PLANNING RESEARCH THAT ACCOUNTS FOR BUSINESS AND STATISTICAL RISK

Tom Carr, Carr Consulting

Jeannine Dzuroska, Symrise, Inc.

AGENDA

STATISTICAL RISKS – TOM CARR, CARR CONSULTING

BUSINESS RISKS – JEANNINE DZUROSKA, SYMRISE, INC.

STATISTICAL RISKS IN SENSORY RESEARCH

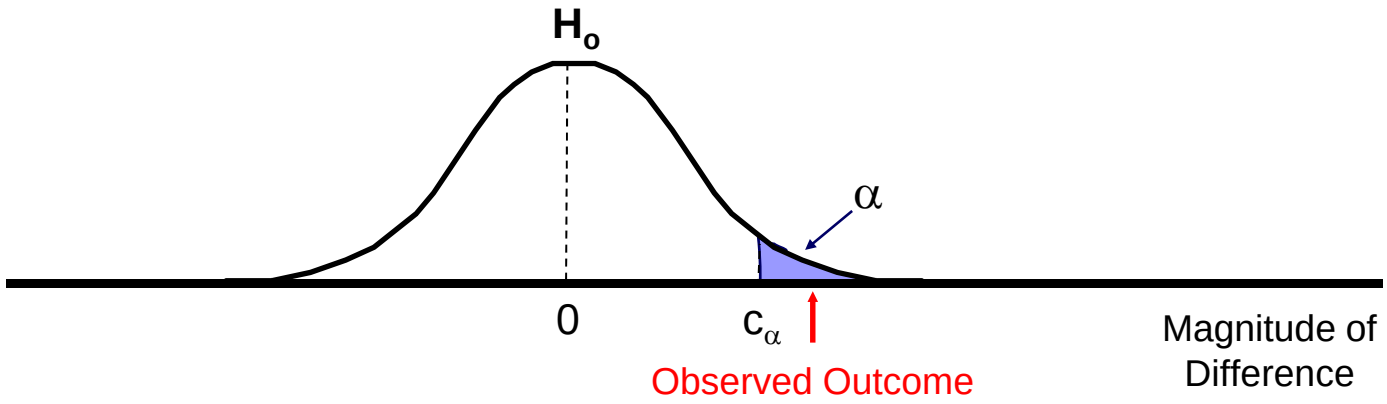
Tom Carr, Carr Consulting

TWO INCORRECT CONCLUSIONS CAN HAPPEN IN SENSORY RESEARCH

- Concluding that a difference exists when it does not.
- Failing to detect a difference that is present.

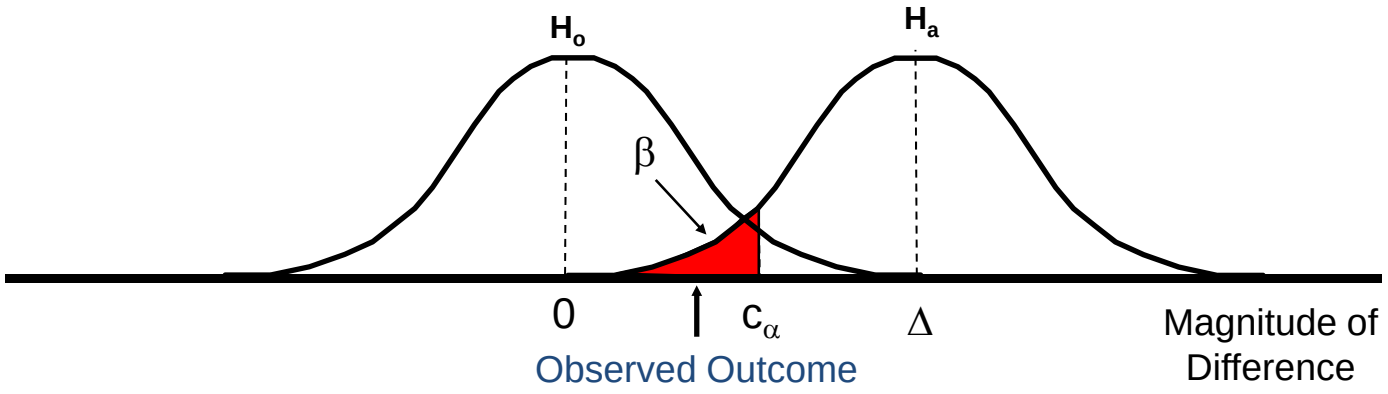
THE “FALSE POSITIVE”

- Concluding that a difference exists when it does not.
  - Type I Error, with associated probability, α.
  - No difference is present but an extremely unlikely outcome is observed in the study.
  - Leads to the incorrect conclusion that the samples are different.
- More important in developmental research.
  - Do not want to claim an improvement when there is not one.



THE “FALSE NEGATIVE” (?)

- Failing to detect a difference that is present.
  - Type II Error with associated probability β and effect size Δ.
  - Outcome does not appear to be particularly extreme for the case when no difference is present.
  - Leads to the incorrect conclusion that the samples are not different.
- More important in product maintenance.
  - Do not want to miss that the cost-reduced prototype is perceptibly different or less liked than the control.

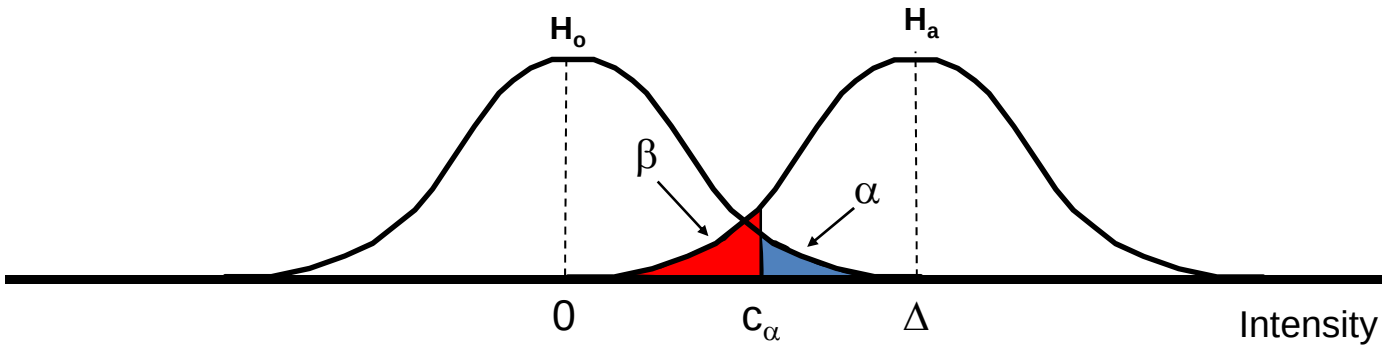


CONTROLLING STATISTICAL RISKS

- An adequately sensitive study is one that has acceptable levels of:
  - Δ: How big of a difference makes a difference?
  - β: What chance are will willing to take of missing a difference as big or bigger than Δ?
  - α: What chance are we willing to take of claiming that there is a difference when there is not?
- Δ is difficult to specify because we typically do not know the size of the difference that impacts consumer behavior.
  - Typically set arbitrarily, e.g., 0.5 units on the 9-point liking scale or 25% discriminators in a difference test.
- Ideally, $\alpha/\beta \sim Cost_{\beta}/Cost_{\alpha}$, but we seldom know both costs.
  - Typically set by firm's historical practice, e.g., $\alpha = 0.05$, $\beta = 0.20$.

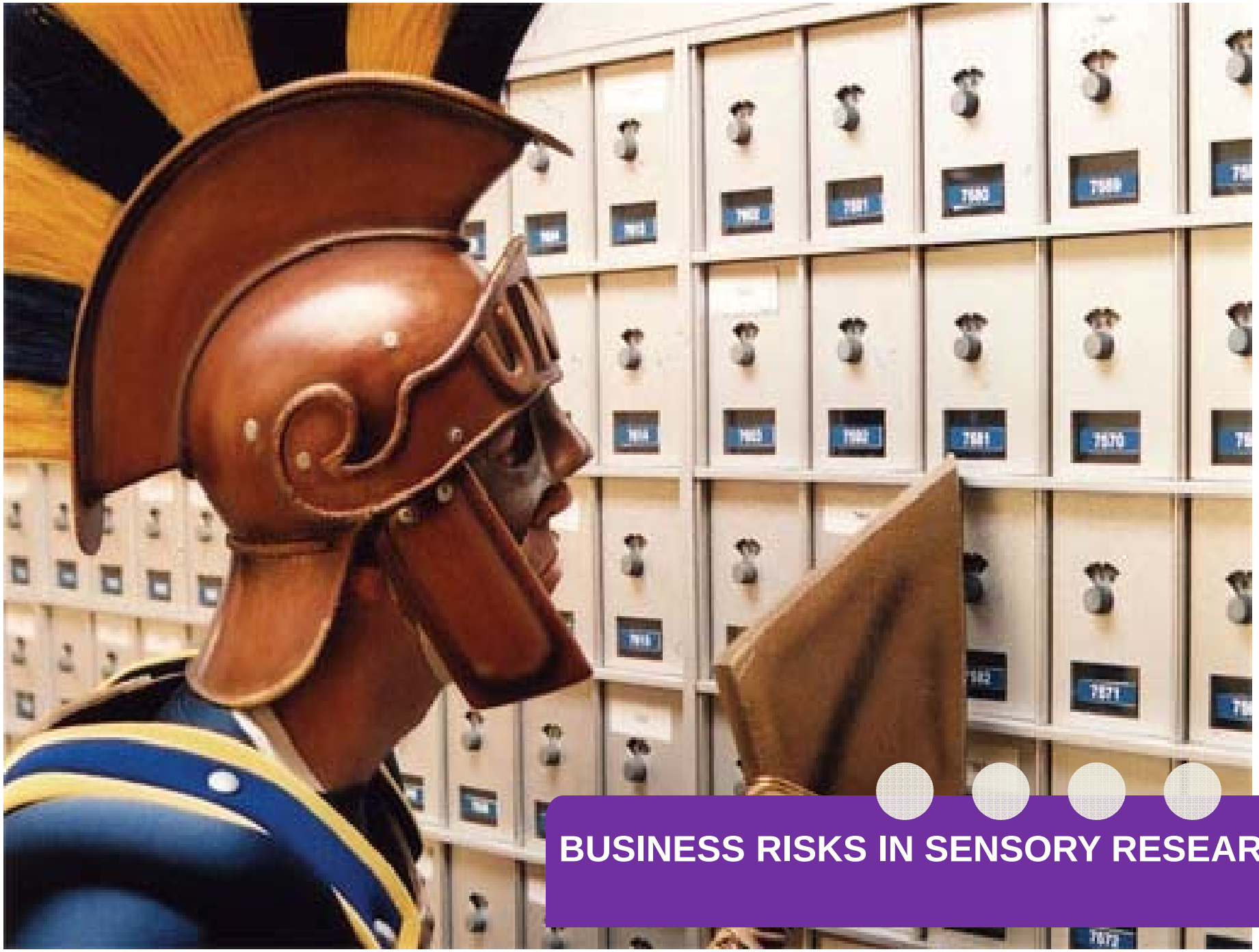
SAMPLE SIZE: NUMBERS OF ASSESSORS AND REPLICATES DRIVE THE SENSITIVITY OF THE TEST

- Picking the right sample size boils down to controlling the amount of overlap between the null and alternative hypothesis distributions so you get the desired values of α and β for the effect size (Δ) you have chosen.



HOW TO DESIGN BETTER TESTS

- Determine relevant values for Δ.
  - How far can a product deviate from its target ratings before experiencing a meaningful drop in quality?
    - Consumer based criteria
    - Compatibility with other product components
    - *etc.*
- Determine costs associated with Type I and Type II errors.
  - It is never as simple as Testing for a Difference vs. Testing for Similarity.
  - Relative costs vary from one study to another but it is seldom, if ever, the case that one or the other cost is 0.



BUSINESS RISKS IN SENSORY RESEARCH

Jeannine Dzuroska, Symrise, Inc.

BEYOND ALPHA & BETA
THE REALITY CHECK

Alpha

+

Launch Study

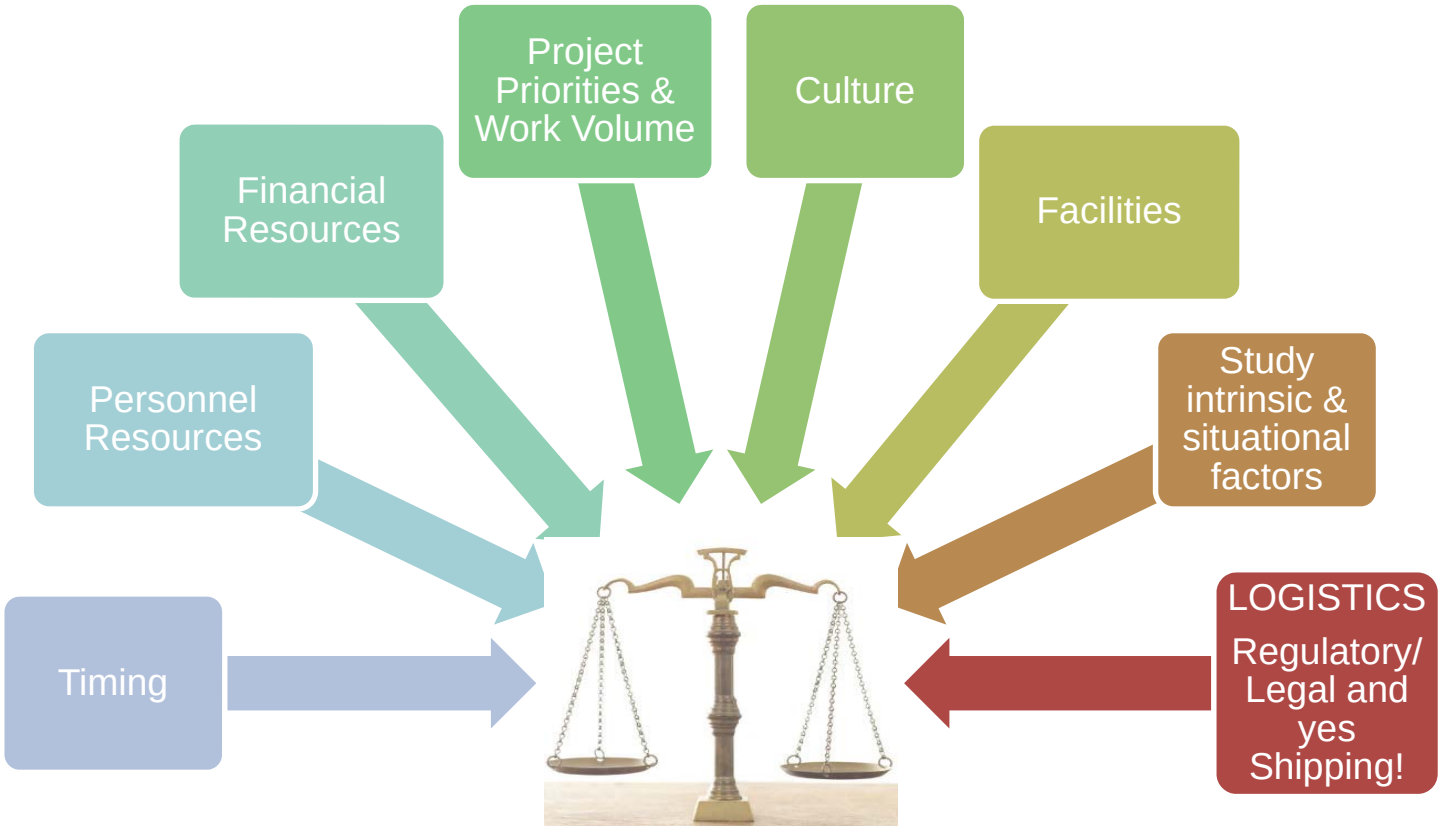
Beta

+

Delta

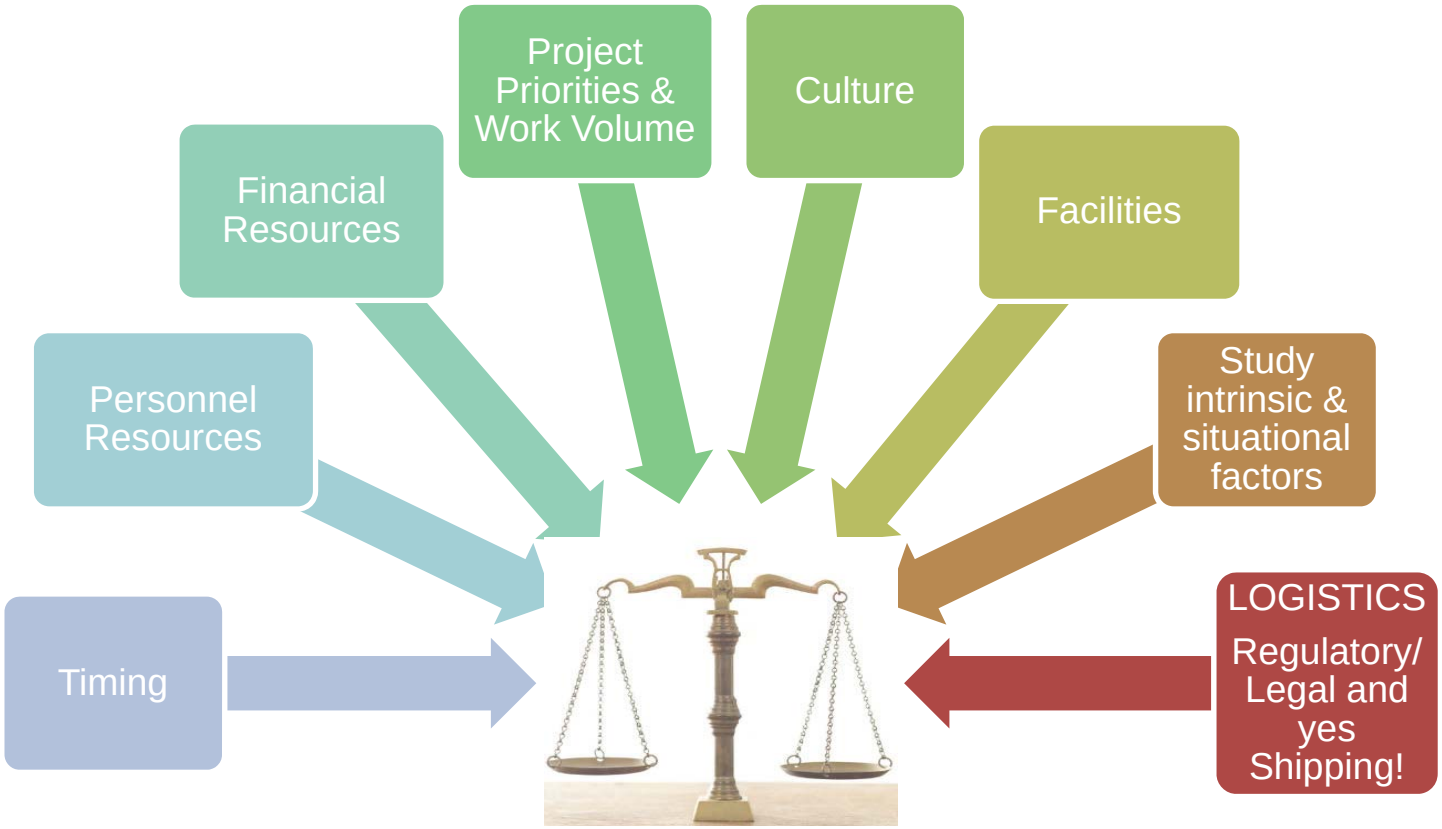
=

BUSINESS RISKS
THE USUAL SUSPECTS TO THE LESS CONSPICUOUS



IDEAL METHODOLOGY

BUSINESS RISKS
THE USUAL SUSPECTS TO THE LESS CONSPICUOUS



IDEAL METHODOLOGY

AND LAST, BUT CERTAINLY NOT LEAST ISTHE RESEARCH

A CASE STUDY
LAUNDRY

THANK YOU