Psychometrics. Partial 2. January 2020. Type A. / Type C

Case 1.

1.

1	2	3	4	5	6	7	8	9	10	11	12
b	a	a	a	a	a	d	a	a	d	a	b

		Test B Pass	Test B Fail	
Test A	Pass	8 (a)	2 (b)	10 (g)
	Fail	0 (c)	2 (d)	2 (h)
		8 (e)	4 (f)	12 (N)

Hamblenton & Novick

$$P_o = \frac{Fc}{N} = \frac{a+d}{N} = \frac{10}{12} = 0'83$$

$$Fa = \frac{e \cdot g}{N} + \frac{f \cdot h}{N} = \frac{80}{12} + \frac{8}{12} = 7.33$$

2. $K = \frac{Fc - Fa}{N - Fa} = \frac{10 - 7'33}{12 - 7'33} = \frac{2'67}{4'67} \simeq 0'57 < 0'7$ Inappropriate

Case 2

3. $T = 50 + 10 Z_x \Rightarrow T = 50 + 10(-1) = 40$

$\bar{x} = 10$
$S_x = 3$
$x = 7$

$$Z = \frac{x - \bar{x}}{S_x} \quad Z = \frac{7 - 10}{3} = -1$$

4. $y = a + b Z_x$

$y = 20 + 3(-1) = 17$

5. $Z_x = -1 \rightarrow p = 0'1587$ (obtained from Z scores table)

$p \simeq 16$

6. $r_{xy} = 0'7$

$Z_x = 1$

$Z_{\hat{y}} = r_{xy} \cdot Z_x \Rightarrow Z_{\hat{y}} = 0'7 \cdot 1 = 0'7$

$E = 5 + 2 Z_n$

$E = 5 + 2(0'7) = 5 + 1'4 = 6'4 \simeq 6$

7.

$x = 6$

$\bar{x} = 6$

$S^2_x = 9 \quad S_x = 3$

$\bar{y} = 10$

$S^2_y = 4 \quad S_y = 2$

$$x^* = y = \left(\frac{S_y}{S_x}\right)(x - \bar{x}) + \bar{y}$$

$$y = \cancel{\left(\frac{2}{3}\right) \cdot (0)} + 10 = 10$$

Case 3.

$N = 100$

$EI = 20$

$\bar{x} = 6$

$S^2_x = 9 \rightarrow S_x = 3$

$\frac{S^2_T}{S^2_x} = 0'7 = r_{xx'}$

$Z_x = 1'5$

$C.L. = 99\% \rightarrow Z_c = 2'58$

$C.L = 95\% \rightarrow Z_c = 1'96$

8. $Z_x = \frac{X - \bar{X}}{S_x} \Rightarrow 1'5 = \frac{X-6}{3} \Rightarrow X = 4'5 + 6 = 10'5$

$Lim = T' \pm E_{max} = 9'15 \pm 3'59 < \begin{matrix} 12'74 \\ 5'56 \end{matrix}$

$T' = r_{xx'}(X - \bar{X}) + \bar{X} = 9'15$

$T' = 0'7(10'5-6)+6 = [0'7(4'5)] + 6 = 3'15 + 6 = 9'15$

$E_{max} = Z_c \cdot S_{TX} = 2'58 \cdot 1'39 = 3'59$

$S_{TX} = S_e \cdot \sqrt{r_{xx'}} = 1'65\sqrt{0'7} = 1'65 \cdot 0'84 = 1'39$

$S_e = S_x \cdot \sqrt{r_{xx'}} = 3 \cdot \sqrt{1-0'7} = 3 \cdot \sqrt{0'3} = 3 \cdot 0'55 \simeq 1'65$

9. $Lim = T' \pm E_{max} = 3'15 \pm 3'59 < \begin{matrix} 6'74 \\ -0'44 \end{matrix}$

otro modo

$T' = T' - \bar{T} = 9'15 - 6 = 3'15$

$\bar{T} = \bar{X}$

$T' = r_{xx'} \cdot x_i = 0'7 \cdot 4'5 = 3'15$

$x_i = X - \bar{X} = 10'5 - 6 = 4'5$

igual que en puntuaciones directas

10. $Lim = Z_{T'} \pm E_{max} = 1'26 \pm 0'90 < \begin{matrix} 2'16 \\ 0'36 \end{matrix}$

$Z_{T'} = r_{TX} \cdot Z_x = 0'84 \cdot 1'5 = 1'26$

$r_{TX} = \sqrt{r_{xx}} = \sqrt{0'7} = 0'84$

$Z_x = 1'5$

$E_{max} = Z_c \cdot S_{Z_T Z_x} = 1'96 \cdot 0'46 = 0'90$

$S_{Z_T Z_x} = \sqrt{1 - r_{xx'}} \cdot \sqrt{r_{xx'}} = \sqrt{1-0'7} \cdot \sqrt{0'7} = 0'55 \cdot 0'84 = 0'46$

11. $n = \frac{R_{xx'}(1 - r_{xx'})}{r_{xx'}(1 - R_{xx'})} = \frac{0'9(1-0'7)}{0'7(1-0'9)} = \frac{0'9 \cdot 0'3}{0'7 \cdot 0'1} = \frac{0'27}{0'07} \simeq 3'86$

$n = \frac{EF}{EI} \Rightarrow 3'86 = \frac{EF}{20} \Rightarrow EF \simeq 77$

12.

$S^2_1 = 9$

$S^2_2 = 4$

$r_{11} = 0'7$

$r_{22} = 1 - \frac{S^2_1}{S^2_2}(1 - r_{11})$

$r_{22} = 1 - \frac{9}{4}(1 - 0'7) = 1 - (2'25 \cdot 0'3) = 1 - 0'675 = 0'32$

Case 4

$\bar{X} = 8$ // $\bar{Y} = 4$ /// $r^2_{xy} = 0'64$

$S_x = 1$ // $S^2_y = 4$ ///

$S_y = 2$

13. $CPV = 1 - C.A = 1 - 0'6 = 0'4$

$CA = \sqrt{1 - r^2_{xy}}$

$CA = \sqrt{1 - 0'64} = \sqrt{0'36} = 0'6$

14.

$Z_x = \dfrac{x - \bar{x}}{S_x}$

$x = 9 \quad Z_x = \dfrac{9-8}{1} = 1$

$Z_{y'} = r_{xy} Z_x = 0'8 . 1 = 0'8$

$r_{xy} = \sqrt{0'64} = 0'8$

15.

$x = 8$

$\alpha = 0'01$

$C.L = 99\%$

$Z_c = 2'58$

$Lim = y' \pm \mathcal{E}_{max} = 4 \pm 3'096 \begin{cases} 7'096 \\ 0'904 \end{cases}$

$y' = a + bx \Rightarrow y' = -8'8 + (1'6 . 8) = 4$

$b = r_{xy} . \dfrac{S_y}{S_x} = 0'8 . \dfrac{2}{1} = 1'6$

$a = \bar{y} - b\bar{x} = 4 - (1'6 . 8) = -8'8$

Another way to solve:

$y' = r_{xx} \dfrac{S_y}{S_x} (x - \bar{x}) + \bar{y}$

$y' = 0'8 . \dfrac{2}{1} (8 - 8) + 4$

$y' = 4$

$\mathcal{E}_{max} = Z_c . S_{Y.X} = 2'58 . 1'2 = 3'096$

$S_{Y.X} = S_y \sqrt{1 - r^2_{xy}} = 2\sqrt{1 - 0'64} = 2\sqrt{0'36} = 2 . 0'6 = 1'2$