

# Analysis of Northwind Consumer Purchasing Behavior for Northwind

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# QUESTIONS ABOUT CONSUMER PURCHASING BEHAVIOR

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- ▶ Q1: “Do discounts have a statistically significant effect on the number of products customers order? If so, at what level(s) of discount?”
- ▶ Q2: Do customers spend more money overall if they are buying discounted items?
- ▶ Q3: Does time of year affect how much consumers buy?
- ▶ Q4: Do countries that buy discounted items in higher-than-average quantities spend more money (have higher order totals)?

# OUR METHODOLOGY

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- ▶ Explored SQL Database for data re: insights into consumer behavior.
- ▶ Defined formal hypothesis and used the scientific method.
- ▶ Performed analysis of data distributions to decide appropriate test.
  - ▶ D'Agostino & Pearson's normality test.
  - ▶ Levene's test for equal variance.
- ▶ Performed proper statistical tests to test our hypotheses.
  - ▶ Mann-Whitney U
  - ▶ Tukey's Pairwise Multiple Comparison tests.

## HYPOTHESIS 1:

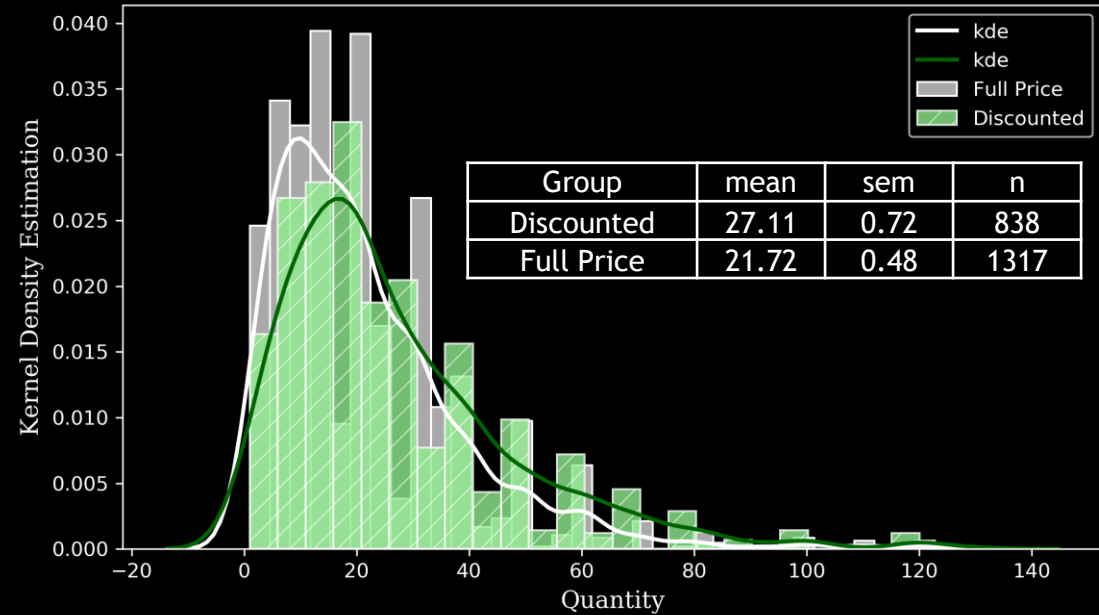
Do discounts have a statistically significant effect on the number of products customers order?

If so, at what level(s) of discount?

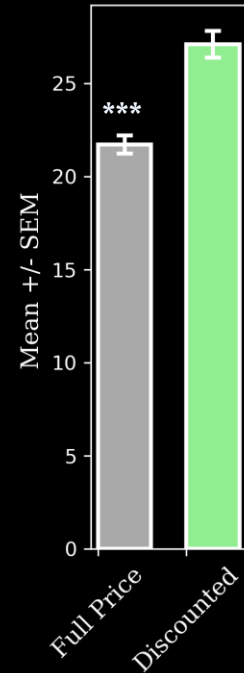
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- ▶  $H_1$  : Products that are discounted sell in higher quantities.
- ▶  $H_0$  : Products that are discounted sell the same quantities as full-price products.

Distribution of Quantity Sold



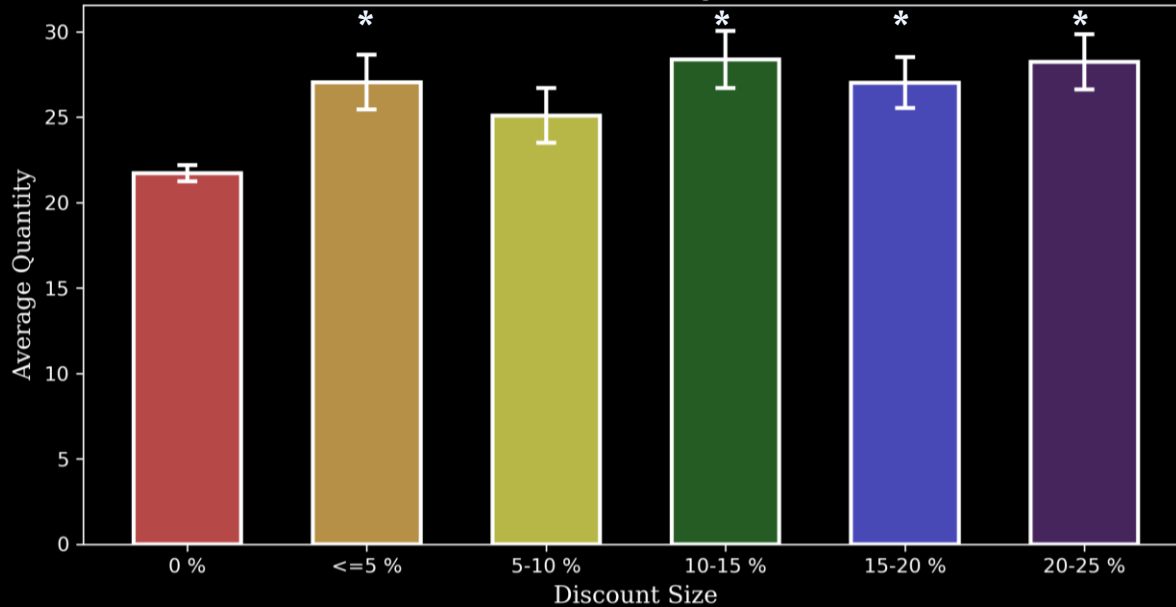
Average Quantity Sold



# Results:

- ▶ Consumers buy larger quantities of discounted items.
- ▶ The level of discount did not have a significant effect on the average quantity purchased.

Quantities Purchased By Discount Size



Discount	mean	sem	n
0 %	21.72	0.48	1317
<=5 %	27.05	1.61	192
5-10 %	25.10	1.61	174
10-15 %	28.38	1.67	157
15-20 %	27.02	1.48	161
20-25 %	28.24	1.62	154

## HYPOTHESIS 2:

Do customers spend more money if they are buying discounted items?

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- ▶  $H_1$  : Customers spend more money overall when their order includes discounted items.
- ▶  $H_0$  : Customers spend the same amount regardless of discounted items.

# Results:

- ▶ Consumers spent significantly more money when they were purchasing 1+ products at a discount.



## Hypothesis 3:

Do customers buy different quantities of products depending on the time of year?

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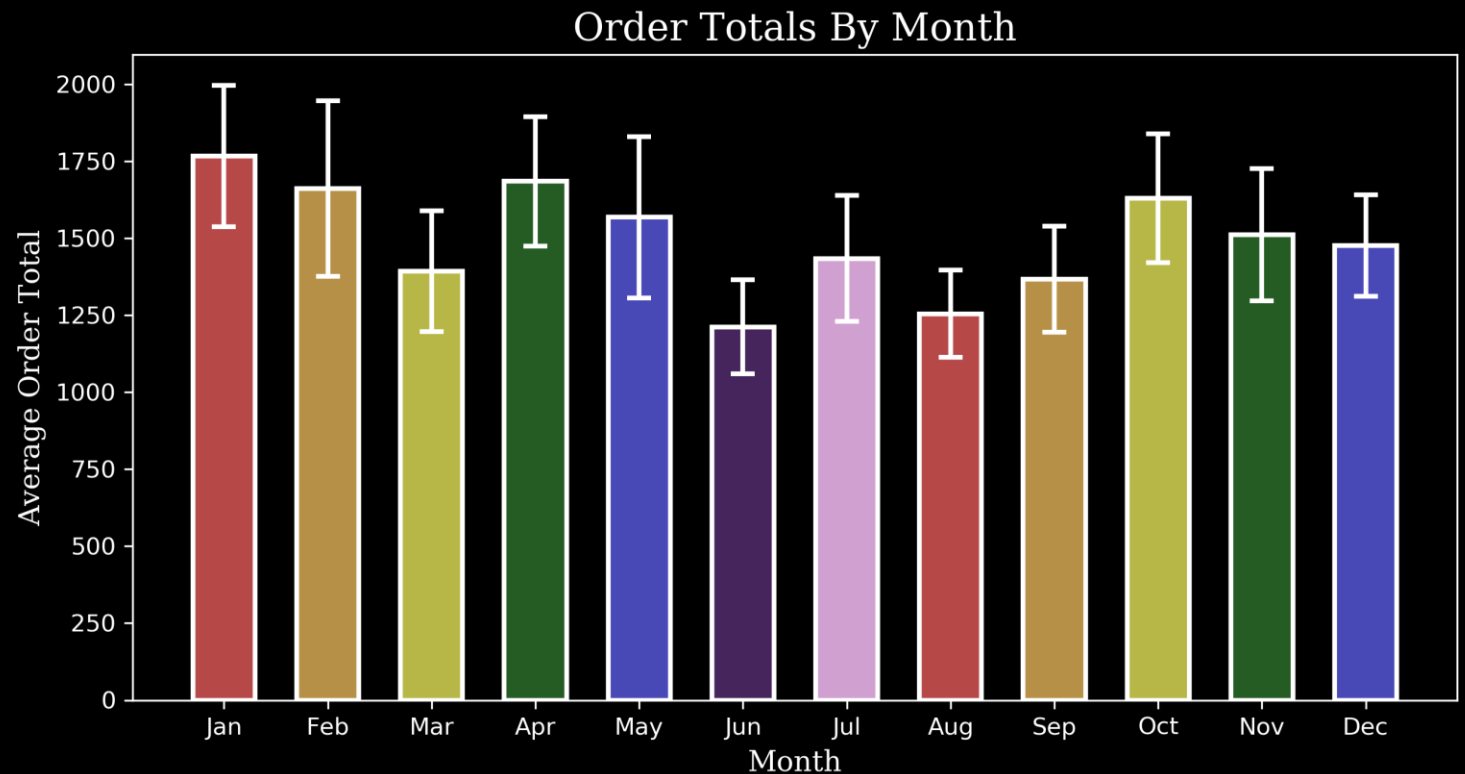
- ▶ ***H1*** : The mean quantities of products sold vary by month.
- ▶ ***H0*** : The mean quantities of products sold do not change by month.



# Results:

- There was no significant effect of month on order totals.

Group	mean	sem	n
jan	1766.82	229.22	88
feb	1661.43	284.95	83
mar	1392.25	195.75	103
apr	1684.11	210.21	105
may	1567.72	261.78	46
jun	1212.09	152.38	30
jul	1434.23	204.70	55
aug	1254.71	141.29	58
sep	1366.84	172.44	60
oct	1629.14	209.65	64
nov	1510.74	215.25	59
dec	1476.43	164.97	79



## Hypothesis 4:

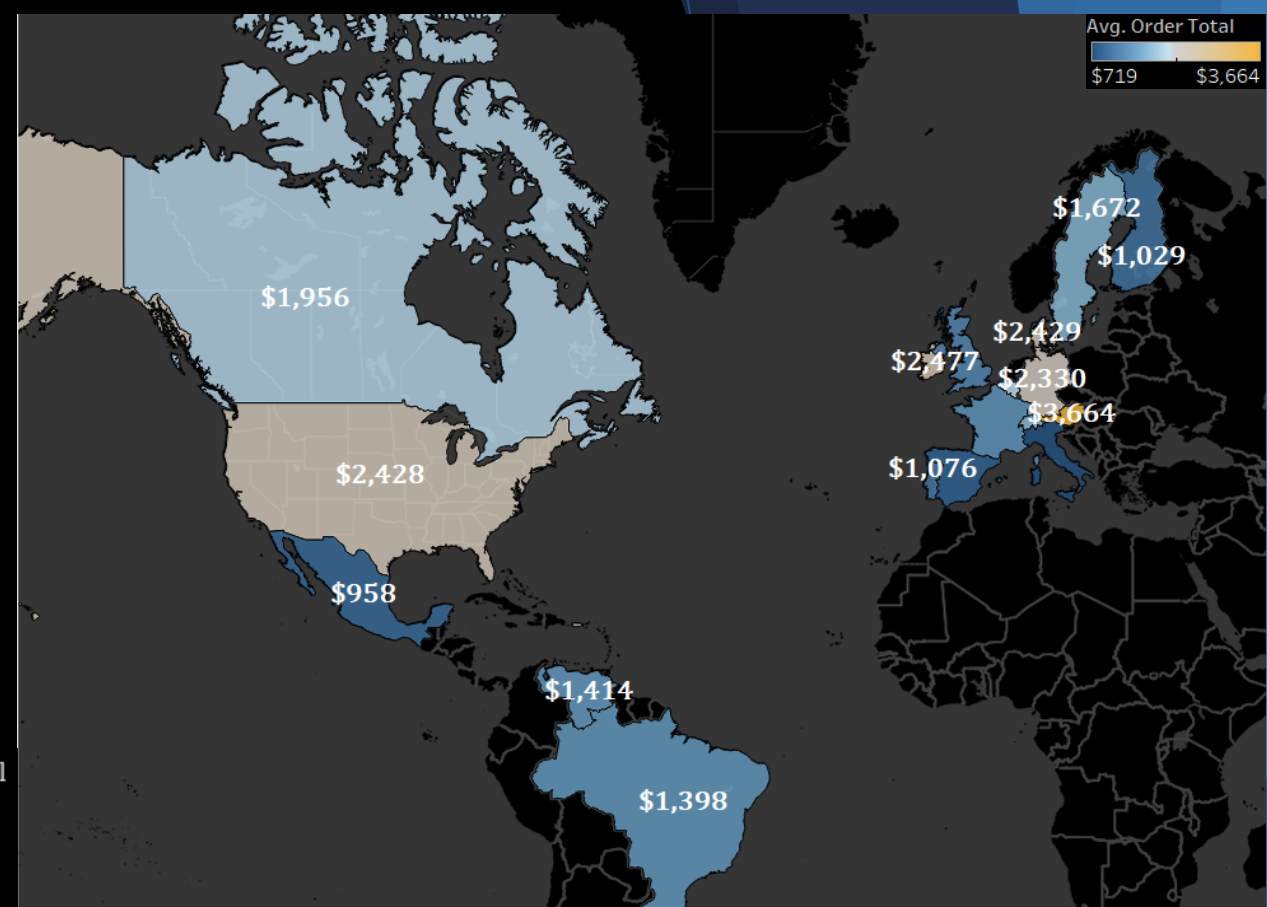
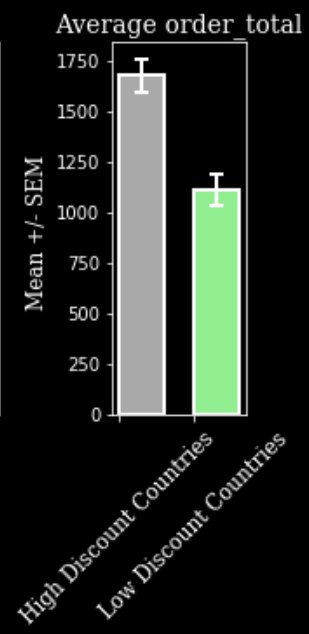
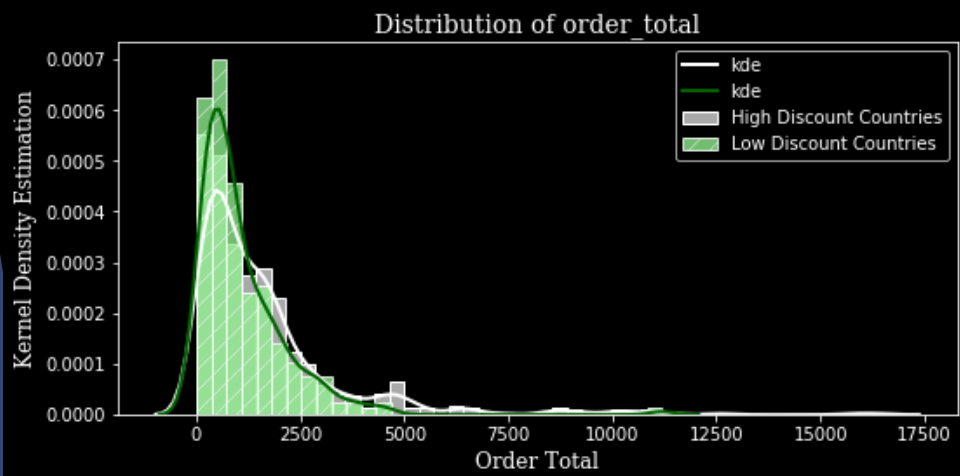
Do countries that buy discounted items in higher-than-average quantities spend more money (have higher order totals)?

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- ▶ ***H1***: Orders shipped to countries where average orders contain higher than average amounts of discounted items per order spend more per order on average than other countries.
- ▶ ***H0***: Orders shipped to countries where average orders contain higher than average amounts of discounted items per order spend the same per order on average than other countries.

# Results:

- ▶ High Discount Countries spend significantly more money than low discount countries.



TestName	Test Purpose	stat	p	p < .05
normaltest	Normality	447.1498921	7.99162E-98	TRUE
normaltest	Normality	215.2311176	1.83298E-47	TRUE
levene	Equal Variance	13.94809425	0.000200801	TRUE
mannwhitney u	Hi sig.	77366.5	0.000227103	TRUE

# Recommendations

- ▶ Discounts spur consumer purchasing behavior.
  - ▶ They buy discounted items in higher quantities.
  - ▶ They spend more money if they are purchasing 1+ discounted items.
- ▶ Time of year (by month) was not significant, but further metrics worth investigating.
- ▶ Customers from different countries have unique spending behaviors that may be capitalized on with further investigation.