Step1. Build Hypotheses

1. Weight (normal/obese)와 number of crackers eaten과의 관계
2. Fullness(empty/full)와 number of crackers eaten 과의 관계
3. Fullness & Weight와 number of crackers eaten의 동시적인 관계

Step2. Locate the critical range for F-ratio. Calculate the df, SS, MS, F

 = N – 1 = 20 + 20 + 20 + 20 - 1 = 79

 = (20 – 1) \* 4 = 76

 = (Number of groups) – 1 = 4 – 1 = 3

 = (Number of levels of A) – 1 = 2 – 1 = 1

 = (Number of levels of B) – 1 = 2 – 1 = 1

 =  - ( + ) = 3 – (1 + 1) = 1

 = =31836 - $\frac{1440^{2}}{80}$ = 5916

 = 1540 + 1270 + 1320 + 1266 = 5396

 =  -  = 5396

 = (440+300)^2/40 + (340+360)^2/40 – 25920 = 20

 = (440+340)^2/40 + (300+360)^2/40 – 25920 = 180

 = = 520 – 20 - 180

=  ÷  = 20 ÷ 1 = 20

=  ÷  = 180 ÷ 1 = 180

=  ÷  = 320 ÷ 1 = 320

=  ÷  = 5396 ÷ 76 = 71

=  ÷  = $\frac{20}{71}$

=  ÷  = $\frac{180}{71}$

 =  ÷  = $\frac{320}{71}$

|  |
| --- |
| Mean number of crackers eaten in each treatment condition |
| M=meanSD=standard deviation | Fullness |
| Empty | Full |
| weight | Normal | M=17, SD=8.34 | M=18, SD=8.16 |
| obese | M=22, SD=9.00 | M=15, SD=8.18 |

|  |
| --- |
| Result |
| Source | SS | Df | MS | F |
| Between treatment | 520 | 3 | - | - |
| -Factor A(weight) | 20 | 1 | 20 | 20/71(0.28) |
| -Factor B(fullness) | 180 | 1 | 180 | 180/71(2.53) |
| -A x Binteraction | 320 | 1 | 320 | 320/71(4.50) |
| Withintreatment | 5396 | 76 | 71 | - |
| Total | 5916 | 79 | - | - |
| Weight x fullness factorial design |

Step3. Statistical Decision

(1,71)≈0.2816, (1,71)≈2.5352, (1,71)≈4.5070

$$\frac{1}{76}≈\frac{13}{1000}이므로 테이블에서 값을 찾았을 때 F\left(crit\right) 값을 넘는 값은$$

 뿐이므로 만 영가설(null hypothesis)를 부정한다.

Step4. Result Explanation

 Weight와 Fullness가 각각의 요인으로 작용할 때는 $F\_{critical value}$ 값을 넘지 못했으므로 number of crackers eaten와는 상관관계가 없다. 하지만 두 요인이 동시에 작용했을 때는 $F\_{critical value}$ 값을 넘었으므로 상관관계가 있다고 말할 수 있다.