

assignment week7 - 미디어통계

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Q1. Build hypothesis - 가설 세우기

- i) Weight 가 number of crackers eaten 에 영향을 준다
- ii) Fullness 가 number of crackers eaten 에 영향을 준다.
- iii) Weight 와 Fullness가 모두 number of crackers eaten 에 영향을 준다
(Weight와 Fullness의 상호작용이 number of crackers eaten에 영향을 미친다)

Q2.

///**Locate the critical range for F-ratio. Calculate the dfs**

Df total : 79

Df within : 76

Df between : $4-1 = 3$

DfA : $2-1 = 1$

DfB : $2-1 = 1$

DfAxB : $= 3-1-1 = 1$

///**compute F-ratio SS**

$$SS \text{ total} = 31836 - ((1440)^2 / 80) = 5916$$

$$SS \text{ within} = 1540 + 1270 + 1320 + 1266 = 5396$$

$$SS \text{ between} = (440)^2 / 20 + (300)^2 / 20 + (340)^2 / 20 + (360)^2 / 20 - (1440)^2 / 80 \\ = 9680 + 4500 + 5780 + 6480 - 25920 = 520$$

$$SS A = ((740)^2 / 40 + (700)^2 / 40) - (1440)^2 / 80 = 13690 + 12250 - 25920 = 20$$

$$SS B = ((780)^2 / 40 + (660)^2 / 40) - (1440)^2 / 80 = 15210 + 10890 - 25920 = 180$$

$$SS AxB = SS \text{ between} - SS A - SS B = 520 - 20 - 180 = 320$$

///compute F-ratio MS

$MS A = SS A / DfA = 20/1 = 20$

$MS B = SS B / DfB = 180/1 = 180$

$MS AxB = SS AxB / dfAxB = 320/1 = 320$

$MS Within = SS within / df within = 5396 / 76 = 71$

///compute F-ratio

$F A = MS A / MS within = 20/71 = 0.282$

$F B = MS B / MS within = 180/71 = 2.535$

$F AxB MS AxB / MS within = 320/71 = 4.507$

/// Check F critic

$F critic(1,71) = 4.00$

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$F critic(1,71) = 4.00$

Factor B: Fullness					
Factor A:		Empty	Full		
Weight	Normal	n=20 $\bar{X} = 22$ T=440 SS=1540	n=20 $\bar{X} = 15$ T=300 SS=1270	$T_{obese} = 740$	
	Obese	n=20 $\bar{X} = 17$ T=340 SS=1320	n=20 $\bar{X} = 18$ T=360 SS=1266	$T_{normal} = 700$	
		$T_{empty} = 780$	$T_{full} = 660$		G=1440 N=80 $\Sigma X^2 = 31836$

Table 1. Mean number of crackers eaten in each treatment condition			
		Fullness	
		Empty Stomach	Full Stomach
Weight	Normal	M=22 SD=9.00	M=15 SD=8.18
	Obese	M=17 SD=8.34	M=18 SD=8.16

Table 2. Result				
Source	SS	DF	MS	F
Between treatment	520	3		
- Factor A (weight)	20	1	20	20/71 (0.282)
- Factor B (fullness)	180	1	180	180/71 (2.535)
- A x B interaction	320	1	320	320/71 (4.507)
- Within treatment	5396	76	71	
Total	5916	79		
Weight x fullness factorial design				

/// 통계학적 결론

1) $F_A = 0.2817$ 그리고 $F_B = 2.5352$ 은 F_{critic} 의 값 4 보다 작으므로 Weight와 Fullness 각각은 numbers of cracker eaten와 무관.

2) 그러나 weight 와 fullness 의 상호작용을 보면 $F_{AxB} = 4.5070 > 4.00$ 이므로 numbers of cracker eaten에 영향을 끼친다.

Q3. 결론

- 1) Weight가 number of crackers eaten 에 영향을 주지 않는다.
- 2) Fullness가 number of crackers eaten 에 영향을 주지 않는다.
- 3) Weight 와 Fullness의 상호작용은 number of crackers eaten 에 영향을 준다.