Chapter 1: Introduction

STAT 371

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Let's start off with...

"**Statistics** is a **Science** , not a branch of mathematics, but uses mathematical models as essential tools. "

-John Tukey

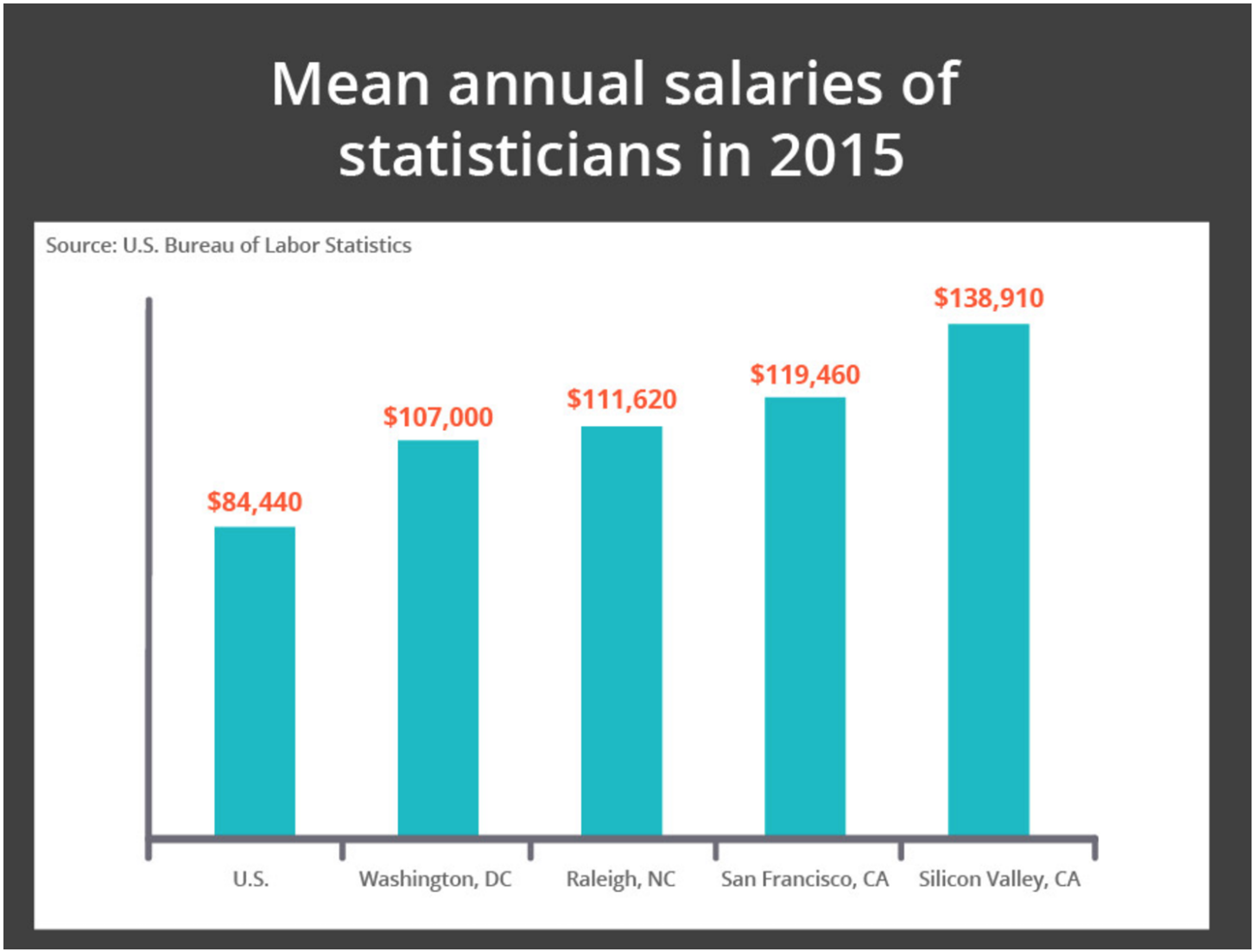
Outline

Why you need to study statistics

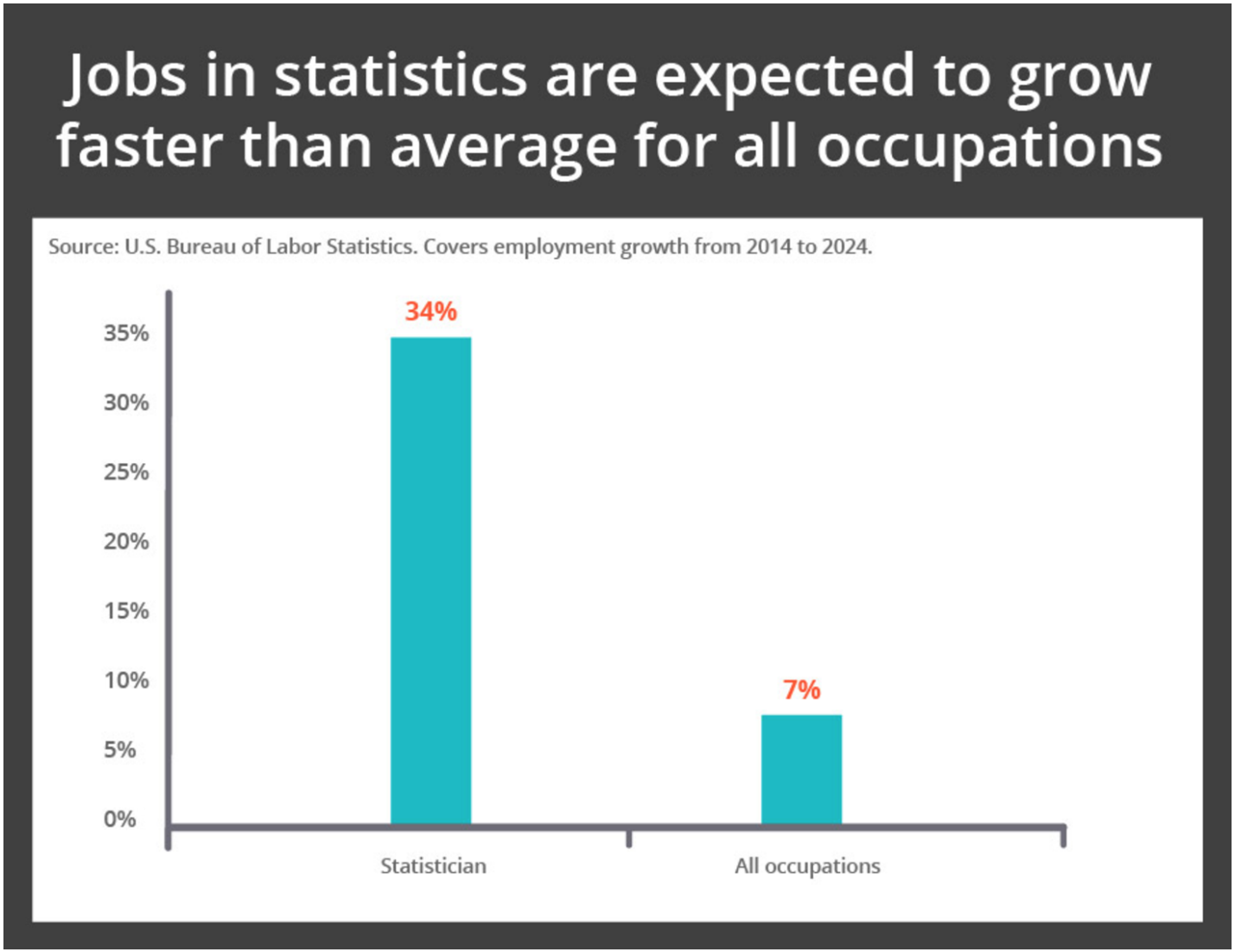
1. Make a difference.
   Statisticians contribute to society in many ways, from protecting endangered species and managing the impacts of climate change to making medicines more effective and reducing hunger and disease.
2. Have fun.
   After learning statistics, you could help professional sports teams pick the next season's new players, or a member of the data science team of a U.S. presidential campaign.
3. Make money.
   Demand for statisticians is growing, and so are their salaries. The median salary for data scientists with less than three years of experience is $\$80,000$, and $\$150,000$ for those with nine or more years of experience.

Outline

Let's look at some statistics



Let's look at some statistics, cont'd



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"Assuming that the men and women were on the whole equally well qualified (and there is no evidence to the contrary), the difference in admission rates looks like a strong piece of evidence to show that men and women are treated differently in the admissions procedure."

Sex Bias in Graduate Admissions, cont'd

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Major	No. Applicants	% Admitted	No. Applicants	% Admitte
A	825	62	108	82
B	560	63	25	68
C	325	37	593	34
D	417	33	375	35
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Over 50% of men in this table applied to Majors A + B. Over 90% of women applied to Majors C-F.

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When confronted with statistical data, it is often a good exercise to ask: are there any other explanations for these data that aren't being taken into consideration?

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2. Determining if and to what extent patterns observed in data are "real," and generalize to a larger context. This is known as **Inferential Statistics.** In inferential statistics, the data form a **sample**, a smaller subset of some well-defined collection of things called a **population**. The idea is to use the sample to learn about the population–the process of inference.

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- Categorical: data that aren't numbers.

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- The ability to carry out simple analyses using a statistical computing package.
- You won't leave fully fledged data analysts, but you will leave prepared to learn more about the discipline.