

GCSE COURSEWORK MODULE 2

MEMORY GAME

1. INTRODUCTION

Hypothesis

The hypothesis that this investigation will be testing is that women will remember more items than the men.

This particular experiment has been chosen, as there is personal interest involved. This topic is often debated at home. It is also interesting to find out what particular items men and women would remember.

Extended Investigation Hypothesis

The second hypothesis that this investigation will be testing is that younger people will remember more items than the older people.

2. COLLECTION OF DATA

Sample Chosen

The sample size chosen for this investigation was 50. It was decided that this would be sufficient for this level of study as it is only intended to obtain a general understanding of memory capability.

The sample that has been chosen for this investigation was a convenience sample. It was a convenience sample as the method of obtaining respondents was by opportunity (knocking on peoples doors). 25 male and 25 female friends, family, neighbours and work colleagues were chosen. Within each group of 25 there were 5 men and 5 women of the following age groups: 20 –30, 31-40, 41-49, 50 – 59, and 60 plus.

This sample was appropriate to this investigation, as it would have proven difficult to conduct the memory game in any other sample type. Other sample types were eliminated for the following reasons:

- Random sampling- this is usually conducted in public places such as outside a supermarket and it would difficult to display the items without a table.
- Systematic sampling -Would need a large population to choose from and have not have enough friends, family, etc to select every 20th person (for example).

Method of Experiment

The method used for collecting primary data was by conducting an experiment.

The experiment was based on a memory game. 16 different items were placed on a table or on the floor and the respondents were given 30 seconds to look at the items. The items were then covered with a cloth and the respondents were given a response sheet to list the as many items they could remember in two minutes. There were also two short questions on the bottom of the response sheet that asked the respondents their gender and their age group. The respondents were asked to specify an age group as it is not as offensive as asking someone their exact age.

The data being collected in this study was both qualitative and quantitative. The 16 items that were used in the memory game would be used as qualitative data as they can be described in words such as hairbrush, pen, and apple. This information will be useful when finding out what was the most popular item remembered by men/women. They could also be grouped together to find relationships/correlations between items. When calculating the total amount of items remembered by men and women and when comparing age groups quantitative data is required. This is because it needs to be measured in a numerical format. The variables in this investigation are discrete as they can only take certain values. Item names or the amount of items remembered are not continuous variables such as height or temperature.

The memory game was conducted on either a one on one basis or in small groups of two or three. It was usually in the respondent's home as it was more convenient for them this way.

The items used were varied in nature so that the experiment would be fair. There were items that men and women would recognise easily. The items were also selected to be familiar with people across different age groups such as a pen, packet of crisps, hairbrush, and an apple. A full list of the items is given in table 1. It was assumed that people would remember items that they are associated with personally. This idea was taken into consideration for the conclusion part of the investigation.

The following items were used in this memory game:

Table 1.

Item Number	Item Name	Item Number	Item Name
1.	Apple	9.	Barbie Doll
2.	Tape Measure	10.	Teddy Bear
3.	Nappy	11.	Packet of Crisps
4.	Pen	12.	Newspaper
5.	Mobile Phone	13.	Screwdriver
6.	Lipstick	14.	Hairbrush
7.	CD	15.	Toy Train
8.	Book	16.	Keys

Steps Taken to Avoid Bias

- The same items were used for every memory game and the items were placed in the same order/pattern to make it fair.
- The same timer was used in all the games.
- Everyone was given 30 seconds to remember the items and 2 minutes to write the items down.
- As mentioned earlier the items selected for the game were varied to appeal to both sexes and all age groups.
- Every effort was made to have an equal amount of respondents in each age group.

3. TABULATING DATA

A tally sheet was used to record the raw data for the items respondents remembered in 2 minutes. Originally the raw data was added onto the tally chart manually with lines in groups of 5. The numbers have been added for word processing purposes. When the data is put into a tally chart it is easy to make comparisons.

Table 2 – Items remembered by respondents

Item	Apple	Tape Measure	Nappy	Pen	Mobile Phone	Lipstick	CD	Book
Men	19	16	15	12	19	14	17	19
Women	16	18	17	19	19	21	16	13

Item	Barbie Doll	Teddy Bear	Crisp Packet	News-Paper	Screw-driver	Hair Brush	Toy Train	Keys
Men	16	8	17	20	13	15	16	13
Women	20	17	11	17	23	20	16	18

A frequency tally chart was used to ungroup the data. The data was ungrouped because it was intended to compare the frequency of each group. This way the hypothesis can be tested. Initially it was intended to do a stem and leaf diagram but it was found that tally charts were more appropriate for this investigation. The data from a Stem and leaf diagram is grouped in ranges. They usually have larger numbers; the data from this study is in smaller numbers.

Table 3. Tally chart for items remembered for men

Number of Items	Tally	Frequency
5		0
6		0
5		3
8		4
9		3
10		5
11		2
12		3
13		1
14		3
15		1
16		0

Table 3. Tally chart for items remembered for women

Number of Items	Tally	Frequency
5		0
6		0
7		1
8		2
9		1
10		3
11		9
12		5
13		1
14		2
15		1
16		0

Table 4 Tally Chart For Items Remembered by Age Groups

AGE GROUPS

ITEM NO	20-30	31-40	41-50	51-60	61 PLUS
7	0	1		3	
8	3	2		1	
9		1	1	1	1
10	2	2	3		2
11	1	2	1	3	4
12	2	1	3		2
13	2				
14		1	2	1	
15	1			1	1
16					
Totals	110	100	114	100	112

This data will be used to create a bar chart to compare the quantities that the different age groups remembered.

4. DISPLAYING DATA

This grouped frequency table shows the number of items remembered by men in the memory game investigation.

Table 2.

Items	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Frequency	0	0	0	0	0	0	3	4	3	5	3	3	0	3	1	0

Histograms have been chosen because they represent frequency. They are suited to this data as it is all in whole numbers. A frequency polygon would have been used for data such as temperature or time therefore a histogram is more appropriate for this study. A relationship is shown of the exact amount of items remembered.

Graph 1 Histogram – The number of items remembered by men

The modal class is seen in this histogram, which is 5.

The data is closely grouped together in this chart. The majority of items remembered by men are in the range of 7 – 11. When there is an increase in the number of items it is more subtle than the women's. This histogram shows that men do not remember as many items as women. It also shows that the men overall remembered a closer number of items.

This grouped frequency table shows the number of items remembered by women in the memory game investigation.

Table 3.

Items	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Frequency	0	0	0	0	0	0	1	2	1	3	9	5	1	2	1	0

Graph 2- The number of items remembered by women.

The modal class is 9

The data in this histogram is widely spread. There are larger increases between the ranges. The majority of items remembered in the range of 10 – 13. This histogram shows that women have remembered more items. It also shows that the women in the investigation either remembered a low number or a high number of items.

Box Plots (Box and Whisker Diagram)

Box plots have been chosen as they show the shape of distribution and enable the two sets of data (men and women items remembered) to be compared. The two sets of values will prove or disprove the hypothesis that women will remember more.

Chart 3- Box Plots (Box and Whisker Diagram)
The total items men and women remembered

This set of box plots is showing the shape of distribution of items remembered between men and women. Since the range is the same between men and women it does not successfully show a difference between the items remembered.

The range for men and women is $7 - 15$ (items remembered) = 8

The lower quartile is 8.5

The upper quartile is 13.5

The interquartile range is 5

This box plot does not successfully show the difference between the number of items between men and women, as their range is the same. Therefore, another method was required.

Chart 4. **Box Plots (Box and Whisker Diagram)**

This box plot shows the shape of distribution of the frequency of items remembered. When using the frequency of items remembered a different distribution of data could be seen. This box plot shows that women remembered a greater number of items.

The range for the frequency for men and women is $5 - 1 = 4$

The lower quartile is 2

The upper quartile is 4

The interquartile range is 2

Chart 5. Comparison of age groups of items remembered

This bar chart shows that overall the total of items remembered is close between age groups. The group with the highest total is the 41 –50 age range. Over the ages the ability to remember is almost the same. This disproves the hypothesis that younger people will remember more items, as the age group that had the highest number was 41-50. This chart also shows that ages 31-40 and 51-60 are the same.

5. ANALYSING DATA

The following methods of analysis have been used to confirm the results of the investigation:

The Mean

The arithmetic mean (mean) has been used to compare the totals of the two groups.

The mean of women who remembered 10 items or more is:

$$3 + 9 + 5 + 1 + 2 + 1 = 21$$

$$\text{Divide by } 6 = 3.5$$

The mean of men who remembered 10 items or more is:

$$5 + 2 + 3 + 1 + 3 + 1 = 15$$

$$\text{Divide by } 6 = 2.5$$

The Mode

The mode has been used to find the most common value. The most common item this investigation is interested in is the most common number of items remembered.

The number of items that occurs the most in women is:

7, 8, 8, 9, 10, 10, 10, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 12, 12, 12, 12, 12, 13, 14, 14, 15

The mode is 11

The number of items that occurs the most in men is:

7, 7, 7, 8, 8, 8, 8, 9, 9, 9, 10, 10, 10, 10, 10, 10, 11, 11, 12, 12, 12, 13, 14, 14, 14, 15

The mode is 10

The Median

The median has been used, as there are some extreme values in the histogram chart. This calculation is useful wanting to ignore extreme values that can change the balance of an investigation. It is good for when considering averages.

The median of the number of items women remembered is:

7, 8, 8, 9, 10, 10, 10, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 11, 12, 12, 12, 12, 12, 12, 13, 14, 14, 15,

The median is 11

The median of the number of items men remembered is:

7, 7, 7, 8, 8, 8, 8, 9, 9, 9, 10, 10, 10, 10, 10, 10, 11, 11, 12, 12, 12, 13, 14, 14, 14, 15

The median is 5

Table 4. The mean of Frequency distribution

Number of Items	Number of People in study	Items and People
7	4	$7 \times 4 = 28$
8	10	$8 \times 10 = 80$
9	4	$9 \times 4 = 36$
10	8	$10 \times 8 = 80$
11	11	$11 \times 11 = 121$
12	8	$12 \times 8 = 96$
13	2	$13 \times 2 = 26$
14	5	$14 \times 5 = 70$
15	2	$15 \times 2 = 30$
Totals	57	567

567 divided 57 = 9.9

This is the mean of the number of items per person.

The formula is

6. CONCLUSIONS

This has proven to be a very interesting investigation.

The tally sheets to record the items remembered in 2 minutes (Table 2) gave an easy way to compare the type of items that men and women remembered. It did show that women remember more 'feminine' items such as lipstick (men 14, women 21). But it was expected that men would have a much lower score in some items than men. For nappies women remembered 15 and women remembered 17, which isn't much of a difference. In some areas this disregarded the theory that the respondents would remember items all linked to them. It is assumed that because of changing roles of men and women today that there is no advantage of remembering such items as they use them equally.

In general the hypothesis was proven to be correct by only marginally. By using the mean it has supported the hypothesis and when using the mean for whether men and women remembered 10 items or more. It can be said by these results that men and women have equal memory ability.

This investigation did not prove that younger people have better memory ability. This was most surprising. Again overall when looking at table 4 it is very close. The age group that remembered the most was age 41 - 50

When looking at the histograms it can be seen that women either have a very good memory or average. The values go up and down dramatically. Whereas the men's histogram is more concentrated. This can be interpreted, as they are all basically the same on average.

When comparing the box plots the first graphs did not show any relationship. When comparing the frequency it gave much better results and favoured the women.

This study could be further tested by:

- Extend the time the respondents had to remember the items to see if it makes a difference.
- Find out if the occupations of the respondents as it could effect how they remember. If they worked with certain items in the game they may remember them more.
- Perhaps in a larger investigation there would be more accurate results of the population. It is difficult to make a statement on the difference between men and women on only a sample of 50.

There was some bias in the investigation. The age groups for example were uneven. 20 -30 was a group of 10, 31 - 40 was a group of 9, 41 - 50 was a group of 9, etc. It would be fairer to have exact age ranges.

There are factors that could affect a person's memory and that could be the time of day and whether they have eaten recently. If a person is tired or hungry they will not remember as well.

It was discussed after the memory test as to what methods people used to remember items. Some mentioned that making up a story about the items or remembering the items in a pattern helped them to remember the items easier. Having groups using different methods to remember the items and see which group remembered the most could test these ideas.

It would be useful to use secondary research in further investigations next time to compare results with previous investigations.

