Step 1/6  
Step 1: Calculate the mean of Math Ability and Belief that Math Ability is Innate. Mean of Math Ability = (66 + 70 + 50) / 3 = 62 Mean of Belief that Math Ability is Innate = (7 + 4 + 10) / 3 = 7  
  
Step 2/6  
Step 2: Calculate the deviation scores for Math Ability and Belief that Math Ability is Innate. Deviation score for Math Ability 1 = 66 - 62 = 4 Deviation score for Math Ability 2 = 70 - 62 = 8 Deviation score for Math Ability 3 = 50 - 62 = -12 Deviation score for Belief that Math Ability is Innate 1 = 7 - 7 = 0 Deviation score for Belief that Math Ability is Innate 2 = 4 - 7 = -3 Deviation score for Belief that Math Ability is Innate 3 = 10 - 7 = 3  
  
Step 3/6  
Step 3: Calculate the product of deviation scores for each participant. Product of deviation scores for participant 1 = 4 x 0 = 0 Product of deviation scores for participant 2 = 8 x -3 = -24 Product of deviation scores for participant 3 = -12 x 3 = -36

Step 1/5  
Step 1: Restate the question as a research hypothesis and a null hypothesis about the populations. Population 1: People exposed only to visual content (V) Population 2: People exposed only to verbal content (Vb) Population 3: People exposed only to paraverbal content (Pv) Research Hypothesis (H1): There is a significant difference in the mean scores of people exposed to visual, verbal, and paraverbal content. H1: μV ≠ μVb ≠ μPv Null Hypothesis (H0): There is no significant difference in the mean scores of people exposed to visual, verbal, and paraverbal content. H0: μV = μVb = μPv  
  
Step 2/5  
Step 2: Determine the characteristics of the comparison distribution. To determine the characteristics of the comparison distribution, we need to conduct an ANOVA (Analysis of Variance) test. For this, we need the sample sizes, means, and standard deviations for each population. However, this information is not provided in the question.  
  
Step 3/5  
Step 3: Determine the cutoff sample score on the comparison distribution at which the null hypothesis should be rejected. To determine the cutoff sample score, we need to find the critical F-value. This can be found using an F-distribution table with the appropriate degrees of freedom and alpha level (α = 0.05). The degrees of freedom are calculated as follows: df1 (between groups) = k - 1, where k is the number of groups (populations) df2 (within groups) = N - k, where N is the total number of participants across all groups Again, we do not have the necessary information to calculate the degrees of freedom or the critical F-value.

Instant Solution:

Step 1/5  
Step 1: Restate the question as a research hypothesis and a null hypothesis about the populations. Population 1: People exposed only to visual content (V) Population 2: People exposed only to verbal content (Vb) Population 3: People exposed only to paraverbal content (Pv) Research Hypothesis (H1): There is a significant difference in the mean scores of people exposed to visual, verbal, and paraverbal content. H1: μV ≠ μVb ≠ μPv Null Hypothesis (H0): There is no significant difference in the mean scores of people exposed to visual, verbal, and paraverbal content. H0: μV = μVb = μPv  
  
Step 2/5  
Step 2: Determine the characteristics of the comparison distribution. To determine the characteristics of the comparison distribution, we need to conduct an ANOVA (Analysis of Variance) test. For this, we need the sample sizes, means, and standard deviations for each population. However, this information is not provided in the question.  
  
Step 3/5  
Step 3: Determine the cutoff sample score on the comparison distribution at which the null hypothesis should be rejected. To determine the cutoff sample score, we need to find the critical F-value. This can be found using an F-distribution table with the appropriate degrees of freedom and alpha level (α = 0.05). The degrees of freedom are calculated as follows: df1 (between groups) = k - 1, where k is the number of groups (populations) df2 (within groups) = N - k, where N is the total number of participants across all groups Again, we do not have the necessary information to calculate the degrees of freedom or the critical F-value.

Solution:

A. Paired t-test is used because the data is dependent.

B. Step 1: Null Hypothesis (Ho): \mud \geq 0

Alternative Hypothesis (Ha): \mud < 0

Step 2: Level of significance,a = 0.05

Step 3: Test Statistics

t = (\bar{Xd} - \mu d)/(sd/sqrt(n))

t = (-1.143 - 0)/ (2.116/\sqrt7)

t = -1.43

Step 4: Reject or Fail to reject Ho

Degrees of freedom, df = n - 1 = 7 - 1 = 6

Using t-tables, the critical value is

t (a/2, df) = t (0.025, 6) = -2.447

Step 5: Conclusion

Since test statistics is greater than the critical value, we fail to reject Ho.

Hence, there is no significant difference in scores after watching a popular science fiction movie.

Calculations of \bar{Xd} and sd

|  |  |  |  |
| --- | --- | --- | --- |
| Before | After | d = After-before | (d - X-bard)^2 |
| 3 | 3 | 0 | 1.306449 |
| 5 | 3 | -2 | 0.734449 |
| 9 | 6 | -3 | 3.448449 |
| 6 | 8 | 2 | 9.878449 |
| 7 | 8 | 1 | 4.592449 |
| 5 | 2 | -3 | 3.448449 |
| 4 | 1 | -3 | 3.448449 |
|  | Sum = | -8 | 26.857143 |
|  |  | -1.142857143 |  |

\bar{Xd} = -1.143, sd = \sqrt(d-\bar{Xd})^2/(n-1) = \sqrt26.8571/6 = 2.116

C. 95% confidence interval is given by:-

\bar{Xd} \pm t (a/2, n - 1)*(sd/sqrt(n))

-1.143 \pm t (0.025, 6)\*(2.116/\sqrt(7))

-1.143 \pm 2.447\*0.7997

-1.143 \pm 1.957

-3.100, 0.814

D. Cohen's d = \bar{X d}/sd

Cohen's d = 1.143/2.116

Cohen's d = 0.54 (Medium effect)

Step 1:

H0: Null Hypothesis: Hd So (People believed more than or equal in the supernatural after watching the movie)

HA:Alternative Hypothesis: 0 < Prl (People believed less in the supernatural after watching the movie) (Claim)

Step 2:

From the given data, values of d = Before - After are got as follows:

d = Before - After = 0, 2, 3, - 2, - 1, 3 3

From d values, the following statistics are calculated:

n = Sample Size = 7

\bar{d} = Mean of d values = 1.143

sd = Standard Deviation of d values

Step 3:

\alpha = 0.01

df = 7 - 1 = 6

From Table, critical value of t = 3.143

Step 4:

The Test Statistic is calculated as follows:

t = =
Sdn
1.143
2.116/17

Step 5:

Since calculated value of t = 1.429 isless than critical value of t = 3.143, the difference is not significant. Fai lto reject null hypothesis.

Conclusion:

The data do not support the claim that eople believed less in the supernatural after watching the movie.

(b)

Effrect Sizeis given by:

d = 1.143
d= 118 = 0.5402