1. A researcher has constructed an 80% confidence interval of µ = 45 ± 8, using a sample of *n* = 25 scores.
2. What would happen to the width of the interval if the researcher had used a larger sample size? (Assume other factors are held constant.)

Solution:

As the sample size increases, estimated standard error decreases so the width of interval will decrease.

1. What would happen to the width of the interval if the researcher had used 90% confidence instead of 80%?

Solution:

The greater the confidence the width of the interval will increase.

1. What would happen to the width of the interval if the sample variance increased? (Assume other factors are held constant.)

Solution:

As the variance increases, estimated standard error increases so the width of interval will increase.

(12). A developmental psychologist would like to determine how much fine motor skill improves for children from age 3 to age 4. A random sample of n=15 3 year old children and a second sample of n= 15 4 year old are obtained. Each child is give a manual dexterity test that measures fine motor skills. The average score for the older children was M= 40.6 with SS=430 and the average for the younger children was M=35.4 with SS=410. Using these data.

N1=15 N2=15

M1=40.6 M2=35.4

SS1=430 SS2=410

Sp2= SS1+SS2 =430+410=840  
 df1+df2 14+14 28=30

Sm1-M2== =4

N1 N2 15+15= 15

(a). Make a point estimate of the population mean difference in fine motor skills.  
M1-M2=MD

40.6-35.4= 5.2 Point Estimate   
(b). Make an interval estimate so you are 95% confident that the real mean difference is in your interval.

M1-M2±tSm-M2=5.2-2.048(.4), 5.2+2.048(4)

5.2-8.192, 5.2+8.192

Interval Est=(-2.992, 7.248

©. Make an interval estimate so you are 99% confident that the real mean difference is in your interval.

(d). Based on your answers from b and c, do these data indicate a significant change using a two-ailed test with a=.05? Os the difference significant with a=.01?

Chapter 13

(4). Explain why you should use ANOVA instead of several t tests to evaluate mean differences when an experiment consists of three or more treatment conditions.

**(10). The following data are from an experiment comparing three treatment conditions with a separate sample of n=4 in each treatment.**

**(a). Use am ANOVA with a=.05 to determine whether there are any significant differences among the three treatments.  
(b). Compute n2 for these data.**

**Treatment**

**I II III**

**2 3 7 N=12**

**6 7 5 G=60**

**2 6 4 Ex2 =344**

**6 4 8**

**M=4 M=5 M=6**

**T=16 T=20 T-24**

**SS=16 SS=10 SS=10**

**(14)A Researcher reports an F-Ratio with df=2,24 for an independent –measured research study.**

**(a). How many treatment conditions were compared in the study**

**(b). How many subjects participated in the entire study?**

**(20). The following summary table presents the results from an ANOVA comparing three treatment conditions with n=12 participants in each condition. Complete all missing values. (Hint: Start with the df Colmn).**

**Source SS df MS**

**Between Treatment \_\_\_ \_\_\_ 9 F=\_\_\_\_**

**Within Treatments \_\_\_ \_\_\_ \_\_\_**

**Total 117 \_\_\_**

**(26). One possible explanation for why some birds migrate and others maintain year round residency in a single location is intelligence. Specifically, birds with small brains, relatively to their body size, are simply not smart enough to find food during the winter and must migrate to warmer climates where food is easily available (Sol, Lefebvre, & Rodriguex-Teijeriro, 2005). Birds with bigger brains, on the other hand, are more creative and can find food even when the weather turns harsh. Following are hypothetical data similar to relative brain size for the individual birds in each sample.**

**Non Short Distance Long Dist Migrants**

**Migrating Migrating**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**18 6 4 N=18**

**13 11 9 G=180**

**19 7 5 Ex2=2150**

**12 9 6**

**16 8 5**

**12 13 7**

**M=15 M=9 M=6**

**T=90 T=54 T=36**

**SS=48 SS=34 SS=16**

**(a). Use an ANOVA with a=.05 to determine whether there are any significant mean differences among the three groups of birds.**

**(b). Compute n2 , the percentage of variance explained by the group differences, for these data.**

**©. Use the Tukey HSD posttest to determine which groups are significantly different.**

**Univariate Analysis of Variance**

| **Between-Subjects Factors** | | | |
| --- | --- | --- | --- |
|  | | Value Label | N |
| 9th Grade English Level | 1.00 | College Prep | 29 |
| 2.00 | General | 154 |
| 3.00 | Remedial | 33 |

| **Descriptive Statistics** | | | | |
| --- | --- | --- | --- | --- |
| Dependent Variable:Dropped out of High School? | | | | |
| 9th Grade English Level | | Mean | Std. Deviation | N |
| dimension1 | College Prep | .0000 | .00000 | 29 |
| General | .0909 | .28842 | 154 |
| Remedial | .1818 | .39167 | 33 |
| Total | .0926 | .29053 | 216 |

| **Tests of Between-Subjects Effects** | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| Dependent Variable:Dropped out of High School? | | | | | | |
| Source | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
| Corrected Model | .512a | 2 | .256 | 3.090 | .048 | .028 |
| Intercept | 1.044 | 1 | 1.044 | 12.603 | .000 | .056 |
| ENGL | .512 | 2 | .256 | 3.090 | .048 | .028 |
| Error | 17.636 | 213 | .083 |  |  |  |
| Total | 20.000 | 216 |  |  |  |  |
| Corrected Total | 18.148 | 215 |  |  |  |  |
| a. R Squared = .028 (Adjusted R Squared = .019) | | | | | | |

**Homogeneous Subsets**

| **Dropped out of High School?** | | | | |
| --- | --- | --- | --- | --- |
| Tukey HSDa,b,c | | | | |
| 9th Grade English Level | | N | Subset | |
| 1 | 2 |
| dimension1 | College Prep | 29 | .0000 |  |
| General | 154 | .0909 | .0909 |
| Remedial | 33 |  | .1818 |
| Sig. |  | .318 | .318 |
| Means for groups in homogeneous subsets are displayed.  Based on observed means.  The error term is Mean Square(Error) = .083. | | | | |
| a. Uses Harmonic Mean Sample Size = 42.088. | | | | |
| b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed. | | | | |
| c. Alpha = .05. | | | | |

**Post Hoc Tests**

| **Multiple Comparisons** | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dropped out of High School?  Tukey HSD | | | | | | | | |
| (I) 9th Grade English Level | | (J) 9th Grade English Level | | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
| Lower Bound | Upper Bound |
| dimension2 | College Prep | dimension3 | General | -.0909 | .05825 | .265 | -.2284 | .0466 |
| Remedial | -.1818\* | .07324 | .037 | -.3547 | -.0090 |
| General | dimension3 | College Prep | .0909 | .05825 | .265 | -.0466 | .2284 |
| Remedial | -.0909 | .05520 | .228 | -.2212 | .0394 |
| Remedial | dimension3 | College Prep | .1818\* | .07324 | .037 | .0090 | .3547 |
| General | .0909 | .05520 | .228 | -.0394 | .2212 |
| Based on observed means.  The error term is Mean Square(Error) = .083. | | | | | | | | |
| \*. The mean difference is significant at the .05 level. | | | | | | | | |