EJERCICIO 1

PART	A	B	C	D	E	F	even p	odd i	d	d^2	X	X^2	p^2	i^2
1	0	1	0	1	1	1	3	1	2	4	4	16	9	1
2	1	0	0	1	1	0	1	2	-1	1	3	9	1	4
3	1	0	0	0	0	1	1	1	0	0	2	4	1	1
4	0	1	1	1	1	0	2	2	0	0	4	16	4	4
5	0	0	0	1	0	1	2	0	2	4	2	4	4	0
6	1	1	1	1	1	1	3	3	0	0	6	36	9	9
7	0	1	1	1	1	1	3	2	1	1	5	25	9	4
8	0	0	0	1	1	1	2	1	1	1	3	9	4	1
							17	12	5	11	29	119	41	24

a) RULON:

$$r_{xx'} = 1 - \frac{S^2 d}{S^2_x} = 1 - \frac{0'98}{1'73} = 0'43$$

$$S^2 d = \frac{\Sigma d^2}{N} - \bar{d}^2 = \frac{11}{8} - 0'625^2 = 0'98$$

$$\bar{d} = \frac{\Sigma d}{N} = \frac{5}{8} = 0'625$$

$$S^2_x = \frac{\Sigma X^2}{N} - \bar{X}^2 = \frac{119}{8} - 3'625^2 = 1'73$$

$$\bar{X} = \frac{\Sigma X}{N} = \frac{29}{8} = 3'625$$

b) GUTMAN-FLANAGAN

$$r_{xx'} = 2\left(1 - \frac{S^2p + S^2i}{S^2x}\right) = 2\left(1 - \frac{0'61 + 0'75}{1'73}\right) = 0'43$$

$$S^2_p = \frac{\Sigma p^2}{N} - \bar{p}^2 = \frac{41}{8} - 2'13^2 = 0'61$$

$$\bar{p} = \frac{\Sigma p}{N} = \frac{17}{8} = 2'13$$

$$S^2_i = \frac{\Sigma i^2}{N} - \bar{i}^2 = \frac{24}{8} - 1'5^2 = 0'75$$

$$\bar{i} = \frac{\Sigma i}{N} = \frac{12}{8} = 1'5$$

EJERCICIO 2

PART.	A	B	C	D	E	F	X	X^2	
1	0	0	0	0	0	0	0	0	
2	1	1	0	0	1	1	4	16	
3	1	1	1	0	0	1	4	16	
4	0	1	1	0	1	0	3	9	
5	0	0	0	1	1	1	3	9	
6	1	1	1	0	0	0	3	9	
7	0	1	1	1	1	0	4	16	
8	1	1	1	1	1	1	6	36	
9	1	1	1	1	1	1	6	36	
10	1	1	1	1	0	1	5	25	
p	0'6	0'8	0'7	0'5	0'6	0'6			
q	0'4	0'2	0'3	0'5	0'4	0'4			Σ
$S^2_j = p \cdot q$	0'24	0'16	0'21	0'25	0'24	0'24			1'34
Σ							38	172	

a) $$\alpha = \frac{n}{n-1}\left(1 - \frac{\overset{p\cdot q}{\Sigma S^2_j}}{S^2_x}\right) = \frac{6}{5}\left(1 - \frac{1'34}{2'76}\right) = 0'62$$

$$S^2_x = \frac{\Sigma X^2}{N} - \bar{X}^2 = \frac{172}{10} - 3'8^2 = 17'2 - 14'44 = 2'76$$

$$\bar{X} = \frac{\Sigma X}{N} = \frac{38}{10} = 3'8$$

$$r_{vx} = \sqrt{r_{xx'}} = \sqrt{0'62} = 0'79$$

b)
$$r_{22} = 1 - \frac{S^2_1}{S^2_2}(1 - r_{11}) = 1 - \frac{2'76}{20}(1 - 0'62) = 0'95$$

EXERCISE 3

$r_{xe} = 0.6$

$z_x = 0.5$

$CL = 90\%$

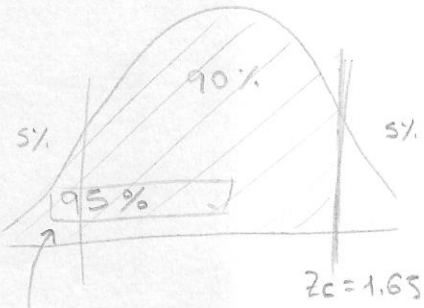
$CI = z_{T'} \pm E_{max} = 0{,}4 \pm 0{,}79 < \begin{matrix} 1.19 \\ -0.39 \end{matrix}$

$z_{T'} = r_{XT}\, z_x = 0{,}8 \cdot 0{,}5 = 0{,}4$

Lesson 5.1. slide 9, deduction 7 $\boxed{r_{xx'} = 1 - r_{xe}^2}$

$r_{xx'} = 1 - 0.6^2 = 1 - 0.36 = 0.64 \longrightarrow r_{xT} = \sqrt{r_{xx'}} = \sqrt{0.64} = 0.8$

$E_{max} = z_c \cdot S_{z_T z_x} = 1{,}65 \cdot 0{,}48 = 0{,}79$



You have to find in the z scores table the z value that corresponds to an area of 0.95 $\longrightarrow z_c = 1.65$

$S_{z_T z_x} = \sqrt{1 - r_{xx'}} \cdot \sqrt{r_{xx'}} = \sqrt{1 - 0.64} \cdot \sqrt{0.64} = 0{,}6 \cdot 0{,}8 = 0{,}48$

TEMA 5.2.

EJERCICIO 4

$r_{pi} = 0'44$

FÓRMULA DE SPEARMAN-BROWN

$$r_{xx'} = \frac{2 r_{pi}}{1 + r_{pi}} = \frac{2 \cdot 0'44}{1'44} = 0'61$$

$$r_{xv} = \sqrt{r_{xx'}} = \sqrt{0'61} = 0'78$$

EJERCICIO 5

$\hat{\alpha}_1 = 0.62$

$\hat{\alpha}_2 = 0'7$

$r_{x_1 x_2} = 0'89$

nc 95% $(\alpha = 0{,}05)$

$$t = \frac{(\hat{\alpha}_1 - \hat{\alpha}_2)\sqrt{N-2}}{\sqrt{[4(1-\hat{\alpha}_1)(1-\hat{\alpha}_2)(1-r^2_{x_1 x_2})]}}$$

$$t = \frac{(0'62 - 0'7)\sqrt{10-2}}{\sqrt{[4(1-0'62)(1-0'7)(1-0'89^2)]}}$$

$$t = \frac{(-0{,}08 \cdot 2'83)}{\sqrt{(4 \cdot 0'38 \cdot 0'3 \cdot 0'21)}} = \frac{-0'23}{\sqrt{0'1}} = \frac{-0'23}{0'32} = -0'72$$

$$t(\alpha, N-2) = t(0.05, 8) = 2'306$$

$|-0'72| < 2'306 - H_0$ La diferencia entre ambos coeficientes no es estadísticamente significativa.

EJERCICIO 6

ⓐ · Items dicotómicos
· Diferente dificultad } KR_{20}

PART	A	B	C	D	X	X^2
1	1	1	0	1	3	9
2	1	1	1	1	4	16
3	1	0	0	0	1	1
4	0	1	1	1	3	9
5	1	1	0	0	2	4
6	1	1	0	1	3	9
p	$\frac{5}{6} = 0'83$	0'83	$\frac{2}{6} = 0'33$	$\frac{4}{6} = 0'67$		
q	0'17	0'17	0'67	0'33		
p·q	0'14	0'14	0'22	0'22		
					16	48

$\Sigma = 0'72$

$$KR_{20} = \frac{n}{n-1}\left(1 - \frac{\Sigma pq}{S^2_x}\right) = \frac{4}{4-1}\left(1 - \frac{0'72}{0'87}\right) = 0'23$$

$$S^2_x = \frac{\Sigma X^2}{N} - \bar{X}^2 = \frac{48}{6} - 2'67^2 = 0'87$$

$$\bar{X} = \frac{\Sigma X}{N} = \frac{16}{6} = 2'67$$

$$r_{xv} = \sqrt{r_{xx'}} = \sqrt{0'23} = 0'48$$

b)

$r_{x_1x_2} = 0'6$

$n = 2$

$$R_{xx'} = \frac{n \cdot r_{xx'}}{1+(n-1)r_{xx'}} = \frac{2 \cdot 0'23}{1+(2-1)\cdot 0'23} = \frac{0'46}{1'23} = 0'37$$

muestras relacionadas (mismas personas cumplimentan el cuestionario original y el duplicado)

$$t = \frac{(\hat{\alpha}_1 - \hat{\alpha}_2)\sqrt{N-2}}{\sqrt{[4(1-\hat{\alpha}_1)(1-\hat{\alpha}_2)(1-r^2_{x_1x_2})]}} = \frac{(0'23 - 0'37)\sqrt{6-2}}{\sqrt{[4(1-0'23)(1-0'37)(1-0'6^2)]}} = \frac{-0'28}{1'11} = -0'25$$

$$t(\alpha, N-2) = t(0.05, 4) = 2'78$$

temp   ttca

$|-0'25| < 2'78$ ——— Ho

No hay diferencias estadísticamente significativas entre los 2 coeficientes de fiabilidad

EJERCICIO 7

$n = 150$

$N = 250$

$\bar{X} = 25$

$S^2_x = 42$

$r_{xx'} = ?$

KR_{21} < ítems dicotómicos / misma dificultad

$$KR_{21} = \frac{n}{n-1}\left(1 - \frac{\bar{X} - \frac{\bar{X}^2}{n}}{S^2_x}\right) = \frac{150}{150-1}\left(1 - \frac{25 - \frac{25^2}{150}}{42}\right) = 0'51$$

625

EJERCICIO 8

(se espera $\alpha < \beta$ porque α infravalora el coeficiente de fiabilidad cuando el nº de ítems en cada subtest es diferente)

$n_n = 10$, $n_v = 15$ } $n = 25$

$S^2_x = 30$

$S^2_n = 10$

$S^2_v = 11$

varianza de cada elemento

$$\alpha = \frac{n}{n-1}\left(1 - \frac{\Sigma S^2_j}{S^2_x}\right) = \frac{2}{2-1}\left(1 - \frac{10+11}{30}\right) = 0'6$$

↳ nº elementos del test

$$\beta = \frac{S^2_x - \Sigma S^2_j}{S^2_x\left[1 - \Sigma\left(\frac{n_j}{n}\right)^2\right]} = \frac{30 - (10+11)}{30\left[1 - \left[\left(\frac{10}{25}\right)^2 + \left(\frac{15}{25}\right)^2\right]\right]} = 0'63$$

↳ nº total ítems

ítems en cada subtest

Efectivamente, $\alpha < \beta$.

EJERCICIO 9

$r_{xe} = 0'4$

$S^2_x = 25 \rightarrow S_x = \sqrt{25} = 5$

$X = 10$

$NC = 99\% \rightarrow \alpha = 0'01$

DERIVACIÓN 7, TRANSPARENCIA 10 DEL TEMA 5.1.

$Lim = X \pm E_{max} = 10 \pm 20$ < 30 / −10

$E_{max} = S_e \cdot k = 2 \cdot 10 = 20$

$S_e = S_x\sqrt{1 - r_{xx'}} = 5\sqrt{1-0'84} = 5 \cdot 0'4 = 2$

$\boxed{r_{xx'} = 1 - r^2_{xe}} = 1 - 0'4^2 = 1 - 0'16 = 0'84$

$k = \sqrt{\frac{1}{\alpha}} = \sqrt{\frac{1}{0{,}01}} = \sqrt{100} = 10$

EJERCICIO 10

$r_{xx'} = 0'6$

$S_x = 5$

$NC = 95\% \rightarrow Z_c = 1'96$

$X = 4$

$$Lim = X \pm E_{max} = 4 \pm 6'19 \left\langle \begin{matrix} 10'19 \\ -2'19 \end{matrix} \right.$$

$$E_{max} = Z_c \cdot S_e = 1'96 \cdot 3'16 = 6'19$$

$$S_e = S_x \sqrt{1 - r_{xx'}} = 5\sqrt{1 - 0'6} = 3'16$$

EJERCICIO 11

$N = 300$

$\bar{X} = 36$

$S_x^2 = 25 \rightarrow S_x = \sqrt{25} = 5$

$\frac{S^2_v}{S^2_x} = 0'81 = r_{xx'}$

$Z_x = 1'5$

$NC = 99\% \rightarrow Z_c = 2'58$

(a) $r_{xx'} = 0'81$

$r_{xv} = \sqrt{r_{xx'}} = \sqrt{0'81} = 0'9$

(b) $S_e = S_x \sqrt{1 - r_{xx'}} = 5\sqrt{1 - 0'81} = 2'18$

(c) $Lim = V' \pm E_{max} = 42'08 \pm 5'06 \left\langle \begin{matrix} 47'14 \\ 37'02 \end{matrix} \right.$

$$V' = r_{xx'}(X - \bar{X}) + \bar{X} = 0'81(43'5 - 36) + 36 = 42'08$$

$$Z_x = \frac{X - \bar{X}}{S_x} \rightarrow 1'5 = \frac{X - 36}{5} \rightarrow 1'5 \cdot 5 = X - 36$$

$$7'5 = X - 36$$

$$7'5 + 36 = X$$

$$43'5 = X$$

$$E_{max} = Z_c \cdot S_{vx} = 2'58 \cdot 1'96 = 5'06$$

Error típico de estimación d la puntuación verdadera $S_{vx} = S_e \sqrt{r_{xx'}} = 2'18 \sqrt{0'81} = 2'18 \cdot 0'9 = 1'96$

Obtenido en el apartado (b)

EJERCICIO 12

	TEST B		Σ
TEST A	SOB	NO SOB.	
SOB.	6 (a)	2 (b)	8 (g)
NO SOB.	0 (c)	4 (d)	4 (h)
Σ	6 (e)	6 (f)	12 (N)

$$F_a = \frac{6 \cdot 8}{12} + \frac{6 \cdot 4}{12} = \frac{48}{12} + \frac{24}{12} = 4 + 2 = 6$$

$$F_a = \frac{e \cdot g}{N} + \frac{f \cdot h}{N}$$

1. HAMBLETON Y NOVICK:

$$p_0 = \frac{\overset{a+d}{F_c}}{N} = \frac{6+4}{12} = \frac{10}{12} = 0'83$$

2. KAPPA:

$$k = \frac{F_c - F_a}{N - F_a} = \frac{10 - 6}{12 - 6} = \frac{4}{6} = 0'67$$