

The Virtues of Building on Sand



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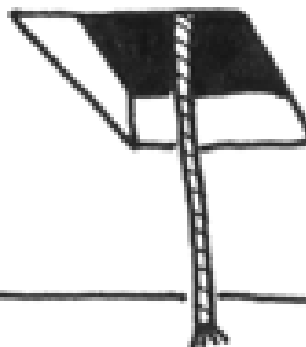
ICOTS 8
July 16, 2010

“... **a wise man** who built his house on rock. The rain fell, the floods came... but it did not fall, because it had been founded on rock.

...**a foolish man** who built his house on sand. The rain fell, and the floods came... and it fell — and great was its fall!”

Matthew 7:24-27

College level
statistics



12

11

10

9

8

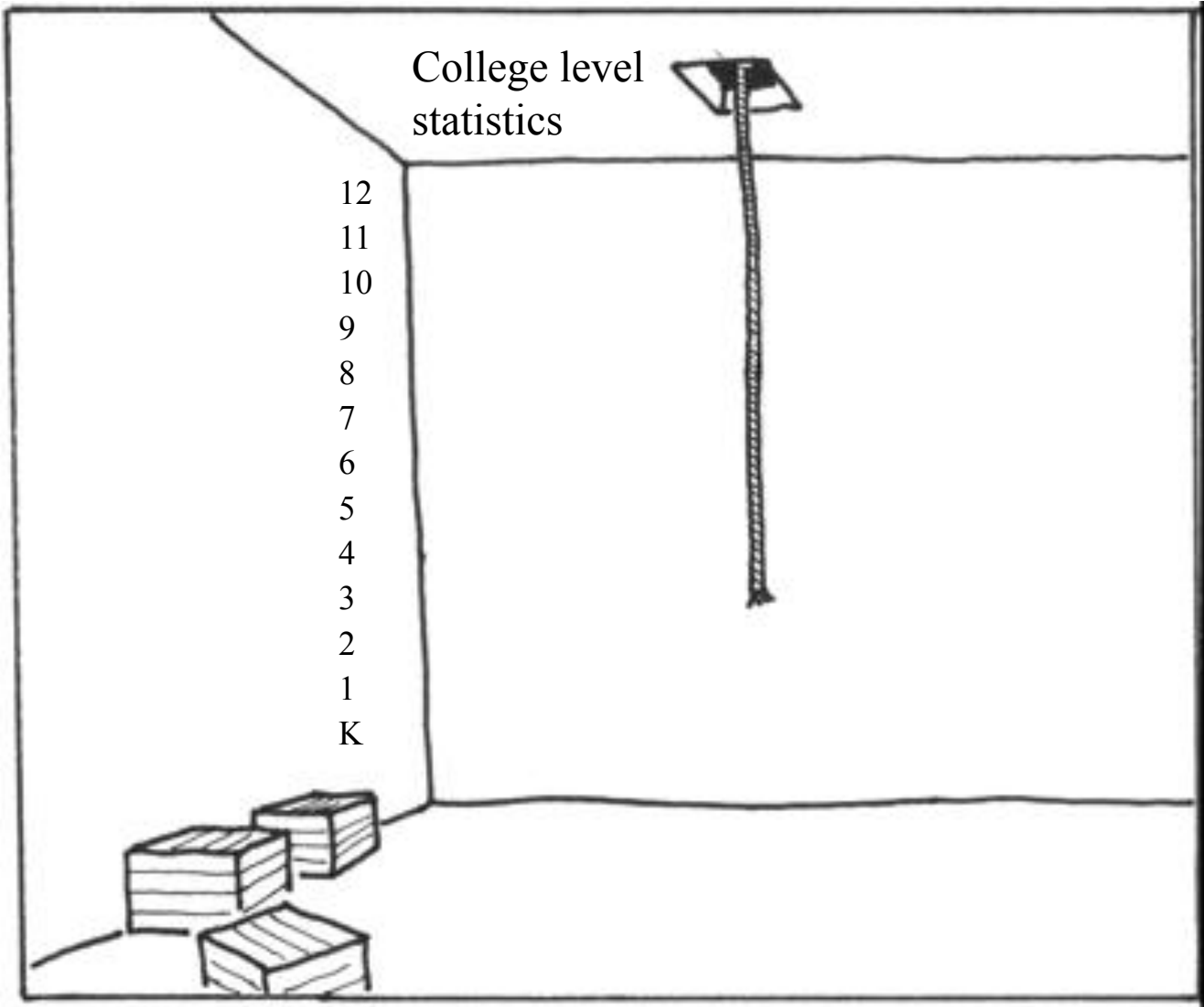
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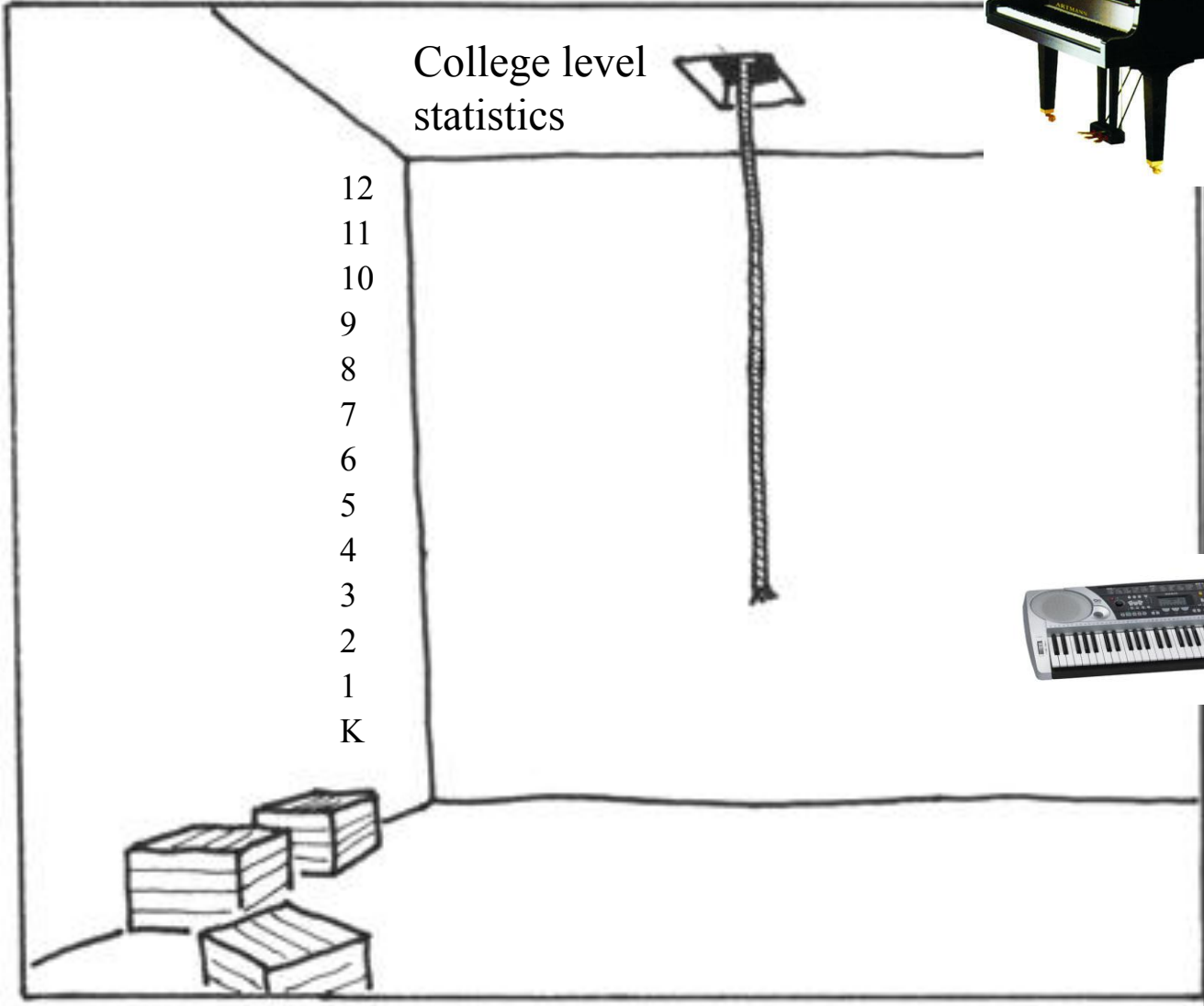
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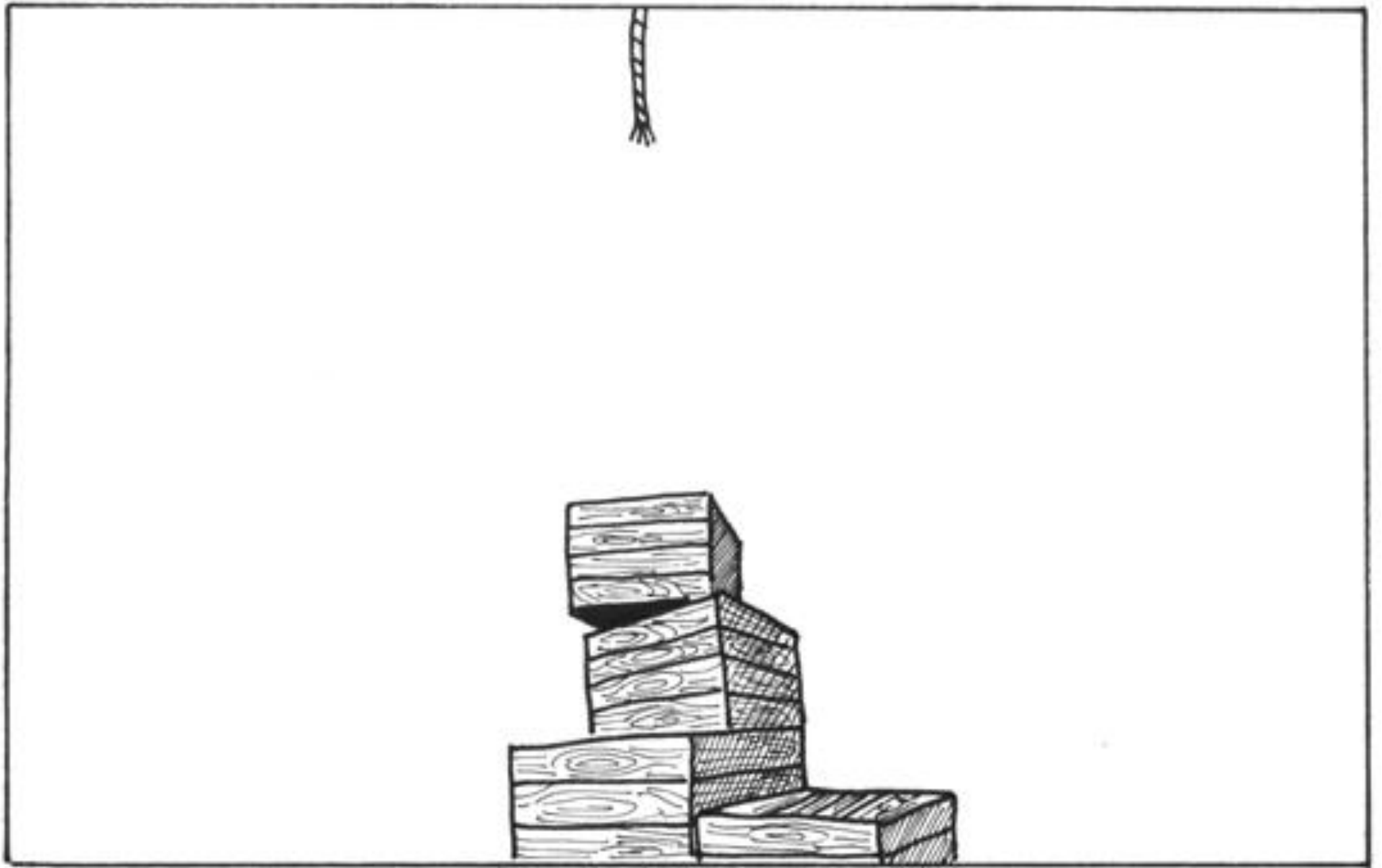
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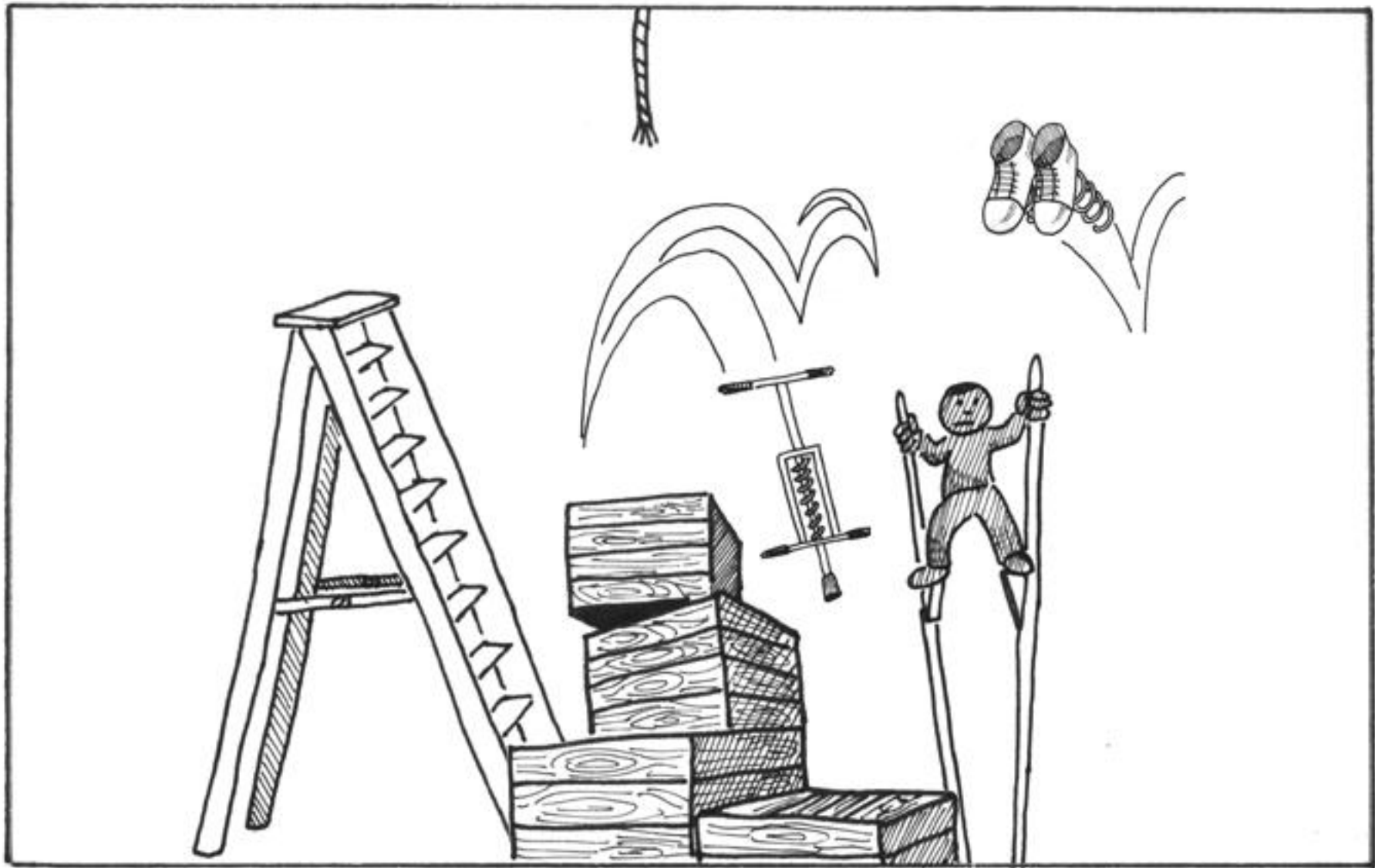
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Transparent Graphs

“Don’t make people understand graphs; make graphs that people understand.”

Hans Rosling

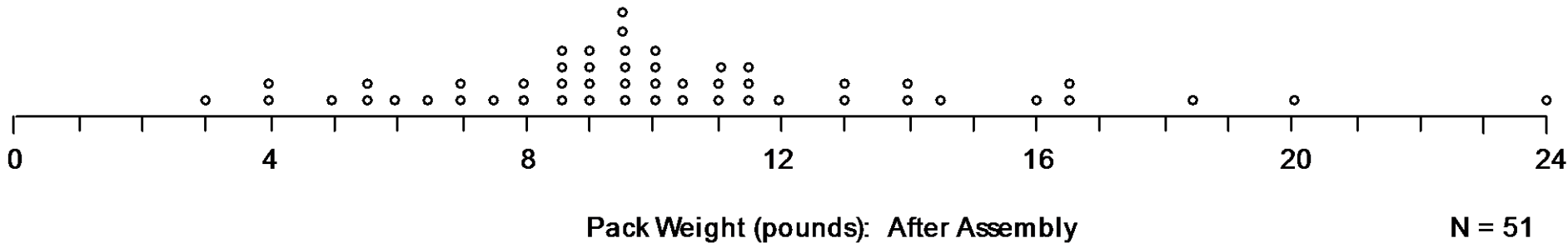
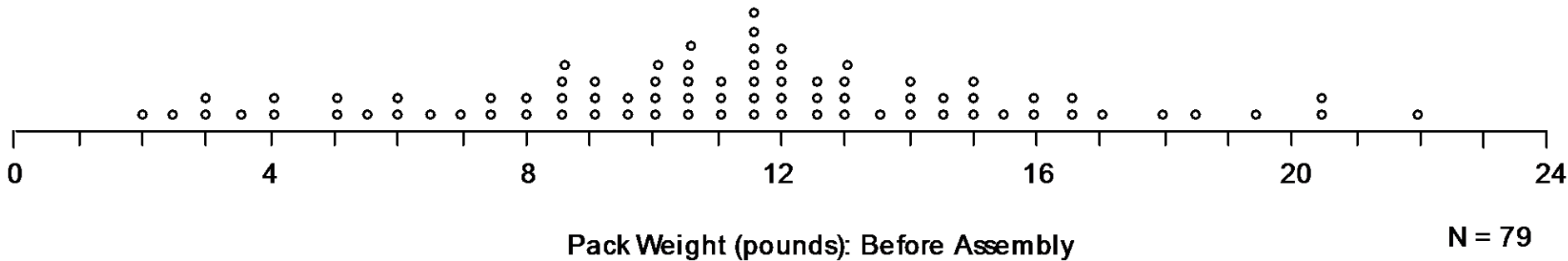
Transparent Graphs?

“Don’t make people understand graphs; make graphs that people understand.”

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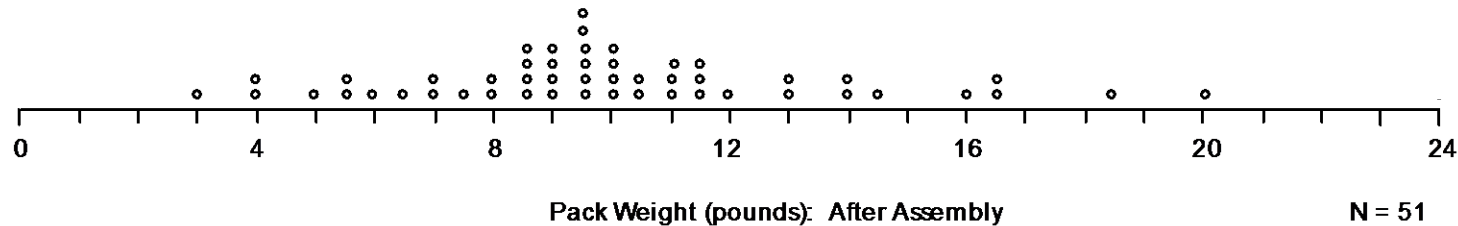
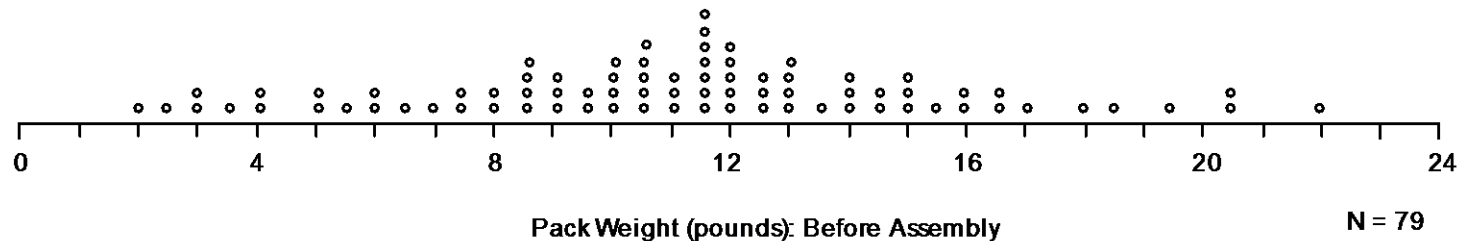
Make graphs that people understand
and the people that can understand them.

Backpack Weights: Before & After Assembly



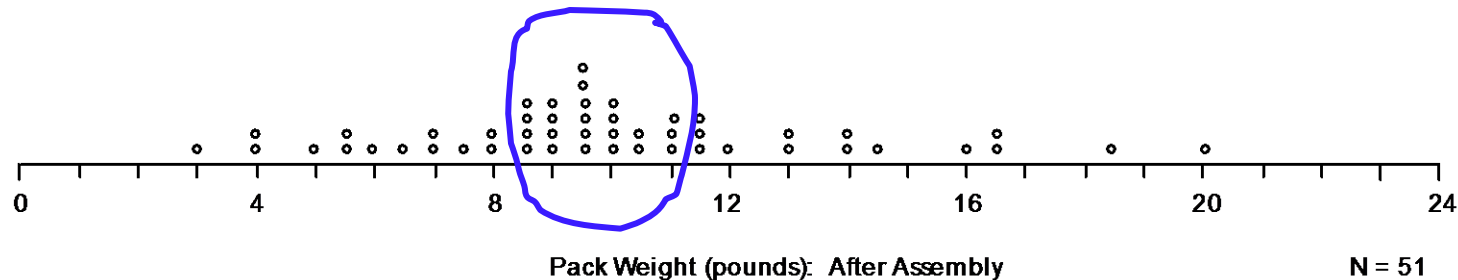
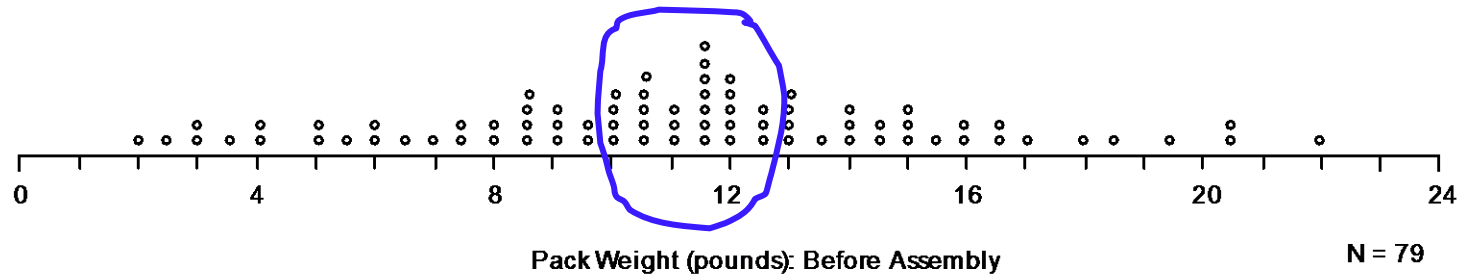
“Based on these data, what would you conclude about the question of whether or not the assembly was effective?”

Example: Comparing Modal Clumps



A: “Looking at the cluster of the plot right here, most of the students before the assembly were carrying from, you know, 10 to 13 range. And after the assembly they went down to — the mode looks like about 9 and a half. And the mode beforehand was about 11 and a half to 12.”

Example: Comparing Modal Clumps

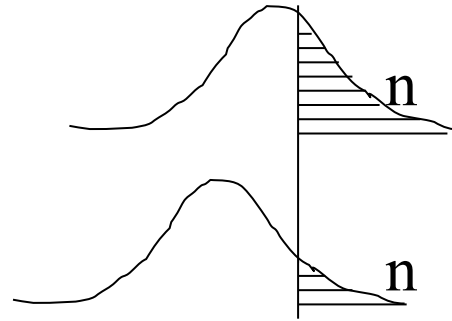


Q: “And you’re looking at the mode and the...”

A: “The mode and the cluster around the mode.”

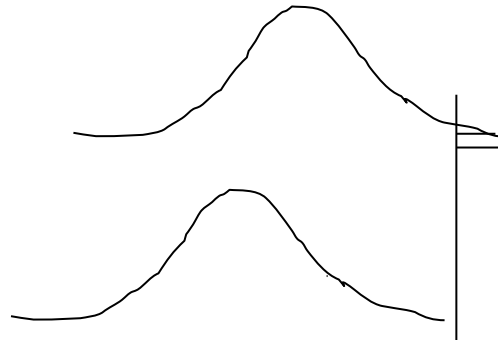
Non-aggregate Methods of Comparison

Cut point counts



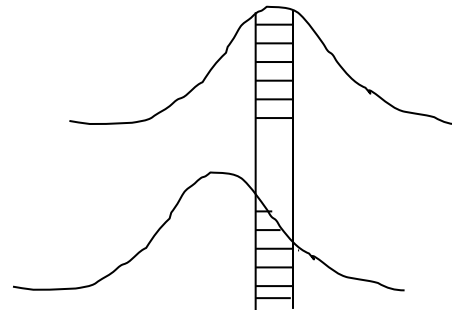
“There were more students carrying over 10 lbs before the assembly than after.”

Extremes



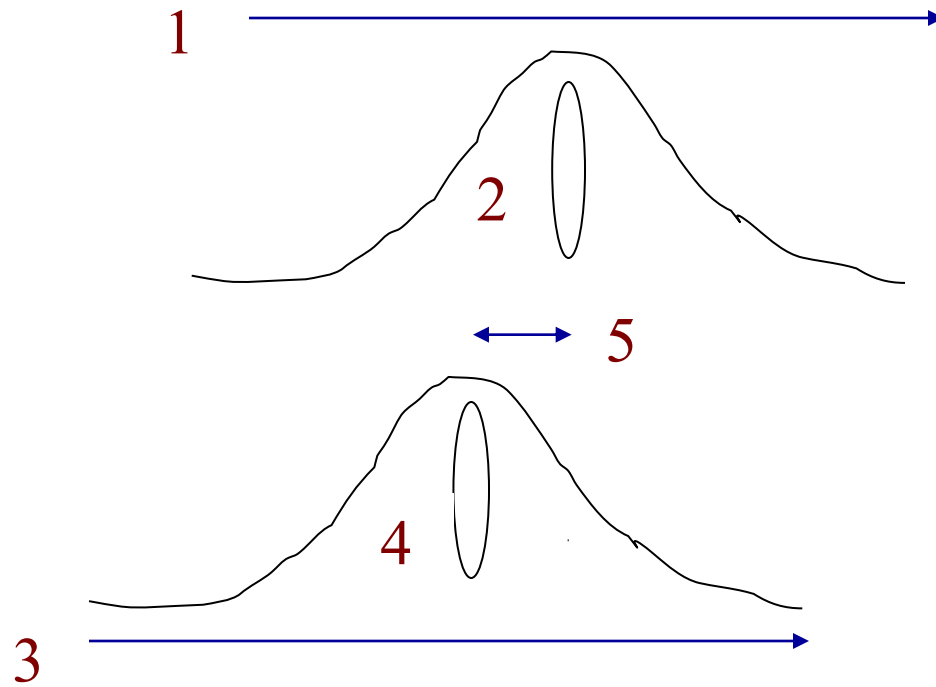
“The 3 heaviest packs were from before the assembly.”

Slices

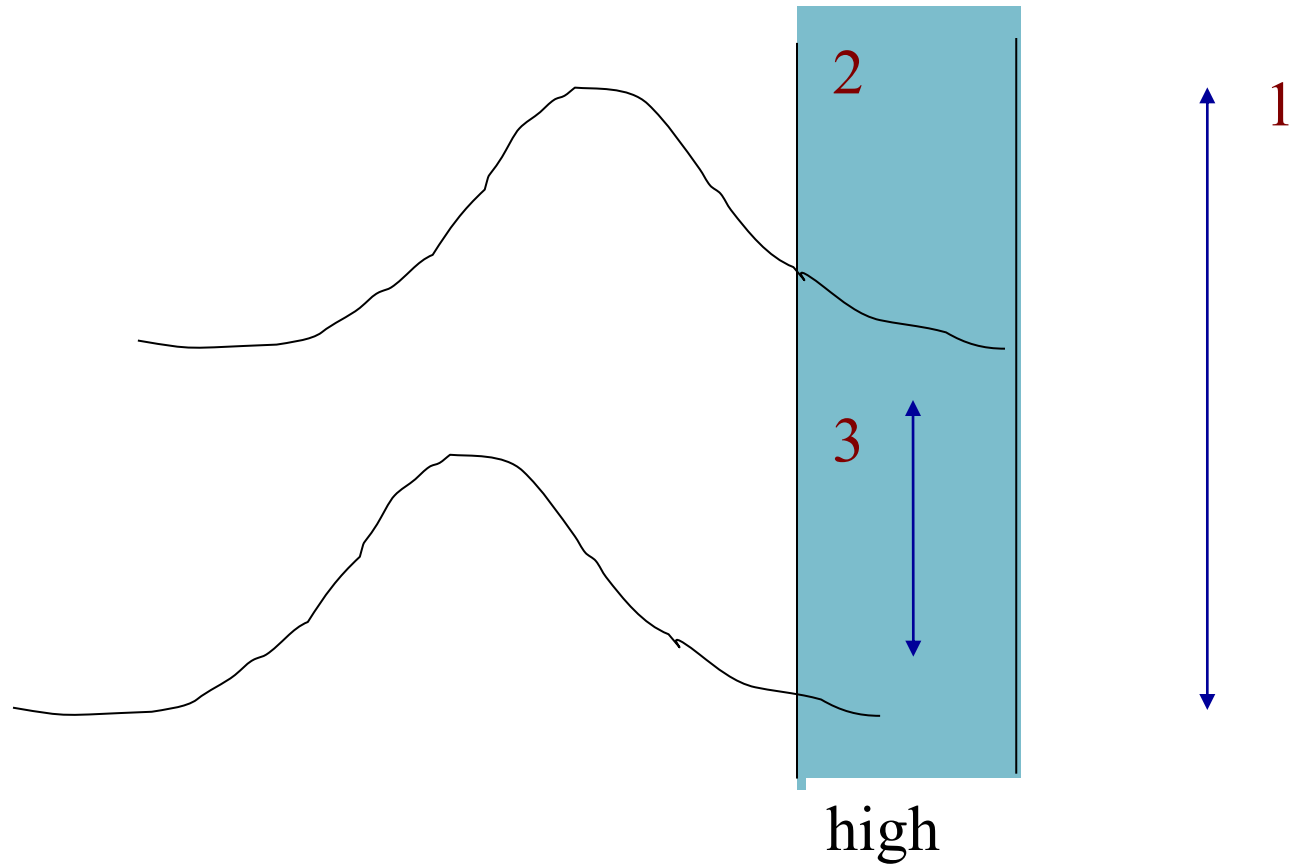


“Before there were 7 students carry 11.5 lbs compared to 3 after.”

Locating and Comparing Centers of Aggregates

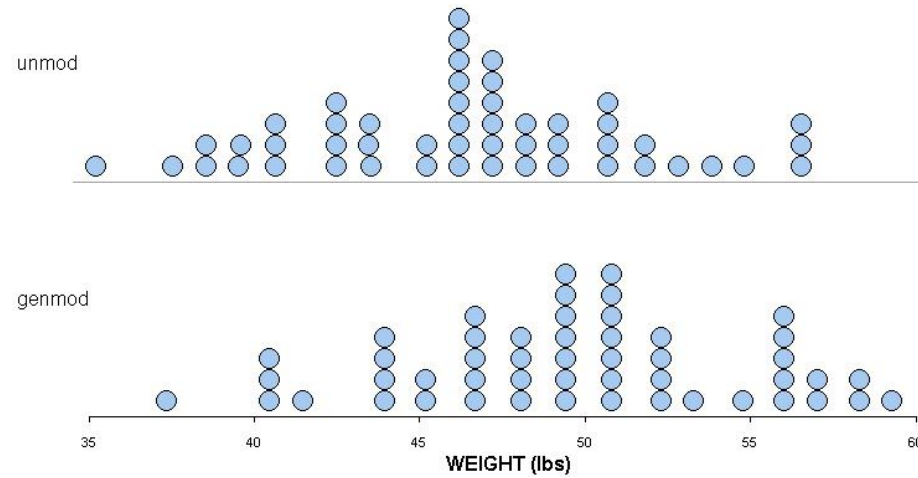


Creating and Comparing Slices/Extremes



Sample Graph Stimulus

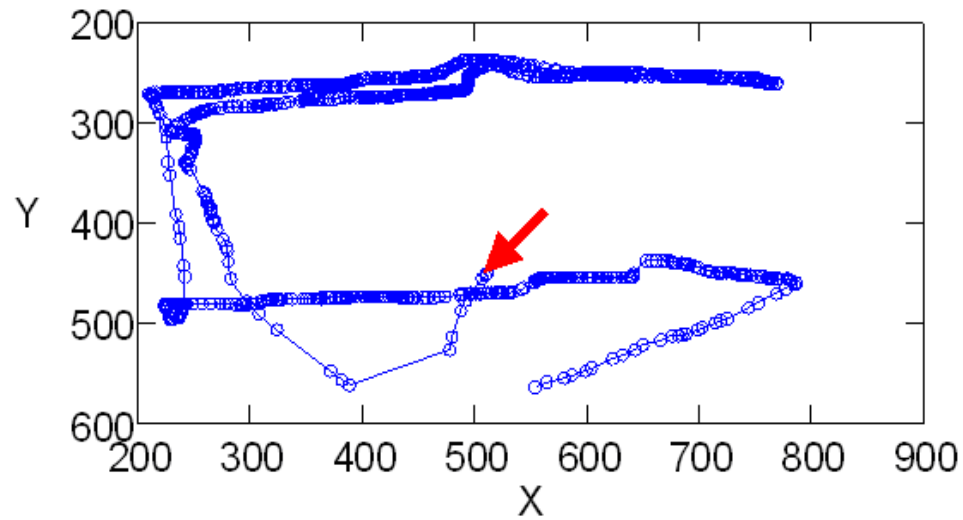
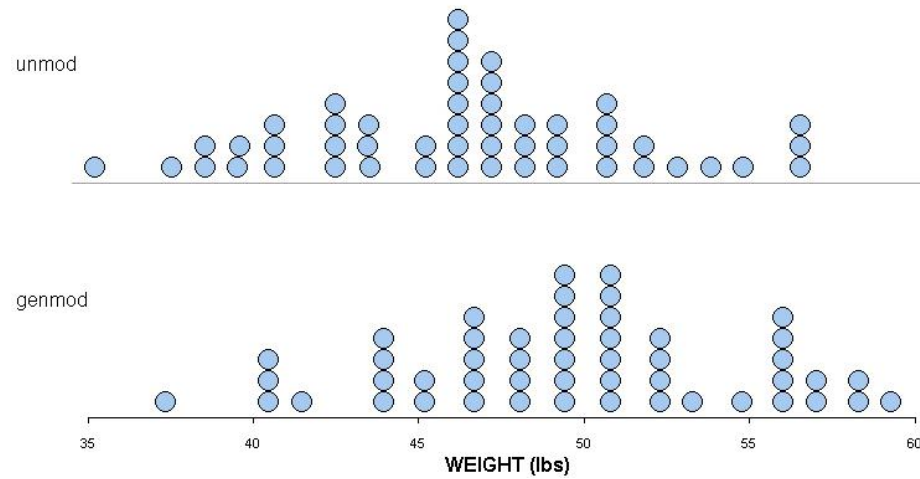
FISH



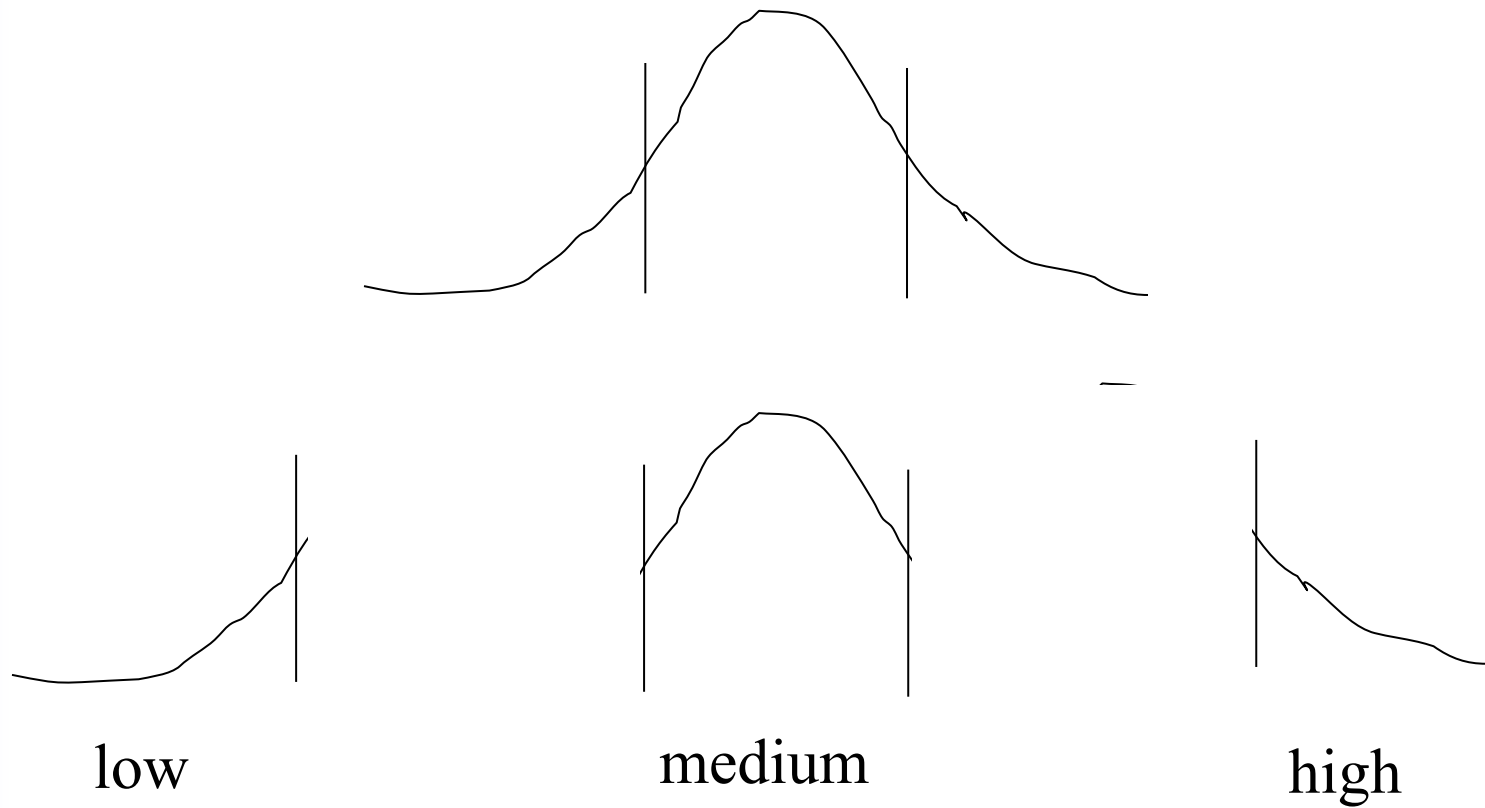
Eena Khalil, 2005 Master Thesis

Expert Scan Path

FISH

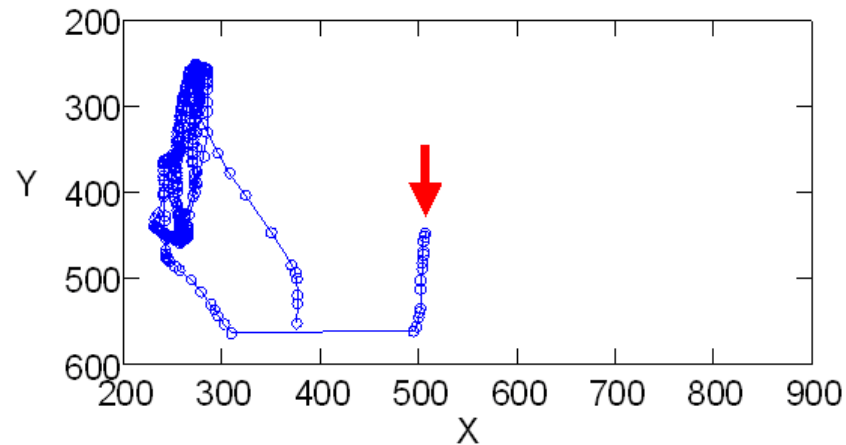
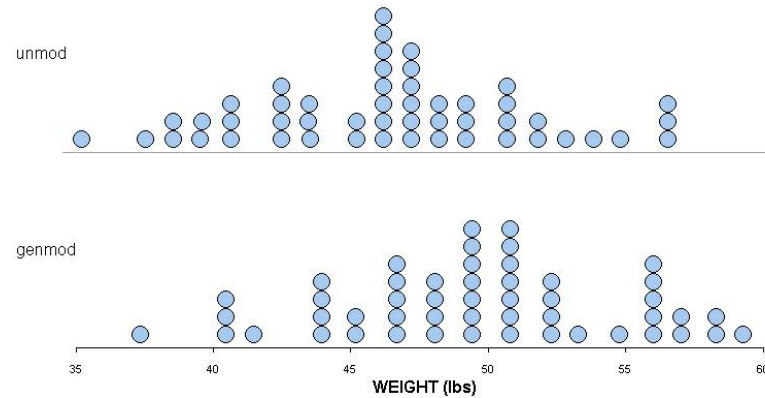


Seeing a distribution as 3 groups



Novice Scan Path: “Which group is less?”

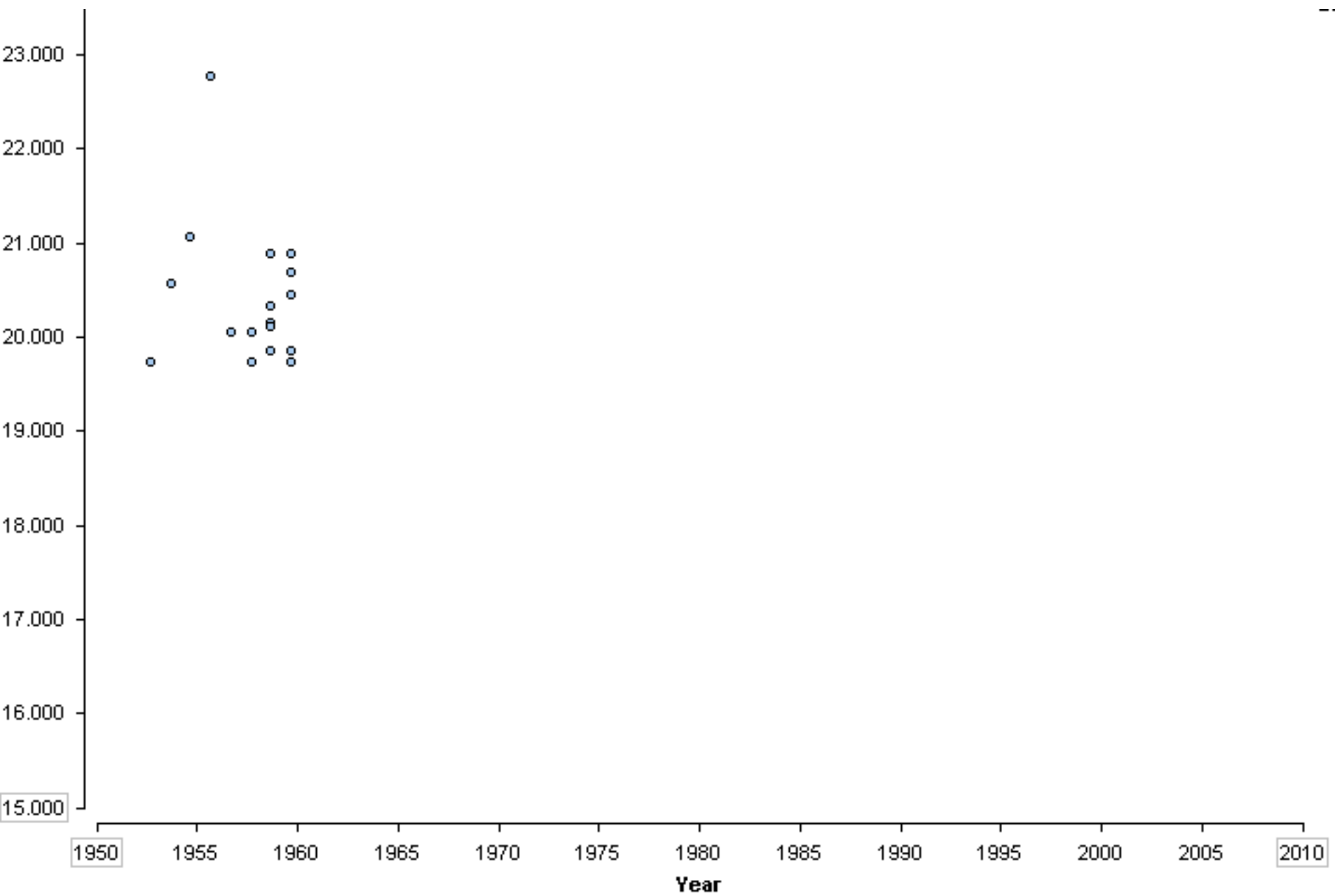
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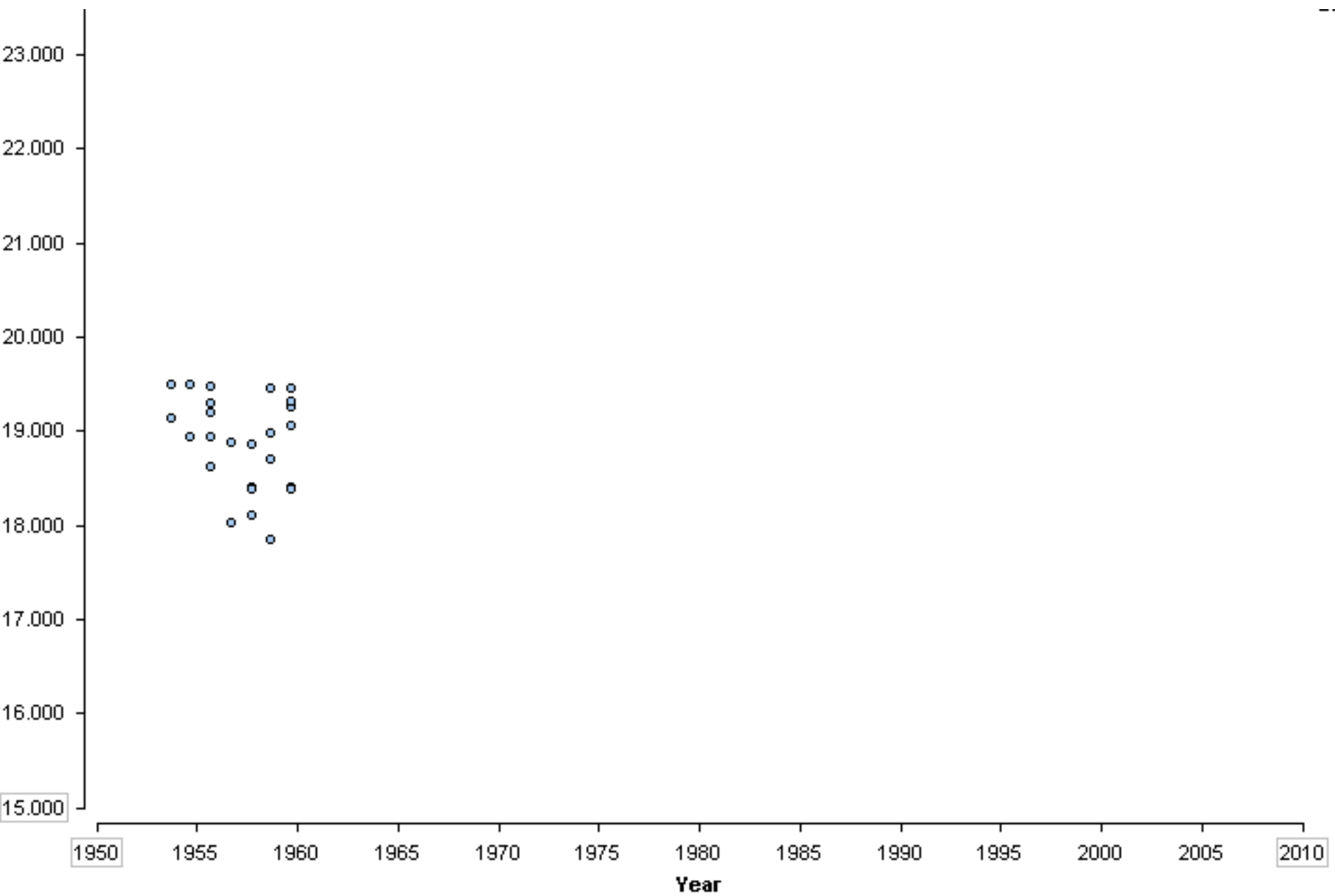


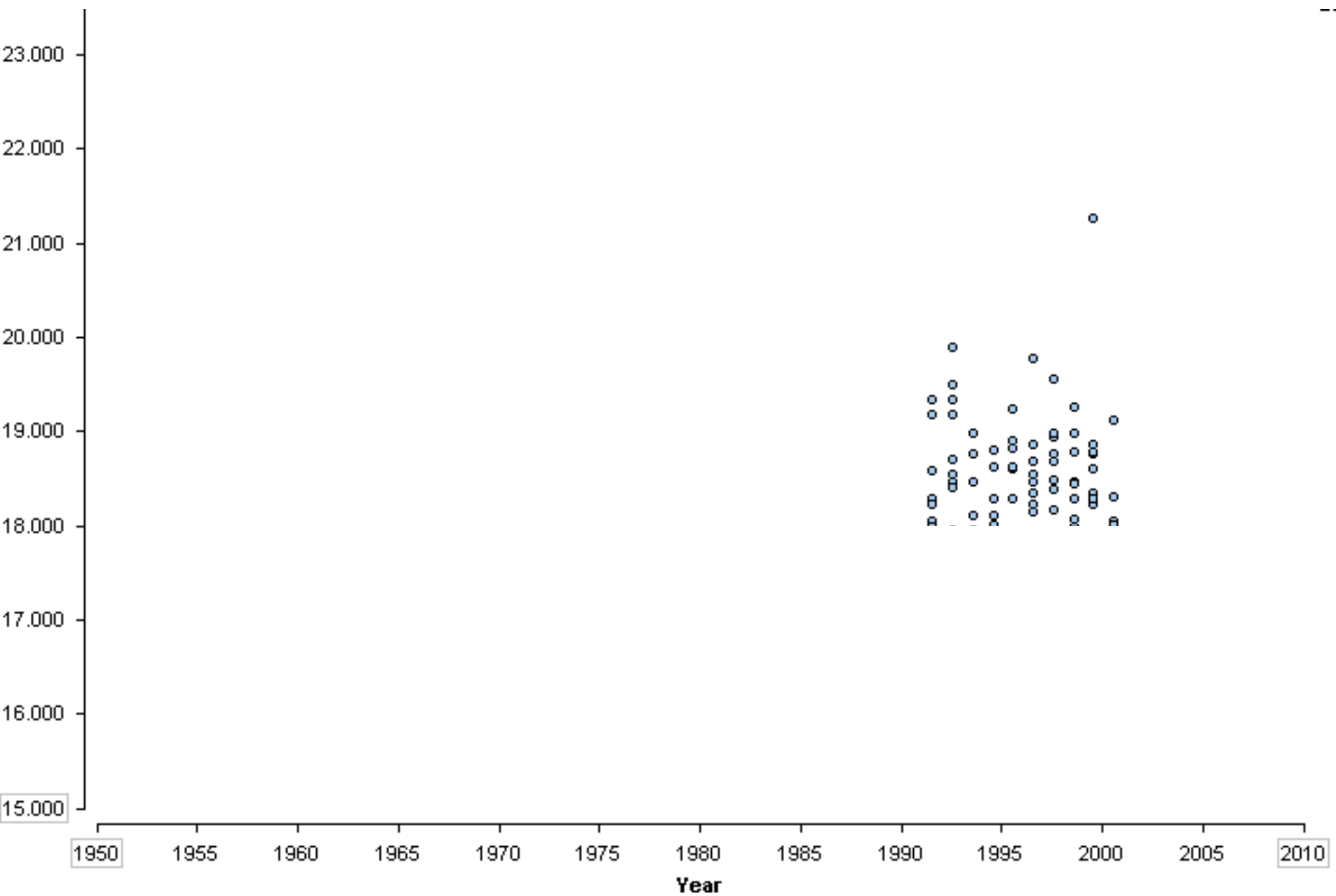
A guess about how novices look at scatterplots

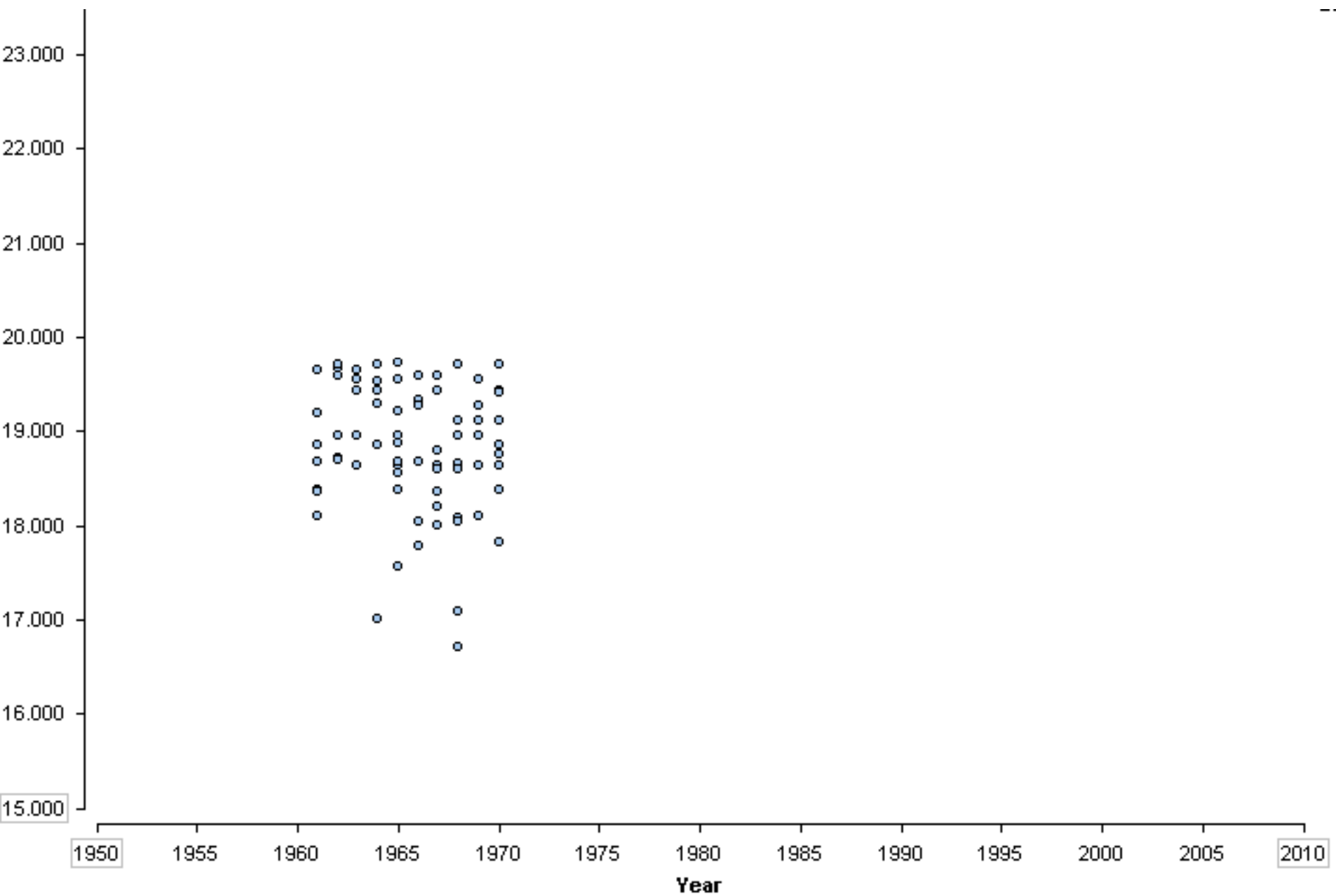


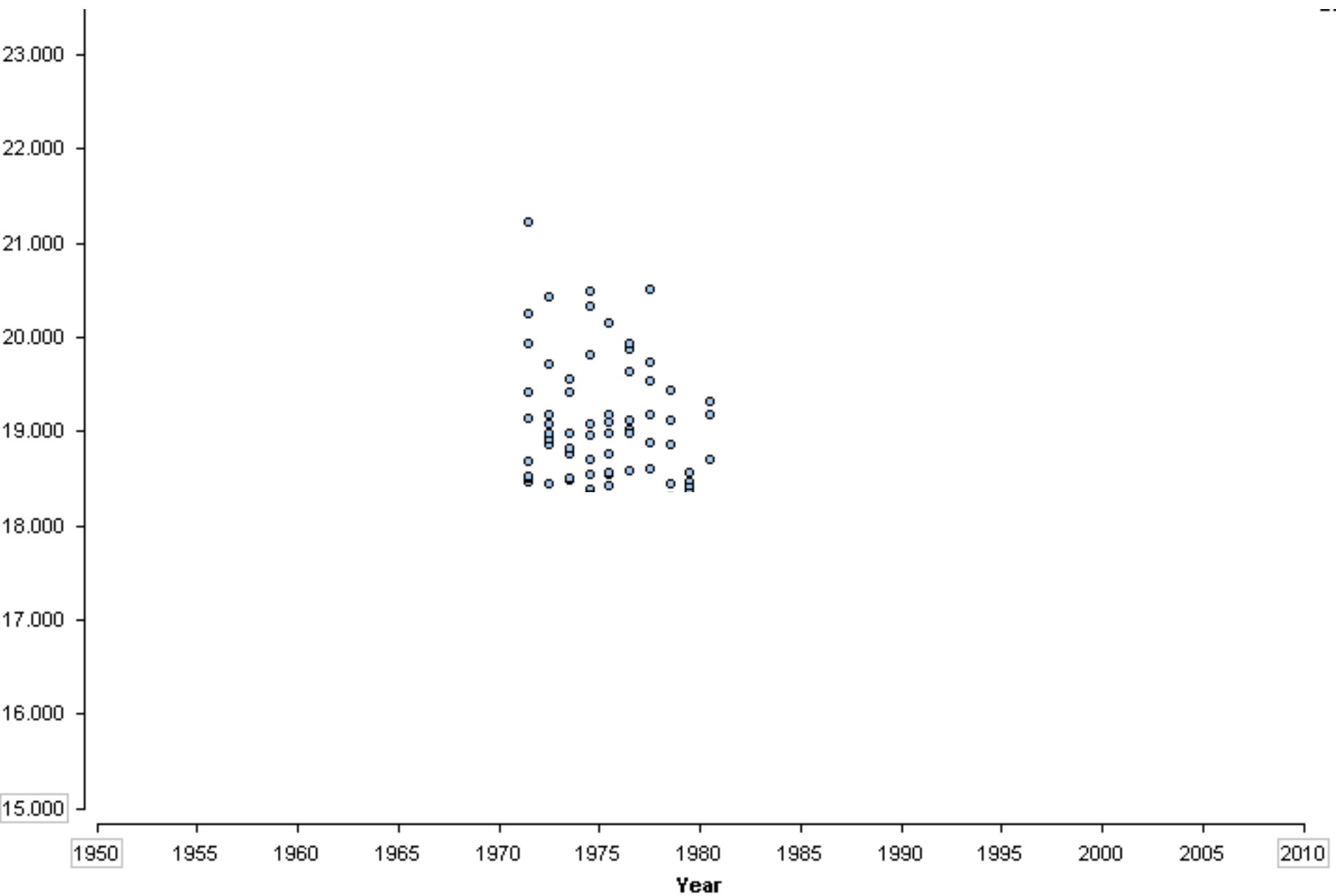


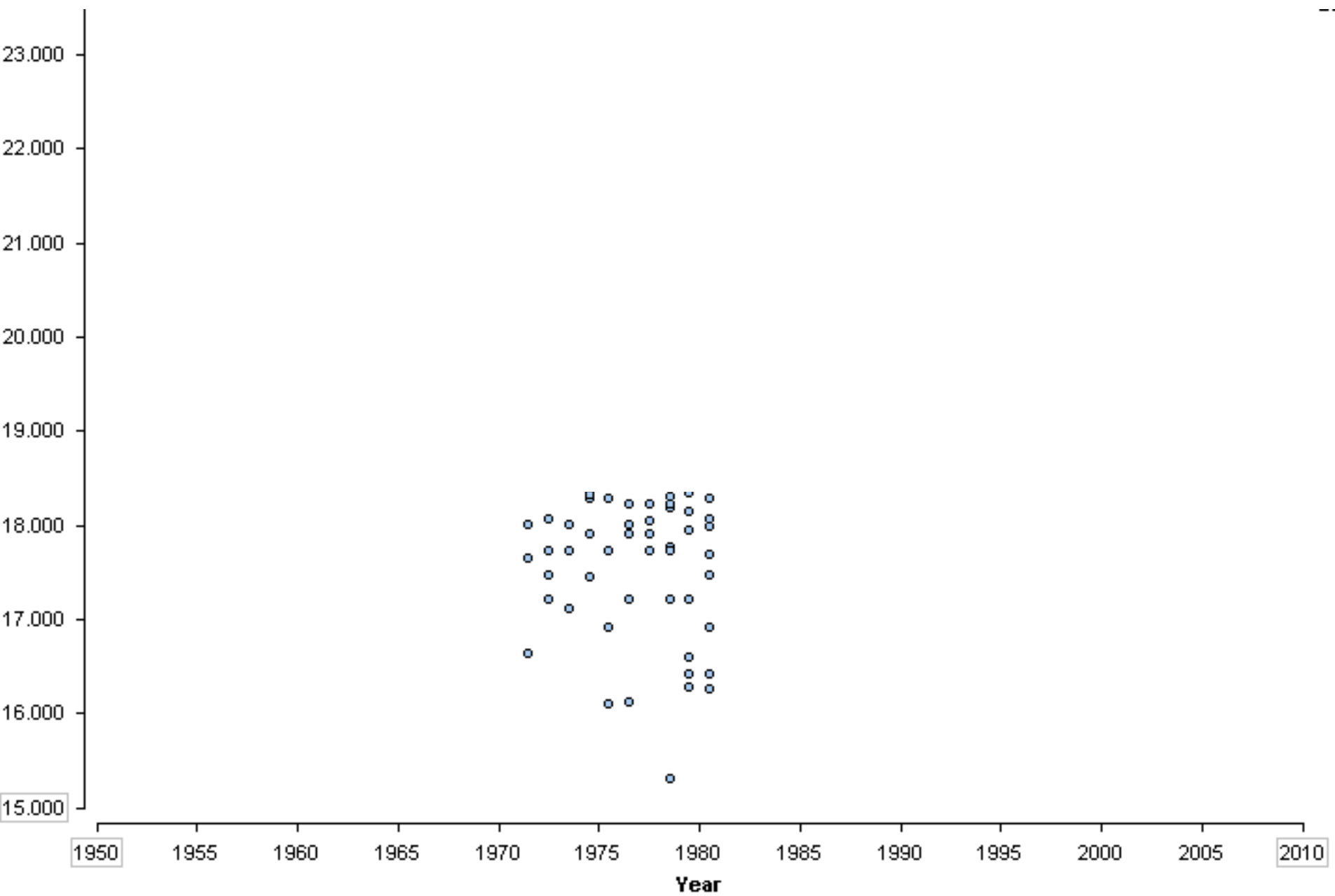


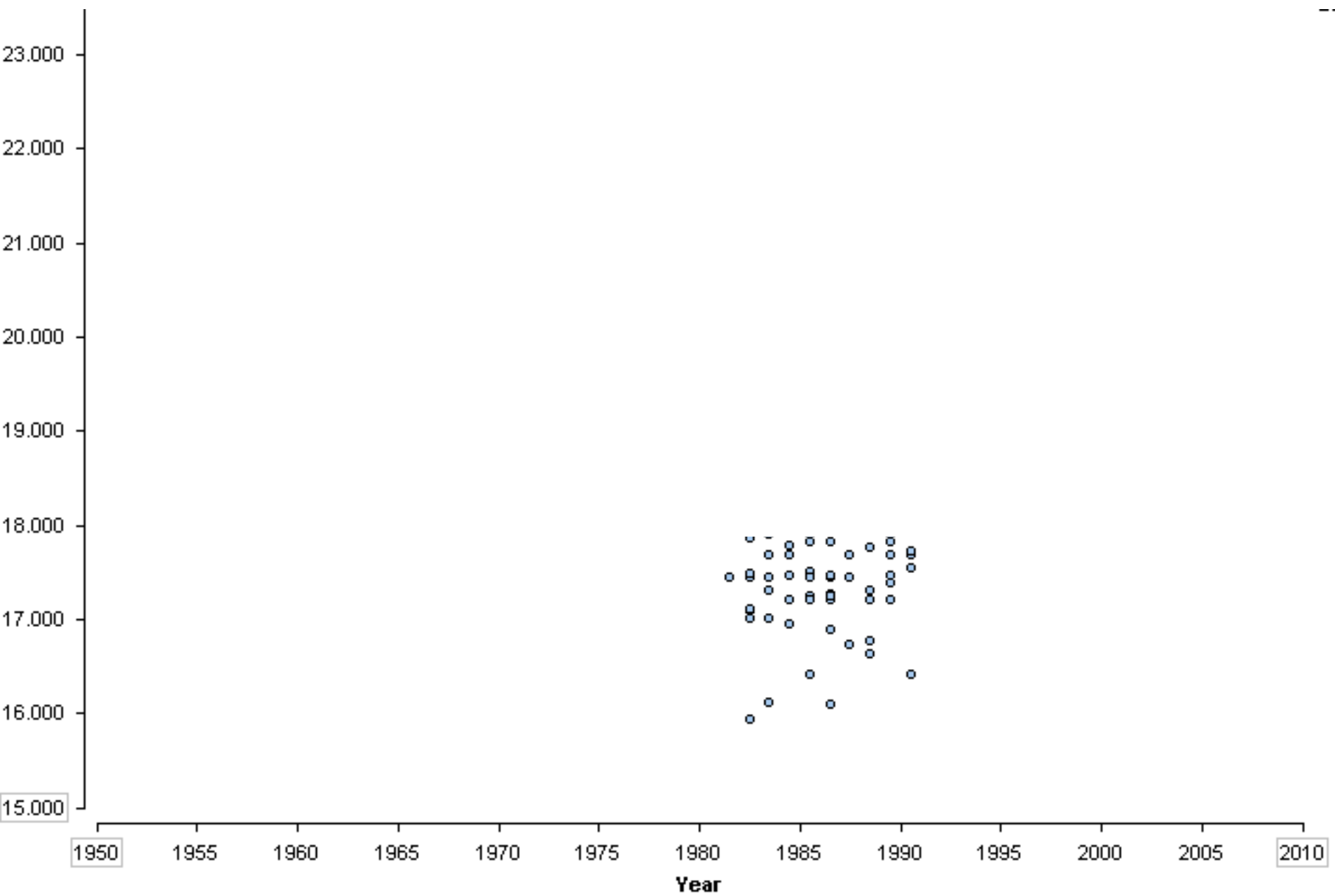


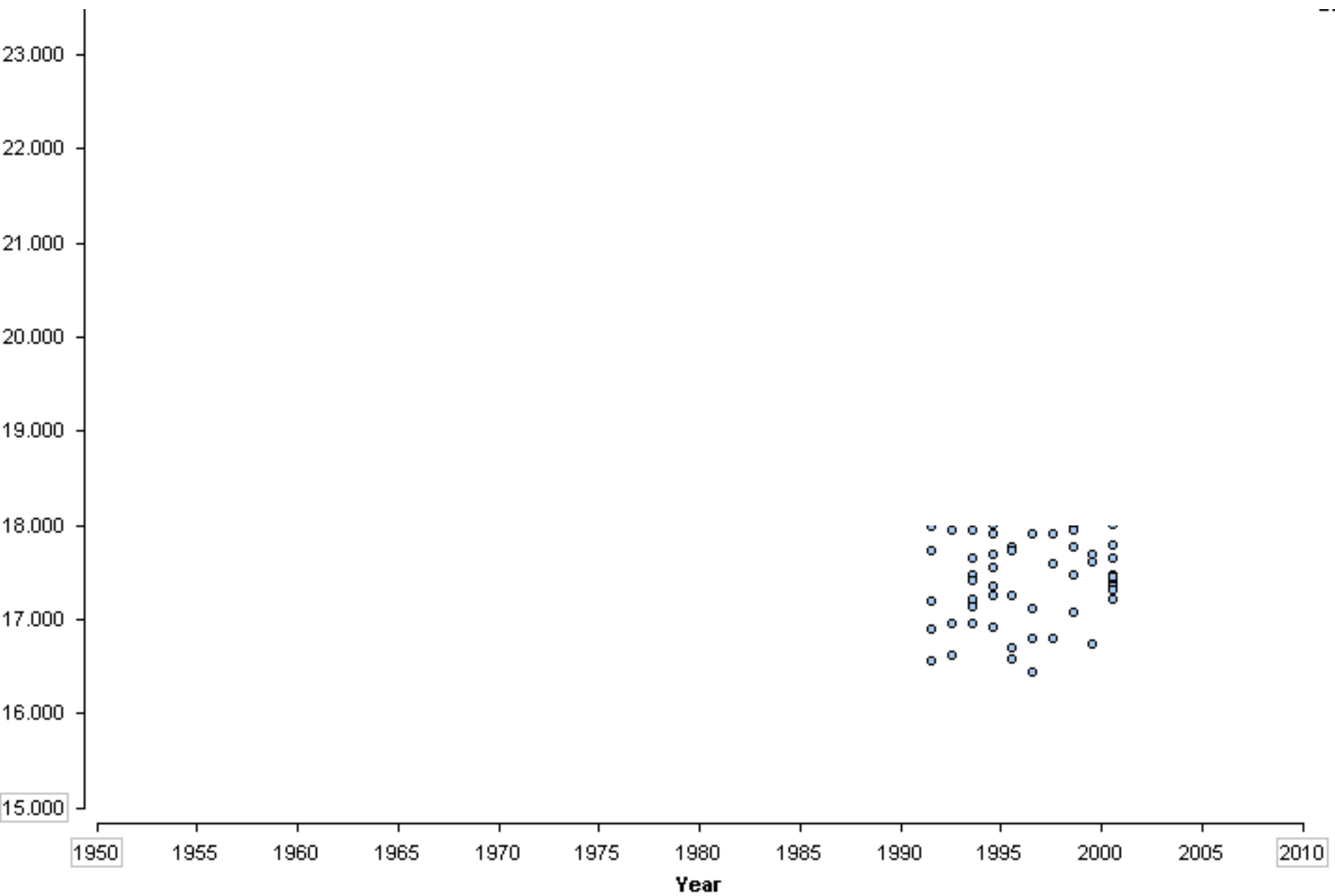




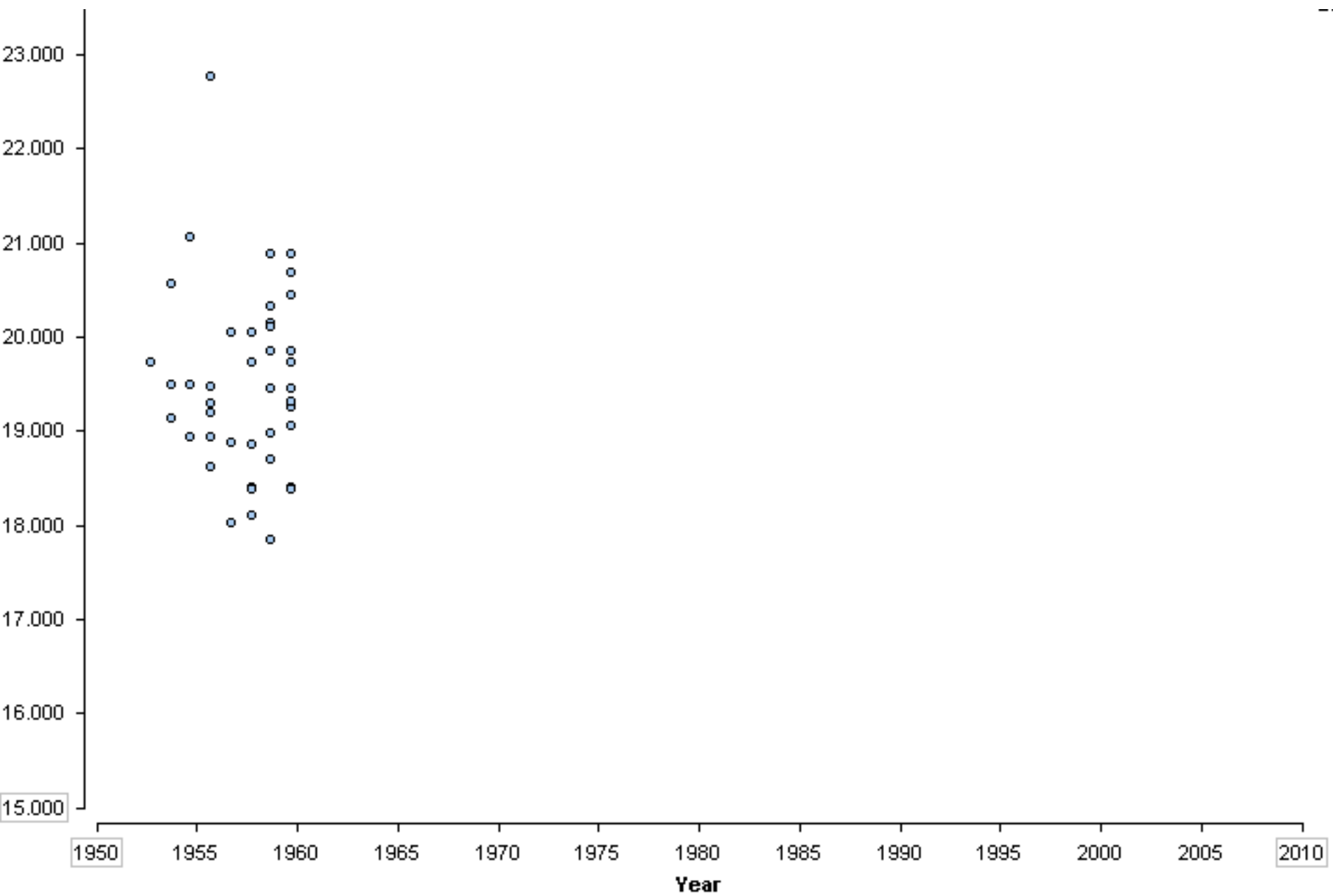


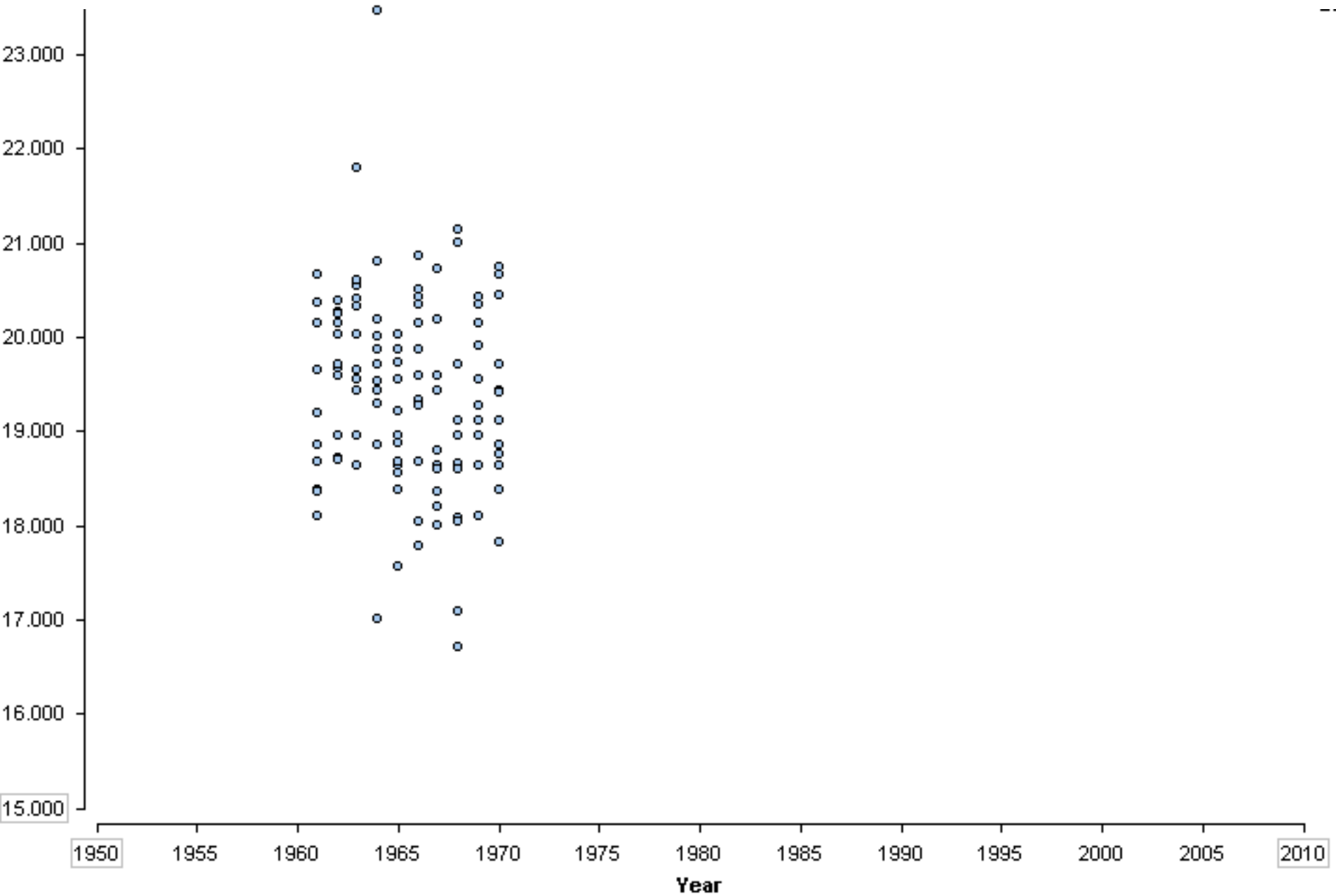


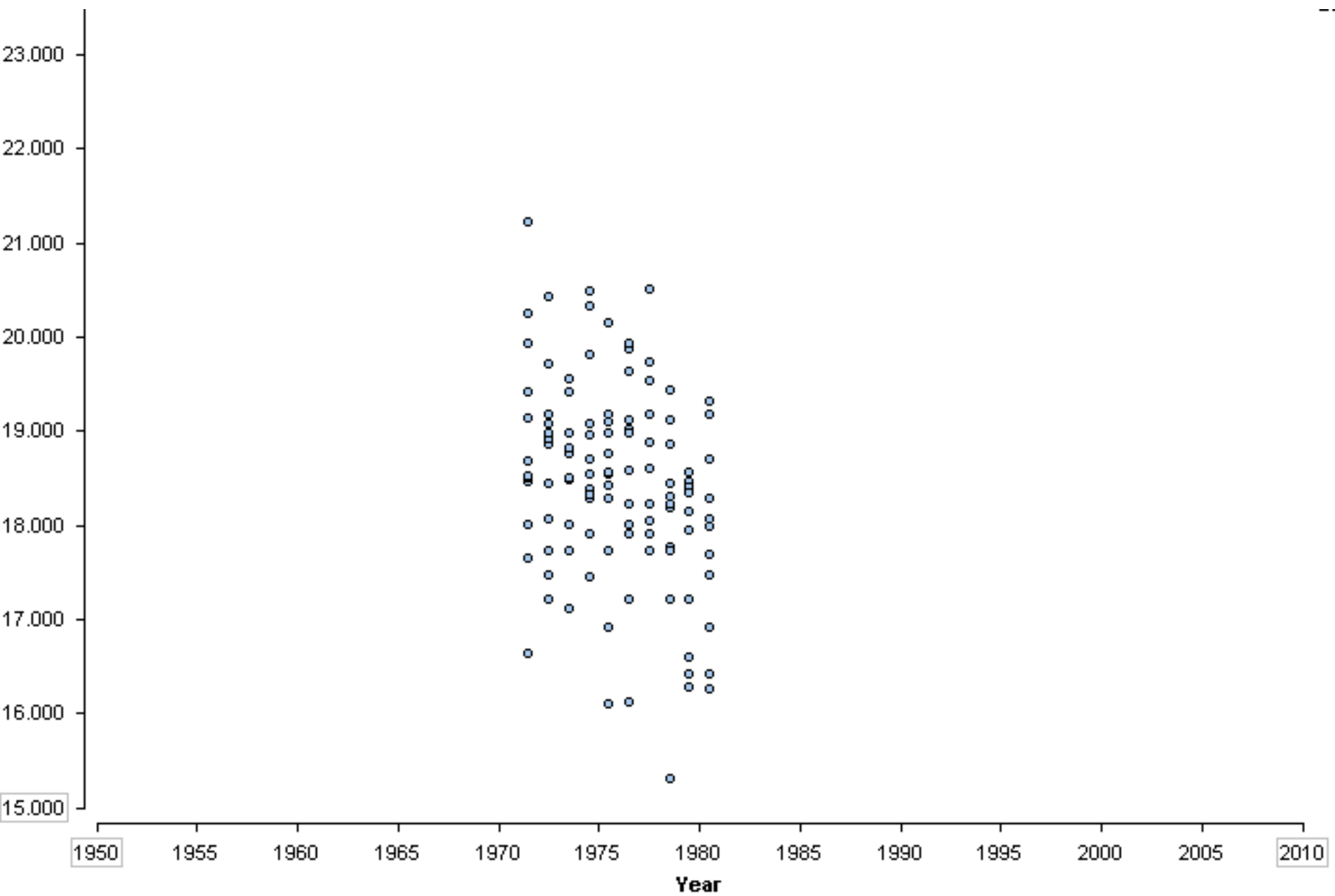


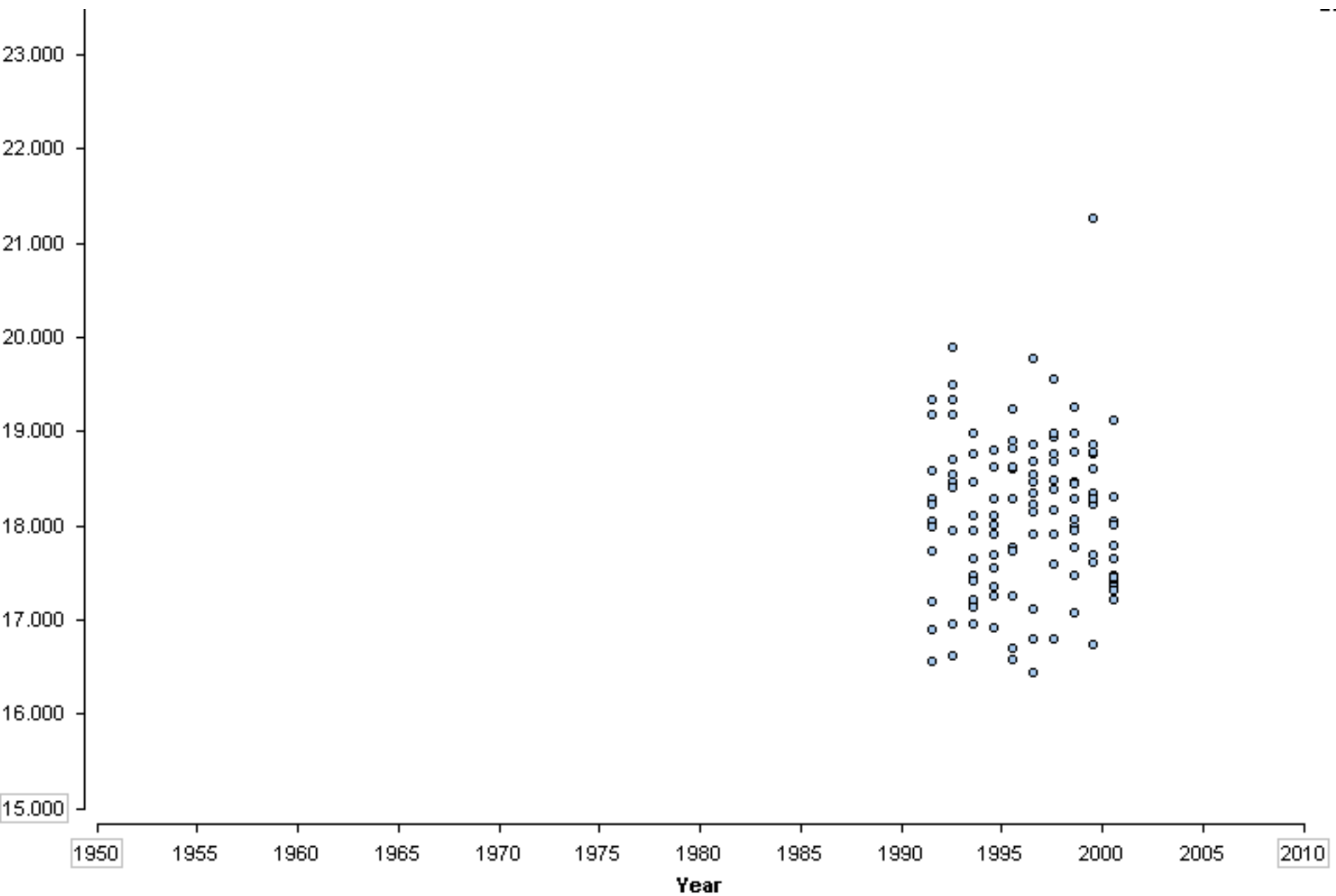


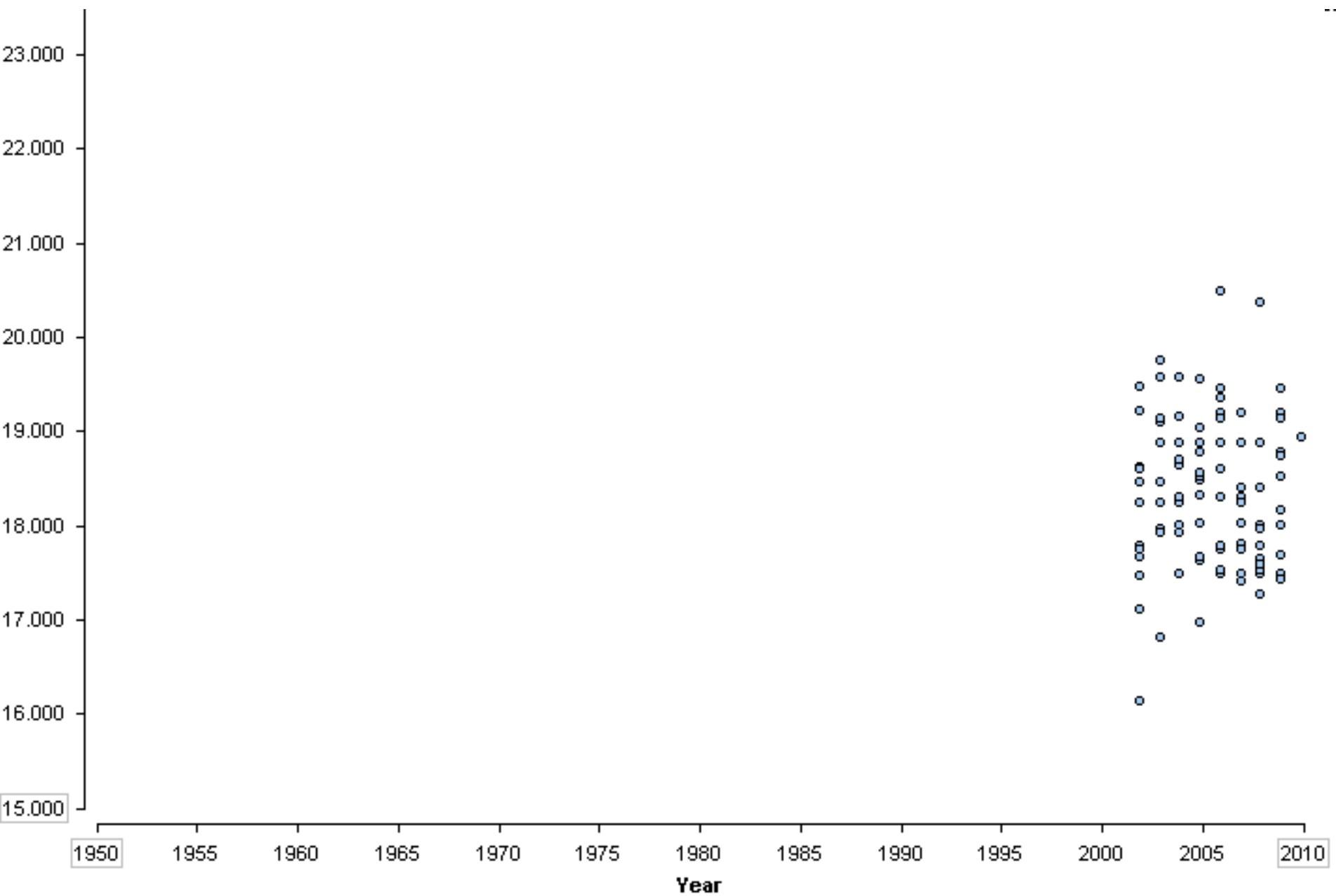
A guess about how experts look at scatterplots















TinkerPlots

Dynamic Data Explorations

Designers: Cliff Konold and Craig D. Miller
University of Massachusetts, Amherst

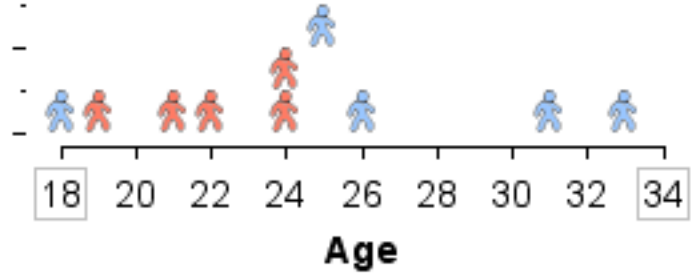
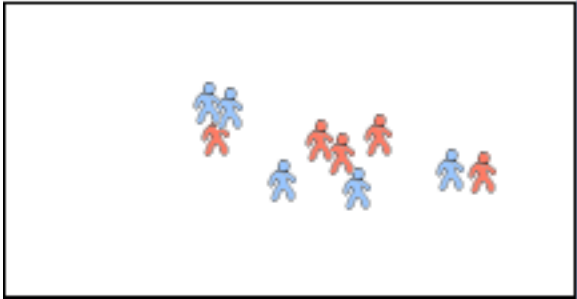
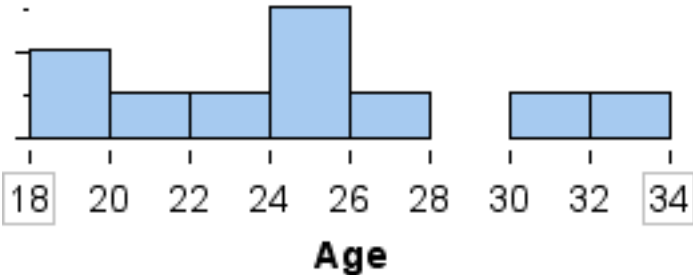
Funded by: The National Science Foundation

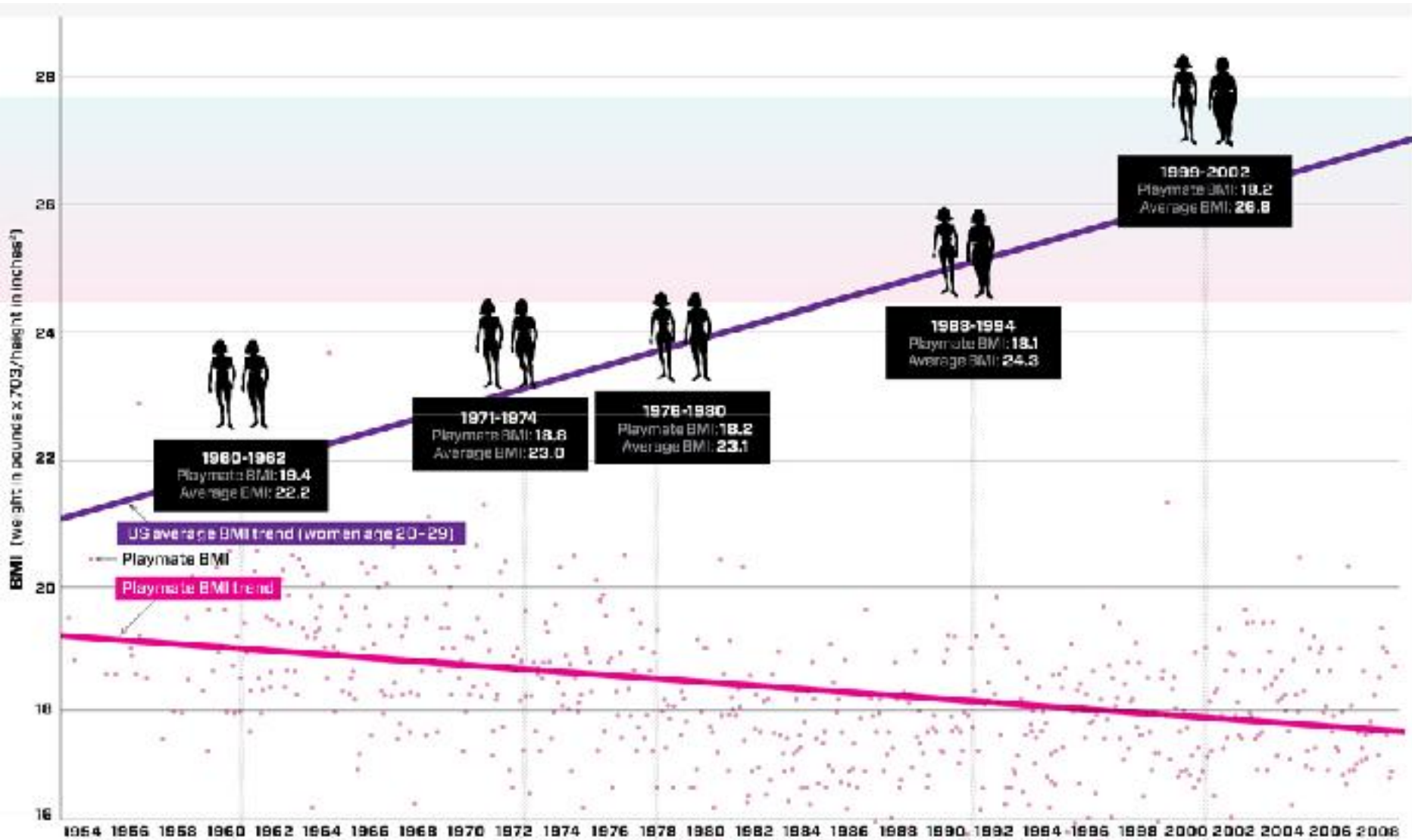
Publisher: Key Curriculum Press



CaseID	Gender	Age	H	W
1	f	21		
2	m	25		
3	m	33		
4	f	24		
5	m	26		
6	f	19		
7	m	18		
8	f	22	65.00	120
9	f	24	63.00	105
10	m	31	70.75	170

Mean m height = 69.4



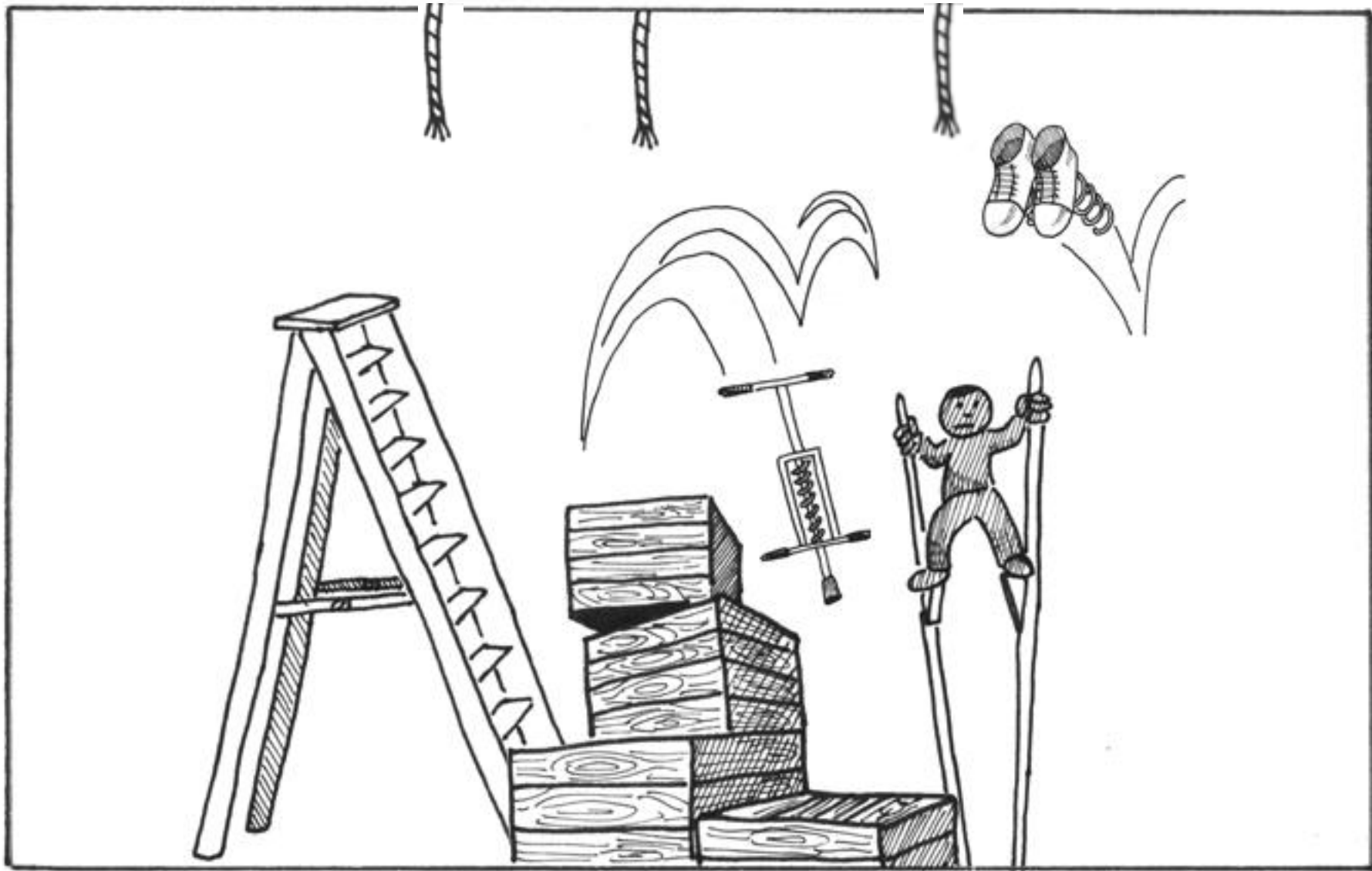


1954 1956 1958 1960 1962 1964 1966 1968 1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008

“Data are not lying around like melons on the ground to gather up and cart off to the table.”

Konold & Higgins, 2003, p. 195

“Data are ~~not~~ lying around like melons on the ground to gather up and cart off to the table.”



“... **a wise man** who built his house on rock. The rain fell, the floods came... but it did not fall, because it had been founded on rock.

...**a foolish man** who built his house on sand. The rain fell, and the floods came... and it fell — and great was its fall!”

Matthew 7:24-27

... **a foolish man** who built his house on rock.
Change came... but it did not fall, because it had
been founded on rock.

... **a foolish man** who built his house on rock.
Change came... but it did not fall, because it had
been founded on rock.

...**a wise man** who built his house on sand. Change
came... and it fell. Great, he said! Let's quick build
another.

Konold, ICOTS 8

