



“Significance” and Why Large Samples Confuse:

Can You Tell When a Finding Is Significant?

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Introduction

Statistically significant results are those that would be unusual if they occurred merely by chance.

For example, such results might be

- group differences
or
- relationships between variables

that go beyond what chance would typically produce.

Introduction

Sometimes results that are **statistically significant** (judged by low p -values) are those that are *systematic* or *consistent* throughout a large data set.

They are **not necessarily large differences or strong relationships!**

Large data sets often cause us to mistake statistically significant findings for those that are **practically significant** – those large enough to matter.

Both types of significance involve subjective decisions!

Group Differences

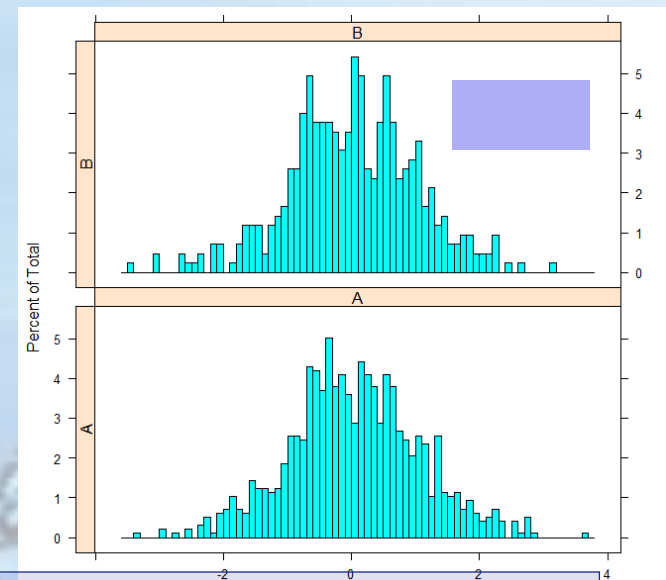
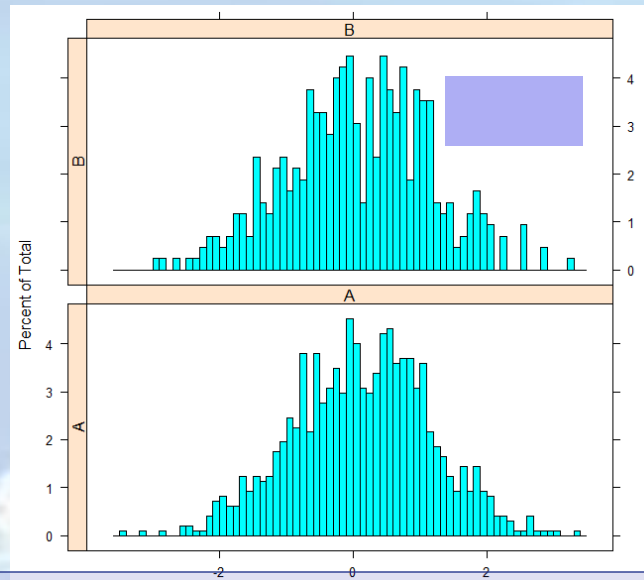
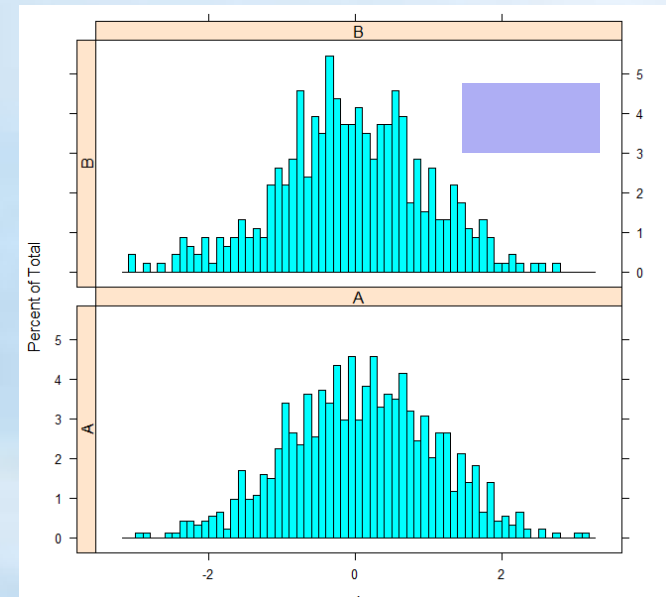
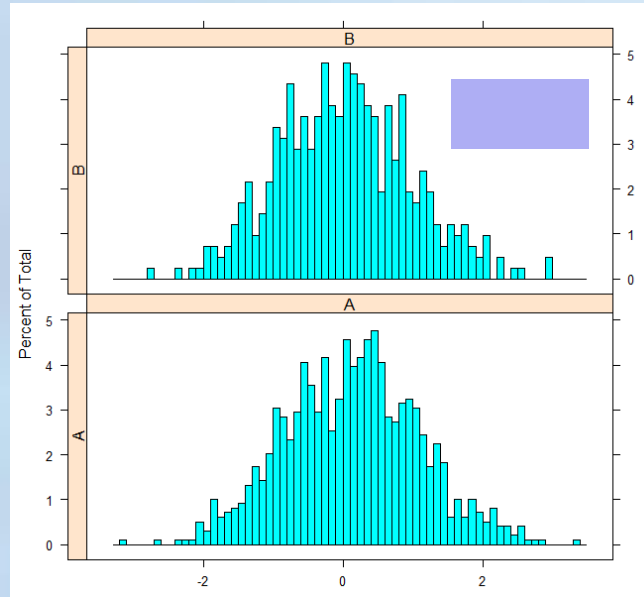
Each N = 1,400

1. Do any of these 4 panels show practically significant group differences, A vs. B?

2. Can you detect which panels show statistically significant T-test results, with $p \leq .01$?

When ready, advance slide to see the p -values.

How many can you correctly identify?

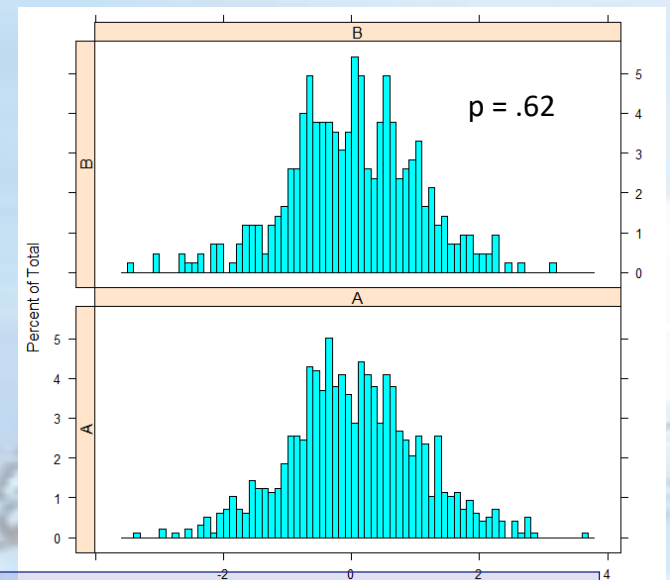
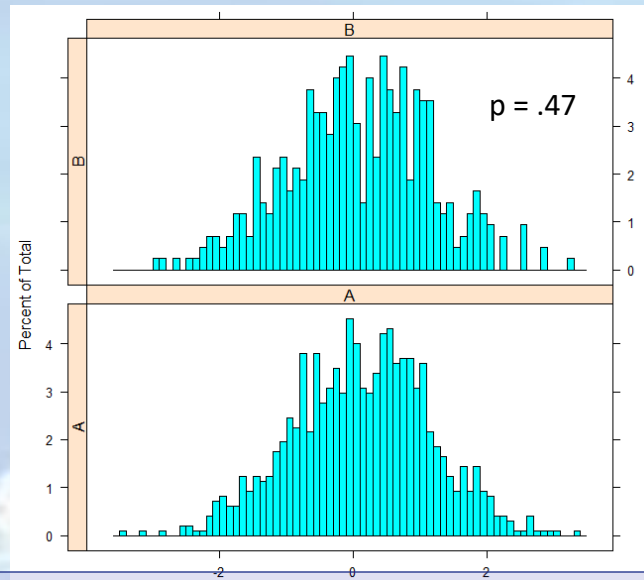
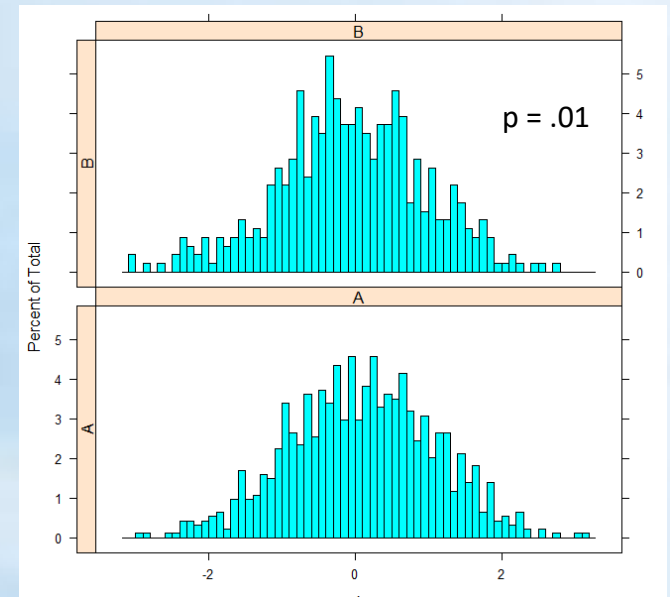
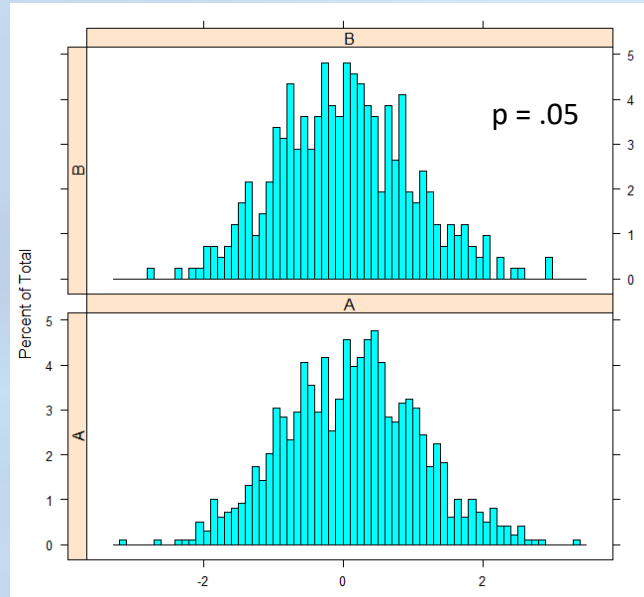


Group Differences

Each N = 1,400

Here we have advanced to see the p -values.

How many did you correctly identify?



Relationships

Each N = 1,400

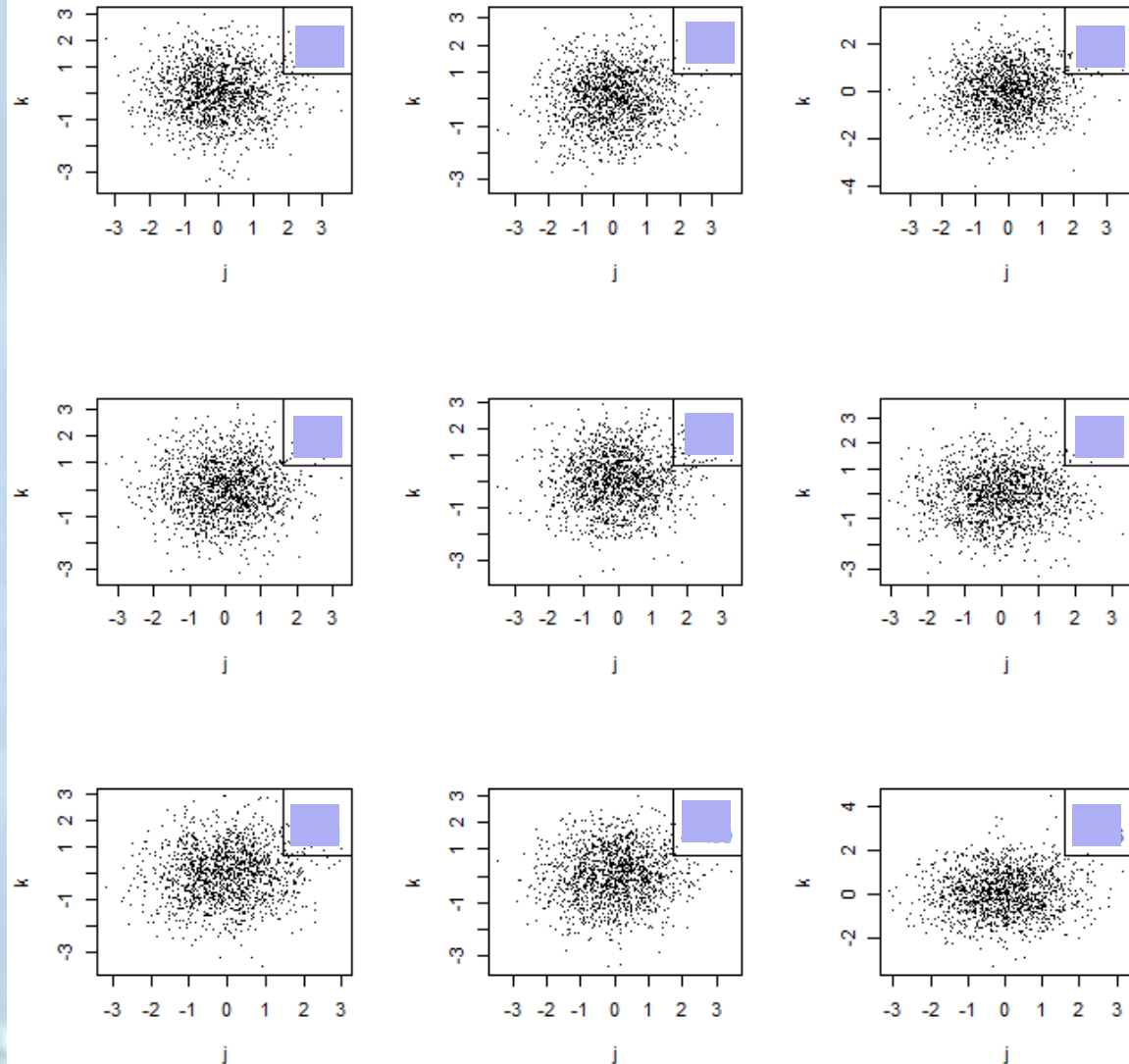
1. Do any of these 9 panels show a meaningful linear relationship?

2. Can you detect the statistically significant correlations, with $p \leq .01$?

When ready, advance to see the p-values.

(A rounded " $p = .00$ " indicates $p < .005$.)

How many can you correctly identify?



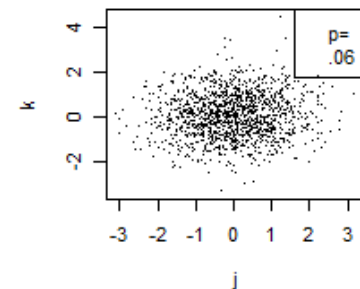
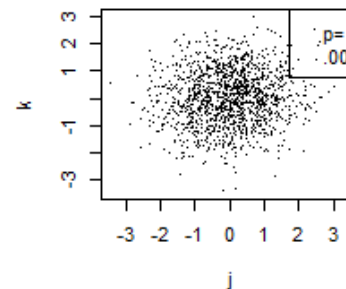
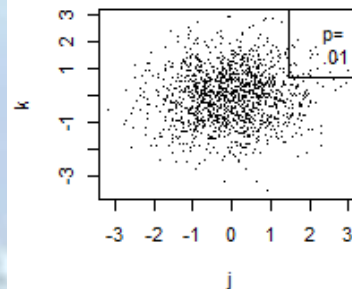
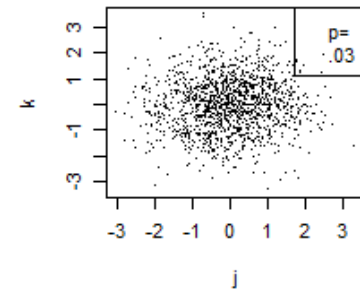
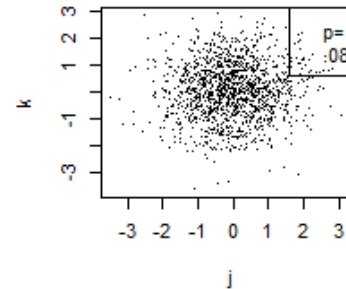
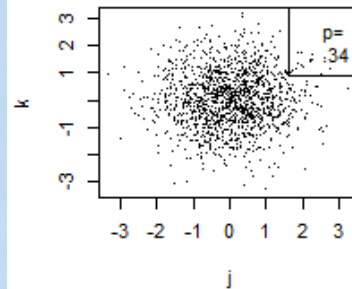
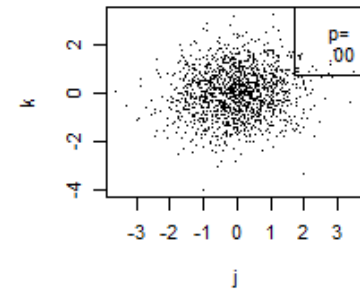
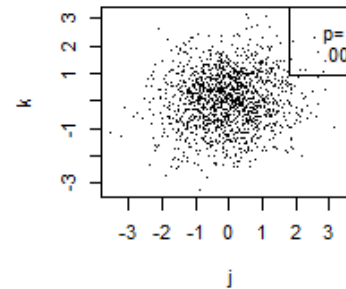
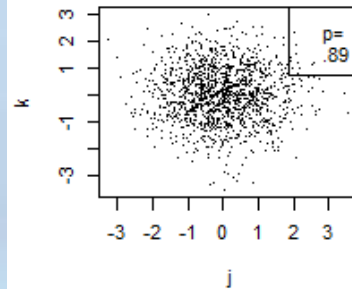
Relationships

Each N = 1,400

Here we have advanced to see the p-values.

(A rounded " $p = .00$ " indicates $p < .005$.)

How many did you correctly identify?



Takeaways

With large samples and very small effects:

- Visually, people often fail to distinguish chance effects from systematic ones.
- Findings invisible to the naked eye may nevertheless be statistically significant, and vice versa.

Thus, results may well go beyond what chance would normally produce, while still being of no consequence.

Takeaways

Practical and statistical significance each involve subjective judgments.

Statistically significant connections (or differences) without practical significance may be **meaningless**.

Practically significant connections without statistical significance may be merely the **result of chance**.

Important connections are those judged significant in both respects.