Factorial ANOVA의 예1을 완전히 풀어서 제시하시오.

step 1. Build hypotheses

①Weight에 따라 number of crackers eaten에 차이가 있을 것이다()

②Fullness에 따라 number of crackers eaten에 차이가 있을 것이다()

③Fullness와 Weight의 상호작용에 따라 number of crackers eaten에 차이가 있을 것이다

(H1: Weight팩터와 Fullness팩터 간의 상호작용이 존재한다. 즉, 각각의 상태에 따라서 나타나는 평균의 차이가 두 팩터가 갖는 주효과에 의해서만 설명되지 않고 부가적으로 더 있다.)



step 2. Locate the critical range for F-ratio. calculate the 

 = 20 + 20 + 20 + 20 – 1 = 79

 = (20-1) + (20-1) + (20-1) + (20-1) = 76

 = 4 – 1 = 3

 = number of levels of A – 1 = 2 – 1 = 1

 = number of levels of B – 1 = 2 – 1 = 1

* = df(between) – df(A) – df(B)

 = 3 – 1 -1 = 1

Compute F-ratio SS

1. 

 = 31836 – 1440^2 / 80

 = 31836 – 25920

 = 5916







1. 



1.  = SS(total) – SS(within) = 5916 – 5396 = 520

 = 440^2/20 + 300^2/20 + 340^2/20 + 360^2/20 – 1440^2/80 = 9680 + 4500 + 5780 + 6480 – 25920 = 520

1. 

 = (440+300)^2/40 + (340+360)^2/40 – 25920 = 13690 + 12250 – 25920 = 20

1.  = (440+340)^2/40 + (300+360)^2/40 – 25920

 = 15210 + 10890 – 25920

 = 180

1. 



= 520 – 20 – 180

= 320

MS

1.  = SS(A) / df(A) = 20/1 = 20
2.  = SS(B) / df(B) = 180/1 = 180
3.  = SS(A\*B) / df(A\*B) = 320/1 = 320
4.  = SS(within) / df(within) = 5396/76 = 71

F-ratio

1. (1,76) = MS(A) / MS(within) = 20/71 = 0.2817
2. (1,76) = MS(B) / MS(within) = 180/71 = 2.5352
3. (1,76) = MS(A\*B) / MS(within) = 320 / 71 = 4.5070

F(crit)(1,76) = 4.00

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In the literature (APA style)

The means and standard deviations are presented in Table 1. The two-factor analysis of variance showed no significant main effect for the weight factor, F(1,71)= 0.2817, p>.05; and no significant main effect for the fullness factor, F(1,71)= 2.5352, p>.05; but the interaction between weight and fullness was significant, F(1,71)= 4.5070, p<.05.

Make decision

①Weight에 따라 number of crackers eaten에 차이가 없다

②Fullness에 따라 number of crackers eaten에 차이가 없다

③Fullness와 Weight의 상호작용에 따라 number of crackers eaten에 차이가 있다

| **Result**  |
| --- |
| Source  | SS  | df  | MS  | F  |
| Between treatment  | 520 | 3 |  |  |
| - Factor A (weight)  | 20 | 1 | 20 | 0.2817 |
| - Factor B (fullness)  | 180 | 1 | 180 | 2.5352 |
| - A x B interaction  | 320 | 1 | 320 | 4.5070 |
| Within treatment  | 5396 | 76 | 71 |  |
| Total  | 5916 | 79 |  |  |
| weigth x fullness factorial design  |



