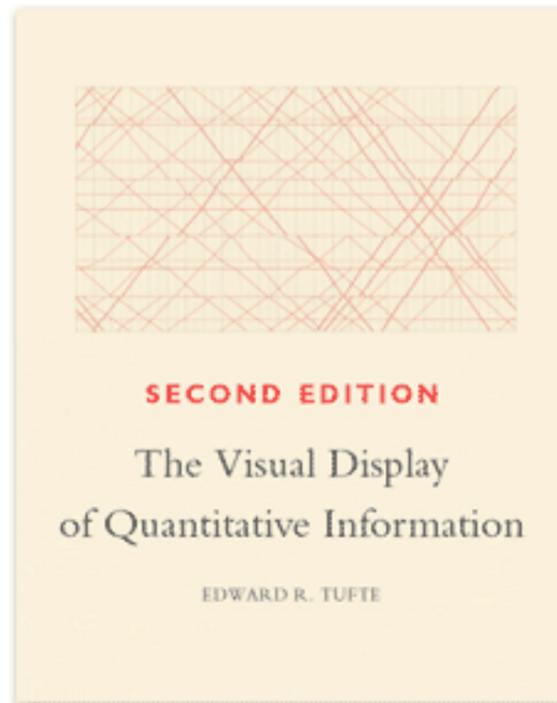
Edward R. Tufte

Tufte has done a lot of work on promoting good style in plots. This is not for aesthetic reasons! Good style is a matter of increasing information density and keeping clutter out of the way. Because ultimately...

The purpose of a plot is to *assist thinking.*
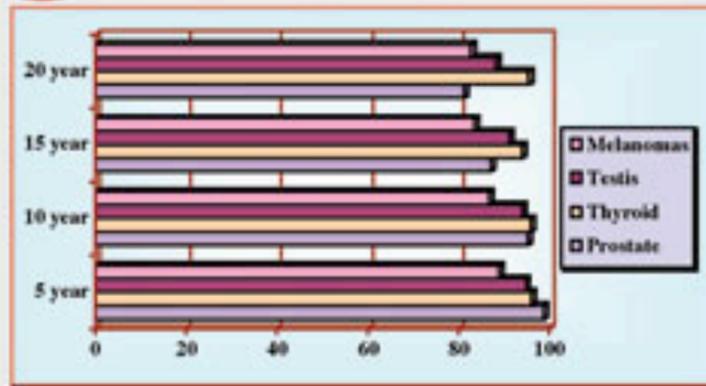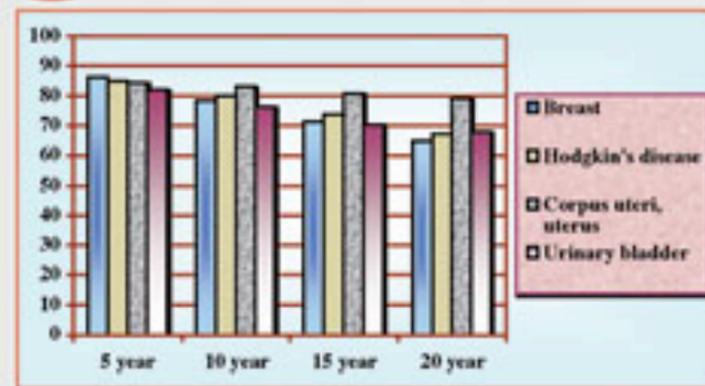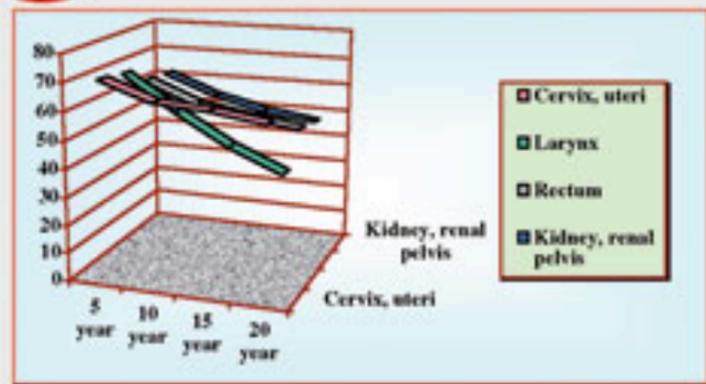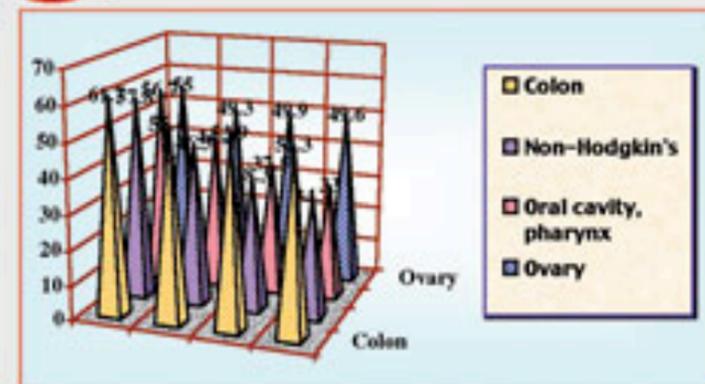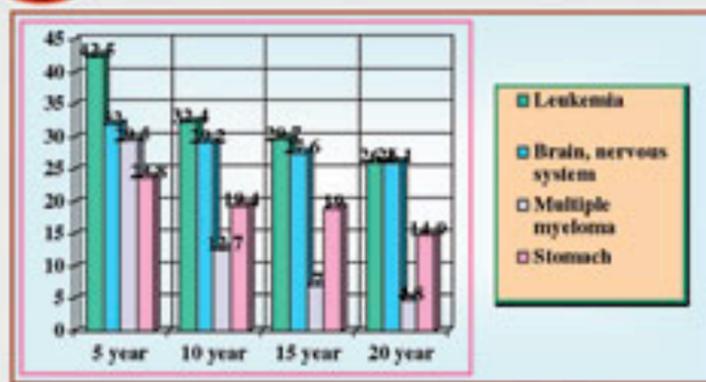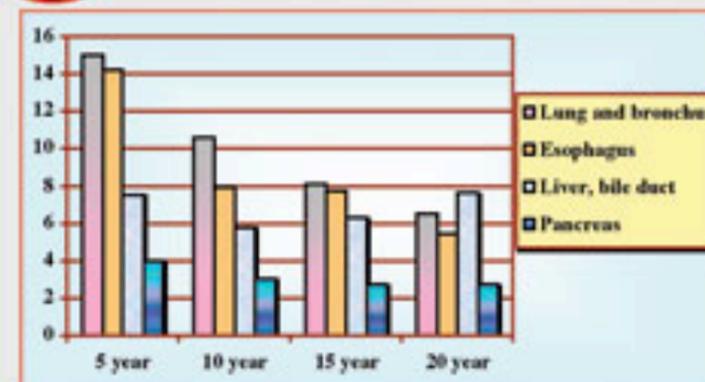
One of Tufte's examples. Take 15 seconds and try to gain some insights from this slide.

Estimates of % survival rates

	5 year	10 year	15 year	20 year
Prostate	99	95	87	81
Thyroid	96	96	94	95
Testis	95	94	91	88
Melanomas	89	87	84	83
Breast	86	78	71	65
Hodgkin's disease	85	80	74	67
Corpus uteri, uterus	84	83	81	79
Urinary, bladder	82	76	70	68
Cervix, uteri	71	64	63	60
Larynx	69	57	46	38
Rectum	63	55	52	49
Kidney, renal pelvis	62	54	50	47
Colon	62	55	54	52
Non-Hodgkin's	58	46	38	34
Oral cavity, pharynx	57	44	38	33
Ovary	55	49	50	50
Leukemia	43	32	30	26
Brain, nervous system	32	29	28	26
Multiple myeloma	30	13	7	5
Stomach	24	19	19	15
Lung and bronchus	15	11	8	6
Esophagus	14	8	8	5
Liver, bile duct	8	6	6	8
Pancreas	4	3	3	3

How long does it take to gain insights from this? This is a brilliant example of a high–density "plot" that communicates a lot of information in a way that is comprehended quickly. It's the exact same information as the previous slide.
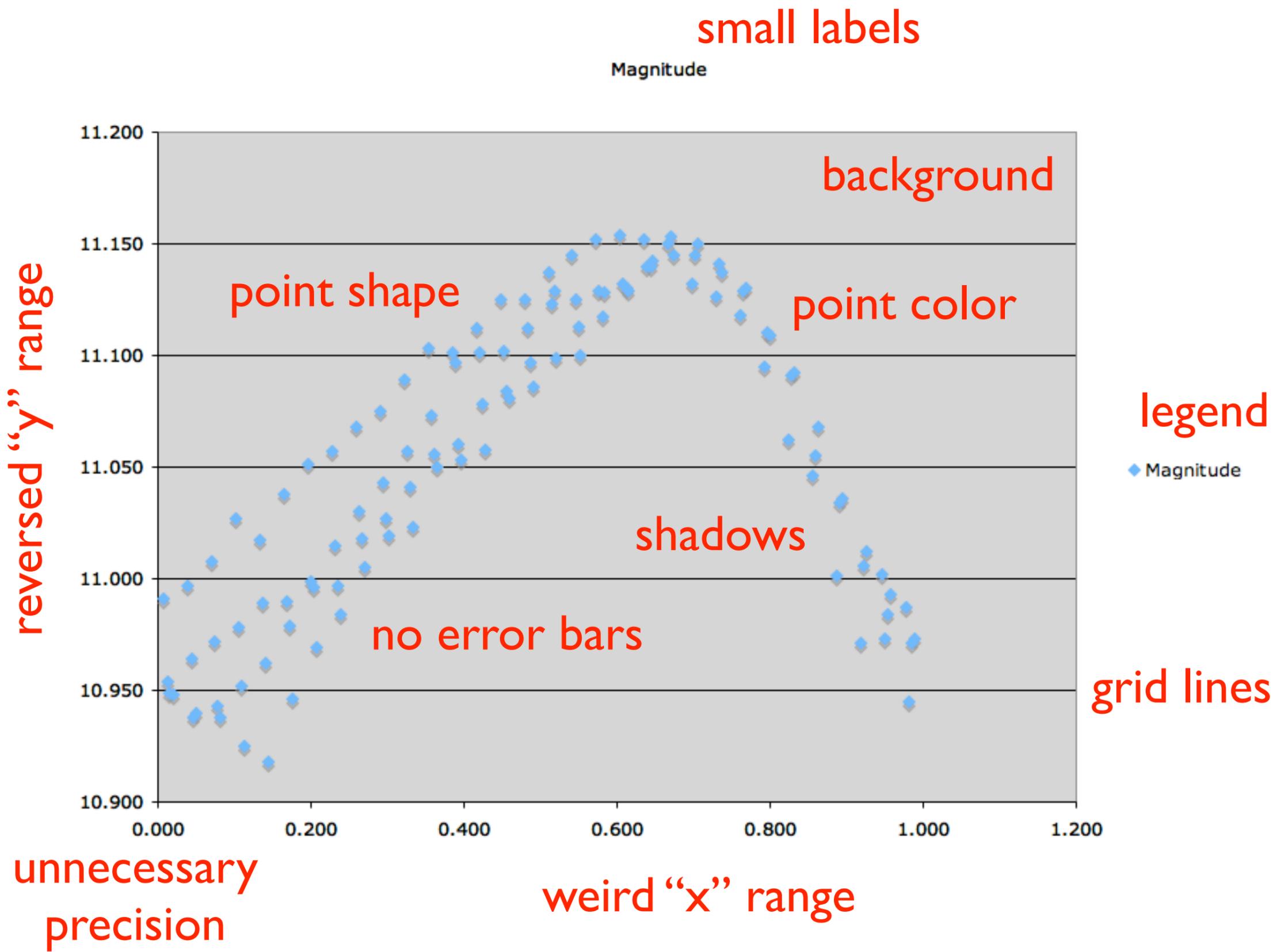
Lots of things wrong with this plot.

BZ Uma
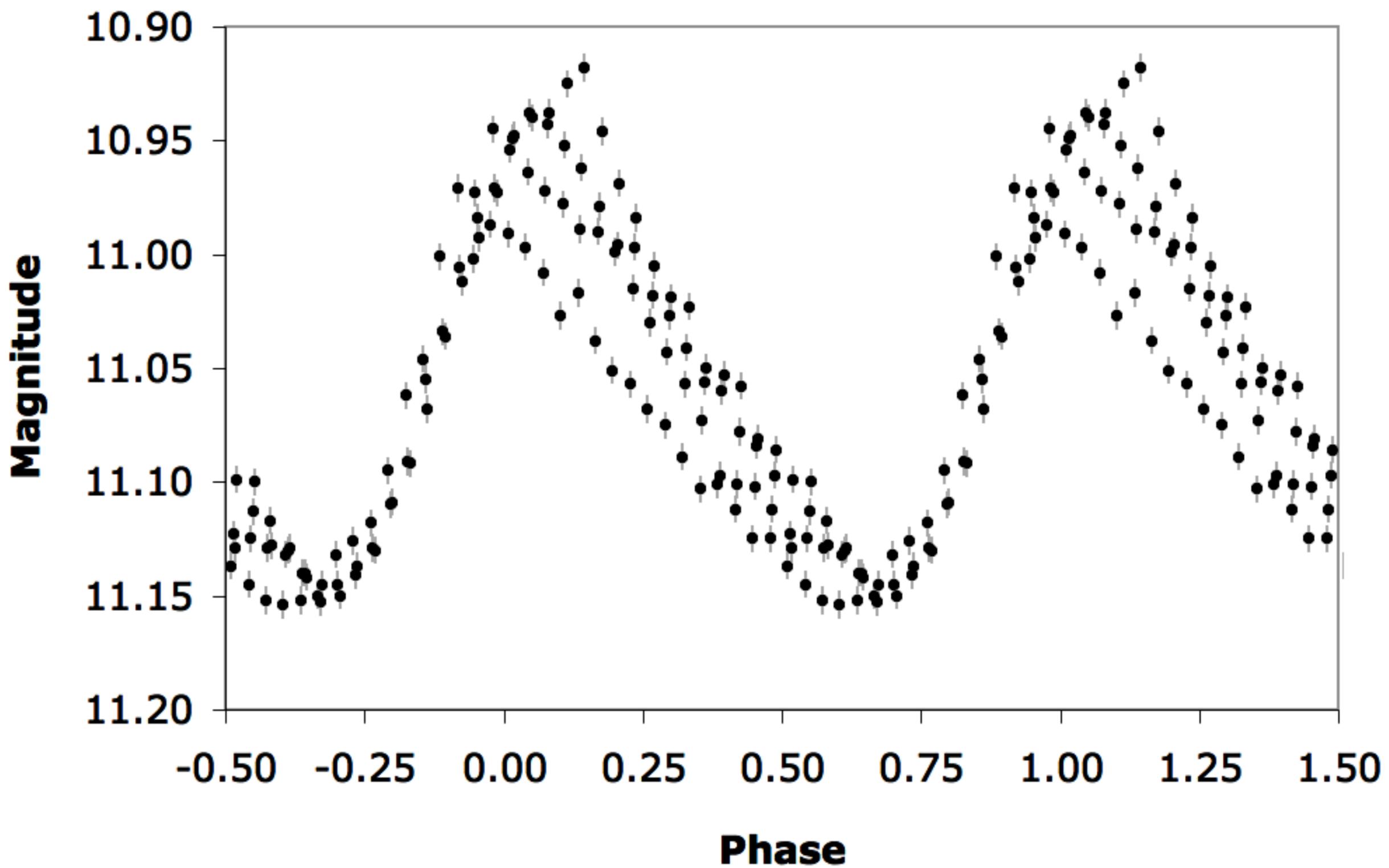
Same data as a good plot.
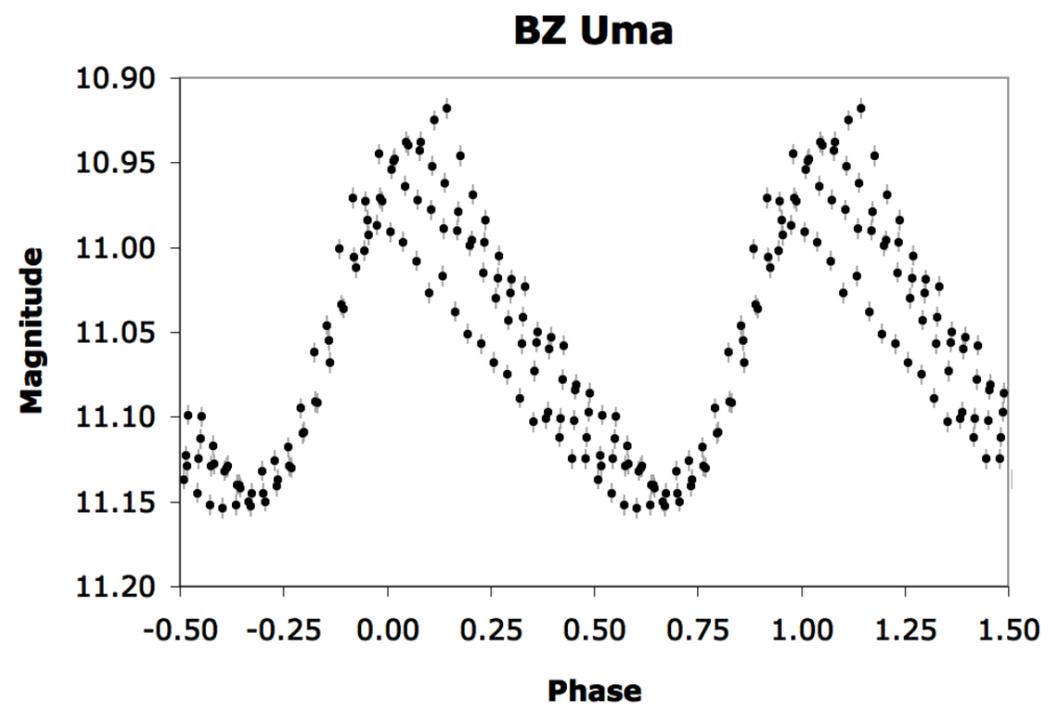
BZ Uma

Still legible.
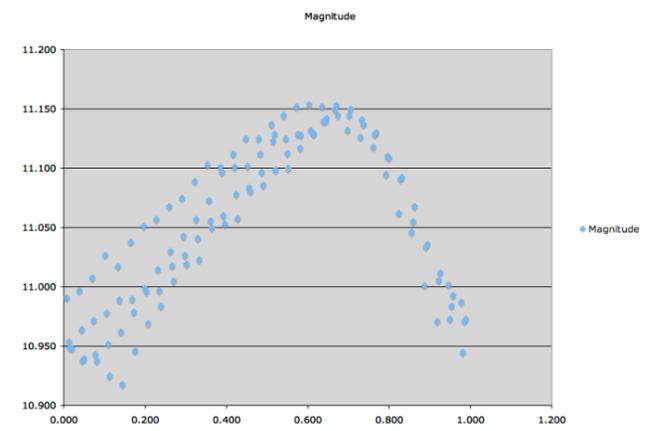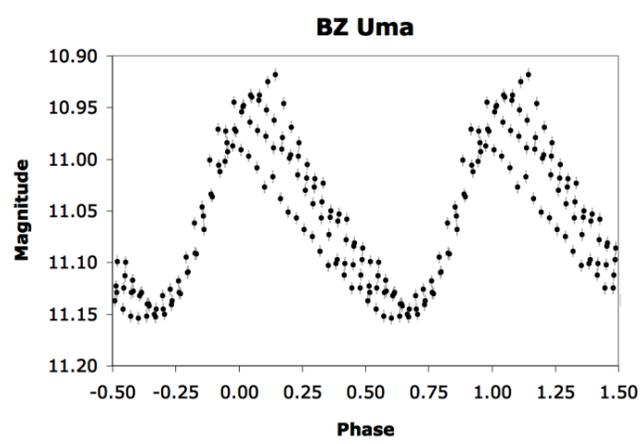
Which does a better job of assisting thinking?

BZ Uma
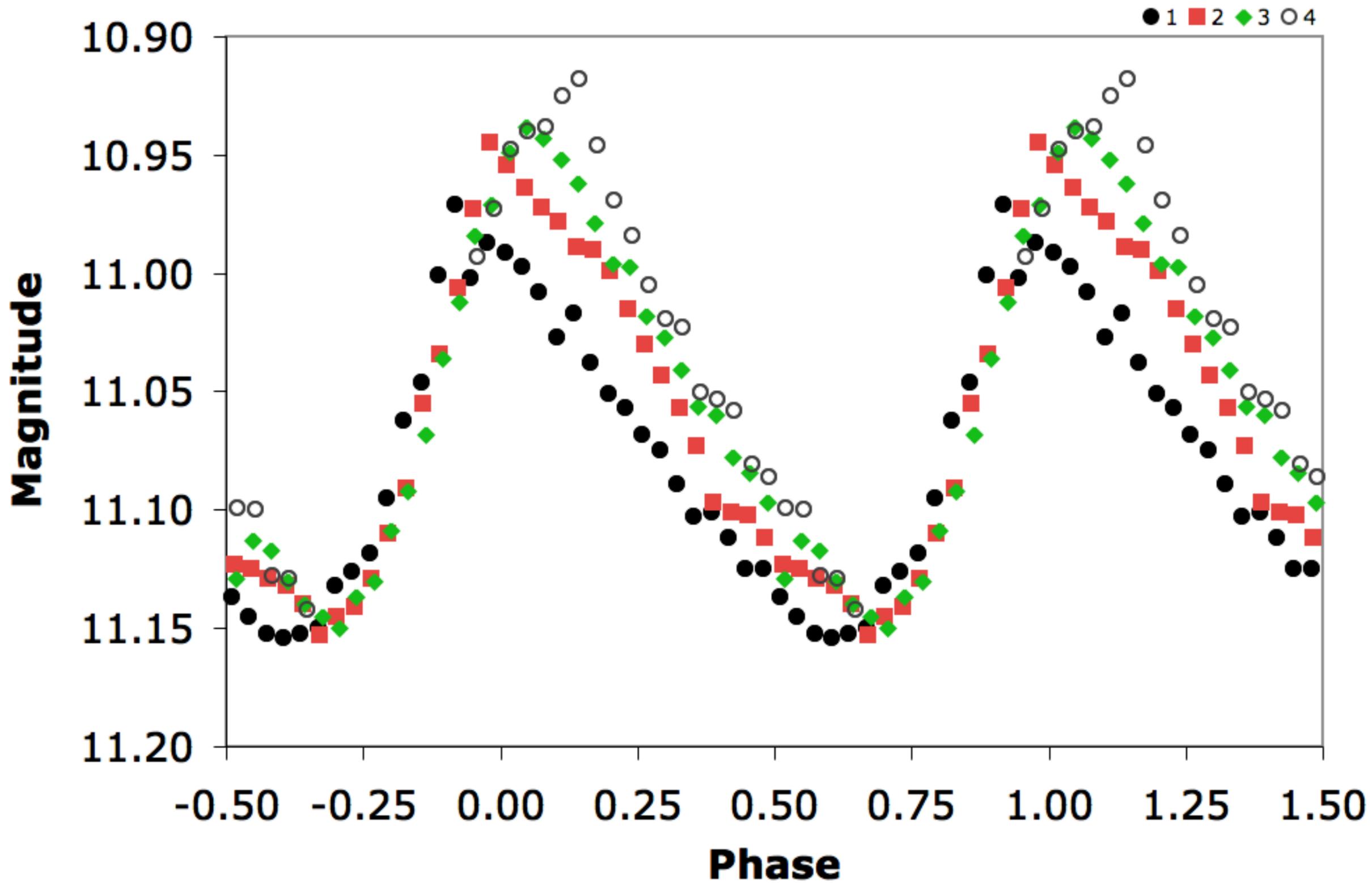
Color is OK when used to add another dimension to data. This would also print OK grey scale.