

*Errata in 2<sup>nd</sup> printing of Maxwell & Delaney, 2<sup>nd</sup> ed.*  
(List updated 19 July 2005)

1. On page 16, line 11 there is a reference to “the shaded portion of Figure 1.1”. One version of the figure had shading in the area of the circles that was outside of T but inside P, but this was not included in the published version. Thus, the sentence on lines 10-12 of page 16 should be revised as follows:

“The careful experimenter proceeds, in essence, by trying to make the ~~shaded area~~ **outer circle (i.e., the predicted data patterns)** as small **(i.e., as constrained or restrictive)** as possible, ~~thereby to refute~~ **the rival theories.**”

So the revised sentence should read:

“The careful experimenter proceeds, in essence, by trying to make the outer circle (i.e., the predicted data patterns) as small (i.e., as constrained or restrictive) as possible to refute the rival theories.”

2. On page 19, in the 11<sup>th</sup> line of the first paragraph under the heading “Realism” (i.e., about the 20<sup>th</sup> line on the page), change “correspondence or lack or correspondence” to “correspondence or lack of correspondence”

3. On page 32, Exercise 3, 2<sup>nd</sup> line up from bottom of page: change “20<sup>th</sup>-century psychology has been” to “20<sup>th</sup>-century psychology was”.

4. On page 56, 17 lines up from bottom of page (i.e. last line of 3<sup>rd</sup> paragraph), omit the word “the” before “Chapter 3” so end of sentence reads “beginning with Chapter 3.”

5. On page 57, 5<sup>th</sup> line, the first “t” was omitted in the word “constitutes”.

6. On page 67, 11<sup>th</sup> line up from bottom of page (1<sup>st</sup> line of 3<sup>rd</sup> paragraph), insert the word “of” after “direction”, so opening phrase reads “To give an overview of the direction of our discussion”.

7. On page 104, 16 lines up from bottom of page (4 lines below Equation 90), insert the word “the” between “in” and “second” so phrase reads “in the second statistical Tutorial”.

8. On page 105, line 4, revise “means are equal” to read “means are equal or not”.

9. On page 119, in Table 3.9, the numerical value of the Kurtosis in Group T2 CRA-D is incorrect. Change the “1.06” to 2.78” as shown below:

Table 3.9: Descriptive statistics on log transformed drinks per week at 9-month follow-up in five therapy groups.

Group	Mean	n	Median	Min.	Max.	SD	Skewness	Kurtosis
T1 CRA-D	1.01	15	1.08	0	2.23	0.80	-0.03	-1.46
T1 CRA+D	0.54	19	0.00	0	2.38	0.83	1.37	0.32
T1 Std	1.23	17	1.47	0	2.80	0.87	-0.24	-0.87
T2 CRA-D	0.39	17	0.00	0	2.41	0.74	1.94	<del>1.06</del> <b>2.78</b>
T2 Std	1.05	20	1.15	0	2.22	0.78	-0.21	-1.39

10. On page 121, on the 22<sup>nd</sup> line of text (i.e., 2<sup>nd</sup> line above the heading “Determining Sample

Size Using f and Power Charts”), the phrase “projected populations parameters” should be “projected population parameters”.

11. On page 122, in the first line of the equation for  $\sigma_m$  there is a misplaced superscript “2”. The superscript 2 on the “3” in the denominator should be deleted; instead the superscript 2 should appear as the exponent on the last term in the numerator, i.e. (500 - 450) should be (500 - 450)<sup>2</sup> :

$$\begin{aligned}\sigma_m &= \sqrt{\frac{(400 - 450)^2 + (450 - 450)^2 + (500 - 450)^2}{3}} \\ &= \sqrt{\frac{2500 + 0 + 2500}{3}} = \sqrt{\frac{5000}{3}} = \sqrt{1666.66} = 40.82\end{aligned}$$

12. On page 125, in the 4<sup>th</sup> sentence of the last full paragraph on the page (i.e., on the 11<sup>th</sup> line up from the bottom of the page), change “Although” to “Admittedly”.

13. On page 171, 8 lines up from the bottom of page, change “in equals 4.49” to “equals 4.49”.

14. On page 172, line 18 of text, the end of the sentence is worded awkwardly. Change “the smaller degrees of freedom than we had when” to “that we have fewer degrees of freedom than when”, so the end of the sentence reads: “...must take into account that we have fewer degrees of freedom than when we assumed homogeneity.”

15. On page 173, line 6 of text, change “in a manner that” to “in such a manner that”.

16. On page 207 some changes are needed in the labeling and alignment of Table 5.5. The point of the table in part is that the SPSS output doesn’t give the simultaneous confidence intervals but they must be computed by hand. Titles for the table and its 2 parts should reflect this. These changes among others are included in the revised form of the table on the next page, including:

a) The division of the table into two parts needs to be indicated by labeling the top half “SPSS Output” and the bottom half “Hand Computations for Simultaneous Confidence Intervals”. Note that the phrase “Simultaneous Confidence Intervals” which appeared as a side heading has been incorporated into the new centered heading for the second half of the table.

b) The term “Contrast Tests” is to be the heading not just for a column but for the whole second section of the table and thus should be raised to a line above that for column headings like “Value of Contrast” (This could be indicated with a centered heading for “Contrast Coefficients” and “Contrast Tests” as in Table 4.4 on page 169, but given we’re here adding centered headings for “SPSS Output” and “Hand Computations for Simultaneous Confidence Intervals”, side headings for “Contrast Coefficients” and “Contrast Tests” seem preferable.)

c) Under “Contrast Tests”, there are 2 subsections to this section of the table, one labeled “Assume equal variances” (note needed capitalization of “Assume”) and “Does not assume equal variances”. These two labels should be aligned and indented to the right of SBP.

d) Similarly, in the second half of the table, which should be labeled “Hand Computations for Confidence Intervals” as indicated above, the two subsections are labeled “Assuming Homogeneity of Variance” and “Without Assuming Homogeneity of Variance”. These two labels also need to be aligned horizontally, as shown below.

e) Given one part of the table is SPSS Output and the other is Hand Computations, the two parts

of the table would be more clearly distinct if two different fonts could be used, but this is not absolutely necessary if the two subsections are clearly labeled “SPSS Output” and “Hand Computations for Confidence Intervals” as mentioned above and show below.

**T A B L E 5.5 SPSS Output and Hand Computations for Planned Comparisons**

		<u>SPSS Output</u>			
<u>Contrast Coefficients</u>					
	GROUP				
Contrast	1.00	2.00	3.00	4.00	
1	1	-1	0	0	
2	1	0	-1	0	
3	0	1	-1	0	
4	1	1	1	-3	

  

<u>Contrast Tests</u>		Contrast	Value of Contrast	Std. Error	t	df	Sig. (2-tailed)
SBP	Assume equal variances	1	5.8333	4.6676	1.250	20	.226
		2	3.3333	4.6676	.714	20	.483
		3	-2.5000	4.6676	-.536	20	.598
		4	35.8333	11.4331	3.134	20	.005
	Does not assume equal variances	1	5.8333	5.7237	1.019	8.947	.335
		2	3.3333	4.0838	.816	9.222	.435
		3	-2.5000	5.2836	-.473	7.508	.650
		4	35.8333	9.0955	3.940	13.288	.002

Hand Computations for Simultaneous Confidence Intervals

Assuming Homogeneity of Variance

Contrast	Computation	Interval
1	5.8333 ± (%7.53) (4.6676)	-6.97, 18.64
2	3.3333 ± (%7.53) (4.6676)	-9.47, 16.14
3	-2.500 ± (%7.53) (4.6676)	-15.31, 10.31
4	(35.83/3) ± (%7.53) (11.4331/3)	1.49, 22.40

Without Assuming Homogeneity of Variance

Contrast	Computation	Interval
1	5.8333 ± (%10.28) (5.7237)	-12.52, 24.18
2	3.3333 ± (%8.68) (4.0838)	-9.37, 16.04
3	-2.500 ± (%11.12) (5.2836)	-20.12, 15.12
4	(35.83/3) ± (%8.39) (9.0955/3)	3.16, 20.73

17. On page 225, on the 8<sup>th</sup> line of text below Table 5.12, change “subtracting  $\bar{Y}_2$  minus the next largest mean.” to read “but this time the interval involves subtracting the next largest mean from  $\bar{Y}_2$ .”

18. On page 237, in Table 5.17, in the 5<sup>th</sup> line of equations in the body of the table (i.e. on the line labeled “Tukey small  $n$ .”), at the end of the expression under the square root sign,

the subscript on the second “s” should be changed from “g” to “h”.

19. On page 283, 5<sup>th</sup> line of text up from bottom of page, the word “that” is inappropriately repeated. Delete the “that” immediately before the words “they possess.”

20. On page 290, in Table 7.5, the label on the bottom row of the table, should be a lower-case, italicized “s” instead of “S”.

21. On page 303, in Equation 53 and the following discussion, we forgot that the sample size had been changed from 5 to 6 and that this resulted in several of the other numerical values also being different. Thus, several changes are needed:

a) In Equation 53, change the critical value from “3.53” to “3.49”, change the value of  $MS_{\text{within}}$  from “155.75” to “136.6”, and change both of the denominators in the fractions within parentheses under the square root sign from “5” to “6”. Thus, the revised equation 53 would be:

$$(189 - 204) \pm (3.49/\sqrt{2})\sqrt{136.6\left(\frac{1}{6} + \frac{1}{6}\right)} \quad (53)$$

b) In the discussion of this equation, two lines below the equation (i.e. the 4<sup>th</sup> line up from the bottom of the page), change “namely 5” to “namely 6”.

c) Four lines after Equation 53 (i.e., the 2<sup>nd</sup> line up from the bottom of the page), change “based on only 5 participants” to “now based on 6 participants”, and change “is based on 10 participants” to “was based on 10 participants”.

d) Five lines after Equation 53 (i.e., on the bottom line of the page), change the values for the limits of the interval from “-34.70 to 4.70” to “-31.65 to 1.65”.

Thus, the last two complete sentences on page 303 would read:

“However, the sample sizes are different here (namely 6) than they were when we compared marginal means (where we used 10 for the sample size) because each cell mean is now based on 6 participants, whereas each column marginal mean was based on 10 participants. Carrying out the arithmetic yields an interval ranging from -31.65 to 1.65.”

22. On page 318, in Table 7.14, in the middle column in the second row of the body of the table, the “Numerator Expression” for Effect B should have a multiplier of “na” not “nb”.

23. On page 338, the last word on the 2<sup>nd</sup> line should be “a” not “an”.

24. On page 411, in Table 9.4, on the line above the first words in the table,  $\bar{Y}_1 = 13$  should be:  $\bar{Y}_2 = 13$ , that is, change the subscript from 1 to 2.

25. On page 414, in Table 9.6, on the last line of the first major section of the table,  $\bar{Y}_2 = 7$  should be:  $\bar{Y}_1 = 7$ , that is, change the subscript from 2 to 1.

26. On page 455, exercise 10. Reword the first two sentences of this exercise as follows:

10. A researcher is planning to compare ~~threetwo~~ groups of ~~2030~~ individuals each in a randomized study. Suppose that he has included ~~+015~~ females and ~~+015~~ males in

each of his groups.

So that the first two sentences read:

10. A researcher is planning to compare two groups of 30 individuals each in a randomized study. Suppose that he has included 15 females and 15 males in each of his groups.

The remainder of the exercise can remain as is.

*[A description of corrections needed on page 509 is indicated at the end of this list as change number 51 because it requires printing a table in “Landscape” rather than “Portrait” format.]*

27. On p. 493, 10 lines up from the bottom of the page, “Serling” should be “Serlin”.

28. On p. 514, 8 lines up from the bottom of the page, the phrase “which in turn in nested” should read “which in turn is nested”.

29. On p. 535, in the first line of Equation 24, there should be a hat above  $\alpha_j$  like there is above the other terms on the right side of the equation. That is, the equation should read:

$$\begin{aligned}\hat{Y}_{ij} &= \hat{\mu} + \hat{\alpha}_j + \hat{\pi}_i \\ &= \bar{Y}_{..} + (\bar{Y}_j - \bar{Y}_{..}) + (\bar{Y}_i - \bar{Y}_{..}) \\ &= \bar{Y}_j + \bar{Y}_i - \bar{Y}_{..}\end{aligned}$$

30. On page 544, 11 lines up from the bottom of the page, the carat above the epsilon at the beginning of the sentence should be a tilde. That is, change “The Huynh–Feldt  $\hat{\epsilon}$  procedure” to read “The Huynh–Feldt  $\tilde{\epsilon}$  procedure”.

31. On pages 564 through 566, the terms “consistency” and “agreement” were interchanged in several places. In many places they can simply be switched. However, in other places, the context prevents simply switching them. The following set of changes provide the most straightforward way of presenting these terms and associated concepts correctly:

a) on page 564, 9 lines from the bottom of the page, change the sentence that begins as “Consistency is relatively low in these data,...” to “Agreement is relatively low in these data,...”

b) on page 564, 7 lines from the bottom of the page, change the sentence that begins as “However, agreement is high in these data...” to “However, consistency is high in these data...”

c) on page 566, the paragraph at the top of the page needs to be revised as follows:

for these data. Why is ICC(2,1) so much less than ICC(3,1) here? The reason is that they answer different questions. Specifically, ICC(2,1) is a measure of ~~consistency~~agreement. To what extent are ratings ~~consistent~~identical across judges? To understand exactly what this means, suppose we wanted to know which subject is truly highest on the construct of interest. Examining all 3 columns in Table 11.20 shows that all 3 judges rate subject 1 highest. Does this mean that subject 1 is ~~consistently~~always rated higher than other subjects are rated? Not literally, because for example judge 1 rates everyone but subject 5 higher than judge 2 rates subject 1. Thus, if we were to compare subject 1 as rated from judge 2 to other subjects as rated by judge 1, we would

conclude that subject 1 has a lower score than most of the other subjects. On the other hand, ICC(3,1) is a measure of ~~agreement~~consistency. In other words, to what extent ~~do are~~ the judges ~~agree~~consistent with one another about the relative position of subjects on the construct of interest? From this perspective, the judges are ~~in-perfect agreement~~ly consistent with one another, so ICC(3,1) equals 1.00 for these data. The bottom line is that you must decide whether mean differences between judges should affect your measure of reliability. If the answer is yes, then ICC(2,1) is appropriate, whereas if the answer is no, then ICC(3,1) is preferable. We should also note that ICC(2,1) will usually be somewhat lower than ICC(3,1), but this is not a reason to prefer ICC(3,1), because ~~consistency~~agreement is more difficult to achieve than ~~agreement~~consistency.

Thus, the corrected paragraph should read as

for these data. Why is ICC(2,1) so much less than ICC(3,1) here? The reason is that they answer different questions. Specifically, ICC(2,1) is a measure of agreement. To what extent are ratings identical across judges? To understand exactly what this means, suppose we wanted to know which subject is truly highest on the construct of interest. Examining all 3 columns in Table 11.20 shows that all 3 judges rate subject 1 highest. Does this mean that subject 1 is always rated higher than other subjects are rated? Not literally, because for example judge 1 rates everyone but subject 5 higher than judge 2 rates subject 1. Thus, if we were to compare subject 1 as rated from judge 2 to other subjects as rated by judge 1, we would conclude that subject 1 has a lower score than most of the other subjects. On the other hand, ICC(3,1) is a measure of consistency. In other words, to what extent are the judges consistent with one another about the relative position of subjects on the construct of interest? From this perspective, the judges are perfectly consistent with one another, so ICC(3,1) equals 1.00 for these data. The bottom line is that you must decide whether mean differences between judges should affect your measure of reliability. If the answer is yes, then ICC(2,1) is appropriate, whereas if the answer is no, then ICC(3,1) is preferable. We should also note that ICC(2,1) will usually be somewhat lower than ICC(3,1), but this is not a reason to prefer ICC(3,1), because agreement is more difficult to achieve than consistency.

d) On page 566, the line immediately after Equation 51 needs to be revised as follows:

for agreement and consistency~~and agreement~~, respectively.

Thus, this line should read as

for agreement and consistency, respectively.

32. On page 775, at the end of the second full paragraph (i.e. on the 15<sup>th</sup> line of text). Change “Finally, the variable...” to “The variable...” in the current final sentence of this paragraph, and then add a new concluding sentence at the end of the paragraph reading:

“The data lines should be sorted by *id* so the multiple observations for one subject appear on successive lines.”

33. On page 820, 7<sup>th</sup> line of text: change “similarity statisticians” to “similar terms statisticians”.

34. At the end of Chapter 15, on pages 820ff. we failed to indicate by an asterisk before the numbers of certain exercises which ones were answered in the back of the book. In fact,

exercises 4, 8, 11, 13, and 16 are answered in the back of the book. Thus, make the following changes:

- a) on page 821, 1<sup>st</sup> line of text: change “4.” to “\*4.”.
- b) on page 821, 10<sup>th</sup> line of text: change “8.” to “\*8.”.
- c) on page 821, 16<sup>th</sup> line of text: change “11.” to “\*11.”.
- d) on page 821, 21<sup>st</sup> line of text: change “13.” to “\*13.”.
- e) on page 822, 12<sup>th</sup> line of text: change “16.” to “\*16.”.

35. On page 846, 18<sup>th</sup> line of text (first line of second complete paragraph): insert “a” between the words “have” and “measure”.

36. On page 850, 3<sup>rd</sup> line up from the bottom of the page, change “According to Table 16.5,” to “According to Table 16.7,”.

37. At the end of Chapter 16, on pages 867ff., we again failed to put an asterisk by question numbers that are answered at the back of the book. Answers appear for Exercises 2 and 7. Thus,

- a) on page 867, 5<sup>th</sup> line of text: change “2.” to “\*2.”.
- b) on page 867, 4<sup>th</sup> line up from bottom of page: change “7.” to “\*7.”.

38. In Appendix B-1, on page B-13 22<sup>nd</sup> line up from bottom of page, change “at are most” to “are at most”.

39. In Appendix B-1, on page B-20, 12<sup>th</sup> line up from bottom of page, change “(see page 263)” to “(see page 301)”.

40. In Appendix C, on page C-26, in the third line of endnote 6 (i.e., 13<sup>th</sup> line up from bottom of page), change “the estimate parameter” to “the parameter estimate”.

41. In Appendix C, on page C-27, on the third line of this page (i.e., in the third line of Chapter 15's endnote 10), change "subjects's" to "subjects' ".

42. Also, in Appendix C, on page C-27, on lines 19 and 20 (i.e., on the 3<sup>rd</sup> and 4<sup>th</sup> line of Chapter 16's endnote 1), some numbers need to be changed. Change "62, 54, and 64" to "61, 54, and 65" on the third line of this note, and change "10.50" to "9.97" on the fourth line.

43. In Appendix D, on page D-8, in the answer for exercise 10, part a, in the table for the analysis of data from Experiment #2, the superscript 2 should be omitted from the left hand side of the equation in the heading of column 4. That is, heading of the column should be:

$$e_{i_F} = D_i - \bar{D}$$

44. In Appendix D, on page D-13, in the answer to Exercise 18, part a., in the first centered equation in this answer (i.e. on the 9<sup>th</sup> line of text on the page), the expression that appears between the second and third equals signs need to have a superscript 2 added to the "  $\alpha_1$  " term. That is, this part of the equation should be:

$$N \alpha_1^2$$

45. In Appendix D, on page D-44, 2 lines below the line “for : 11, : 12, : 21, and : 22,

respectively. Thus,”

This line should read as

$$= .61 (52) + .39 (46) - .61 (48) - .39 (42)$$

instead of as

$$= .61 (52) + .39 (46) - .61 (48) + .39 (42)$$

46. In Appendix D, on page D-45, line 8 under part d should read as

$$F_{.05;1, N-a} = F_{.05;1,12}$$

instead of as

$$F_{.05;1, N-a} = F_{.05;1,16}$$

47. In Appendix D, on page D-46, in the answer for Exercise 10, part a., the centered equation that appears immediately above the phrase “For these data” (i.e. on the 16<sup>th</sup> line of print on the page), the first minus sign should be an equals sign so the equation reads:

$$\hat{\alpha}_j = \bar{Y}_j - \bar{Y}..$$

48. In Appendix D, on page D-47, in the answer for part b of this same exercise, in the first equation appearing below the phrase “We know that...” (i.e., on the 9<sup>th</sup> line of print on the page), the “ $N - a$ ” in the denominator should be “ $N - abc$ ”. That is, the first line of the equation should be:

$$MS_W = \frac{SS_W}{N - abc}$$

49. In Appendix D, on page D-76, the second line of the answer to part e (the equation that is numbered 13.22) is missing a vertical bar in the denominator:

the denominator should read as

$$|E(F)|(n-a+1)$$

instead of as

$$|E(F)/(n-a+1)$$

50. In the Subject Index, on page S-4, in the entry for Extrinsic components (i.e., in the first column on the 4<sup>th</sup> line up from the bottom of the page), insert “296,” before “432-433”.

51. The computations shown on page 509 are correct but there are a couple of errors in the formulas (each occurring twice) in the table and one error in the formula just below the table. These are detailed below. First, in the next to last row of the Table (i.e., in the row labeled “B/A”), in both the third and fourth columns the denominator **to the right of the equals sign** should be just “*n*” not “*bn*”. Second, in the last row of the Table (i.e., in the row labeled “A”), in both the second and third columns the denominator on the left of the equals sign should be just “*a*” not “*a - 1*”.

T A B L E 10.10 Estimates of Variance Components for Two-Factor Designs with Nesting  
(Showing erroneous “*bn*” and “*a - 1*” denominators as they appear in the printed book)

Effect	A & B both Fixed	A Fixed, B Random	A & B both Random
Error	$\hat{\sigma}_{\epsilon}^2 = MS_W$	$\hat{\sigma}_{\epsilon}^2 = MS_W$	$\hat{\sigma}_{\epsilon}^2 = MS_W$
B/A	$\frac{\sum_j \sum_k \beta_{kj}^2}{ab} = \frac{(b-1)}{b} \frac{(MS_{B/A} - MS_W)}{n}$	$\hat{\sigma}_{\beta}^2 = \frac{MS_{B/A} - MS_W}{bn}$	$\hat{\sigma}_{\beta}^2 = \frac{MS_{B/A} - MS_W}{bn}$
A	$\frac{\sum_j \alpha_j^2}{a-1} = \frac{(a-1)}{a} \frac{MS_A - MS_W}{bn}$	$\frac{\sum_j \alpha_j^2}{a-1} = \frac{(a-1)}{a} \frac{MS_A - MS_{B/A}}{bn}$	$\hat{\sigma}_{\alpha}^2 = \frac{MS_A - MS_{B/A}}{bn}$

The table with the needed corrections incorporated appears on the following page.

T A B L E 10.10 Estimates of Variance Components for Two-Factor Designs with Nesting  
(Incorporating corrections)

Effect	A & B both Fixed	A Fixed, B Random	A & B both Random
Error	$\hat{\sigma}_\epsilon^2 = MS_W$	$\hat{\sigma}_\epsilon^2 = MS_W$	$\hat{\sigma}_\epsilon^2 = MS_W$
B/A	$\frac{\sum_j \sum_k \hat{\beta}_{kij}^2}{ab} = \frac{(b-1)(MS_{B/A} - MS_W)}{bn}$	$\hat{\sigma}_\beta^2 = \frac{MS_{B/A} - MS_W}{n}$	$\hat{\sigma}_\beta^2 = \frac{MS_{B/A} - MS_W}{n}$
A	$\frac{\sum_j \hat{\alpha}_j^2}{a} = \frac{(a-1)MS_A - MS_W}{bn}$	$\frac{\sum_j \hat{\alpha}_j^2}{a} = \frac{(a-1)MS_A - MS_{B/A}}{bn}$	$\hat{\sigma}_\alpha^2 = \frac{MS_A - MS_{B/A}}{bn}$

Finally, in the first equation appearing in the text below Table 10.10, just before the second equals sign, the  $MS_W$  should be  $MS_{B/A}$

*Text on page 509 immediately below Table 10.10, showing the incorrect  $MS_W$ :*

components would be estimated as follows:

$$\frac{\sum \hat{\alpha}_j^2}{a} = \frac{(a-1)(MS_A - MS_W)}{a \quad bn} = \frac{(2-1)(1176-118)}{2 \cdot 3 \cdot 4} = \frac{1058}{24} = 44.083$$

$$\hat{\sigma}_\beta^2 = \frac{MS_{B/A} - MS_W}{n} = \frac{118 - 45.556}{4} = 72.444/4 = 18.111$$

$$\hat{\sigma}_\epsilon^2 = MS_W = 45.556$$

*Text on page 509 immediately below Table 10.10, incorporating needed correction:*

components would be estimated as follows:

$$\begin{aligned}\frac{\sum \hat{\alpha}_j^2}{a} &= \frac{(a-1)(MS_A - MS_{B/A})}{a \quad bn} = \frac{(2-1)(1176-118)}{2 \cdot 3 \cdot 4} = \frac{1058}{24} = 44.083 \\ \hat{\sigma}_\beta^2 &= \frac{MS_{B/A} - MS_W}{n} = \frac{118 - 45.556}{4} = 72.444/4 = 18.111 \\ \hat{\sigma}_\epsilon^2 &= MS_W = 45.556\end{aligned}$$