Experiment and Statistical Analysis to find the best Biscuit

Abstract

This paper details an experiment to find the best biscuit, it details the methodology involved in the experimentation collecting data of multiple crisps over a variety of categories and performs a statistical analysis on the results finally coming to a conclusion.

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1. Introduction

I have previously looked at the best Prawn Cocktail crisp. I am now following on from this I am now looking at another type of snack, Biscuits.

2. Aim

The aim of this experiment is to determine the second best biscuit (since we all know that Chocolate Fingers are the best) for this we will look at scores given across different criteria and at the end provide an assessment on value for each of the biscuits.

3. Methodology.

To conduct this experiment 13 people rated various biscuits out of 5 over the following categories.

Appearance – the look of the biscuit

Taste – how nice the flavours of the biscuit

Texture – How the biscuit feels in the mouth

Dunkability – a rating of how the biscuit performs when dunked in tea

Overall Rating – Overall opinion of the person

The biscuits were tastes sequentially, with each packet in turn being passed round the room until everyone had the current biscuit being tasted, these were then eaten and rated by each person.
The order of the crisps were as follows

1.Chocolate Digestive

2.Maryland Cookie

3.Custard Cream

4.Bourbon

5.Ginger Nut

6.Jammie Dodger

7.Chocolate HobNob

4. Results.

Digestives		A	B	C	D	E	F	G	H	I	J	K	L	M
	Appearance	3	3	5	5	3	3	1	3	4	5	2	5	5
	Taste	4	3	5	5	2	3	2	1	5	4	2	5	5
	Texture	4	3	3	5	4	3	1	1	4	4	2	5	4
	Dunkability		3	3	4	4	3	3	3	4	5	3	4	
	Overall	4	3	4	5	5	3	2	2	5	5	2	5	4
Maryland Cookiee		A	B	C	D	E	F	G	H	I	J	K	L	M
	Appearance	4	4	2	4	2	2	3	4	4	2	3	3	4
	Taste	5	4	2	5	1	4	4	1	3	2	2	3	5
	Texture	5	2	2	4	2	3	5	2	3	4	3	3	5
	Dunkability		3	4	2	2	2	4	3	2	5	4	2	
	Overall	5	4	3	5	2	4	4	2	3	2	1	3	4
Custard Cream		A	B	C	D	E	F	G	H	I	J	K	L	M
	Appearance	5	3	5	4	2	5	5	5	5	5	4	5	3
	Taste	2	3	3	0	1	3	4	4	5	4	4	5	3
	Texture	2	2	3	1	1	3	3	5	4	5	4	5	2
	Dunkability		2	5	3	1	3	2	4	4	3	2	3	
	Overall	2	2	3	0	1	3	4	4	4	5	3	5	3
Bourbon		A	B	C	D	E	F	G	H	I	J	K	L	M
	Appearance	3	4	1	0	3	3	2	3	4	2	3	3	2
	Taste	3	5	2	0	3	5	1	3	3	3	2	3	3
	Texture	3	4	2	1	4	4	2	4	3	3	4	4	3
	Dunkability		3	4	1	5	5	4	4	3	3	2	4	
	Overall	3	5	2	1	5	4	2	3	3	3	3	3	3
Ginger Nut		A	B	C	D	E	F	G	H	I	J	K	L	M
	Appearance	3	1	2	0	2	4	4	2	3	1	4	3	1
	Taste	3	2	4	0	5	5	5	4	4	3	4	5	1
	Texture	4	3	4	0	5	5	5	5	4	5	5	4	4
	Dunkability		3	2	3	5	4	4	5	5	4	4	5	
	Overall	3	1	2	0	4	5	5	4	3	3	5	4	2
Jammie Dodger		A	B	C	D	E	F	G	H	I	J	K	L	M
	Appearance	5	5	5	5	5	4	3	4	5	5	3	5	5
	Taste	5	3	5	4	5	5	3	1	3	5	3	4	2
	Texture	5	1	5	3	5	4	3	3	3	5	2	3	4
	Dunkability		2	1	3	5	2	3	2	3	5	2	1	
	Overall	5	2	5	4	5	4	3	2	4	5	2	3	3
HobNob		A	B	C	D	E	F	G	H	I	J	K	L	M
	Appearance	3	3	4	2	3	1	2	1	3	2	2	4	5
	Taste	5	5	5	1	4	4	5	4	5	5	2	5	5
	Texture	5	2	5	0	4	2	5	4	4	5	4	5	5
	Dunkability		4	5	5	4	3	3	4	5	4	5	4	
	Overall	5	4	5	1	5	3	4	4	5	4	4	5	4

5. Analysis

Biscuits rated over multiple catagories
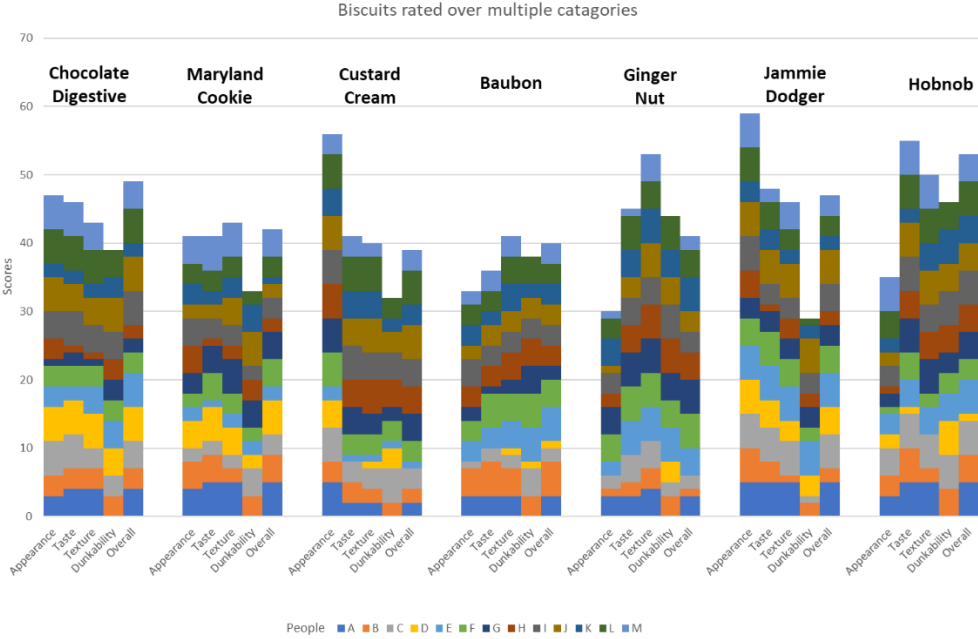
This Graph shows the total results for each type of biscuit as well as each person tasting them represented in a different colour. The total area covered by each biscuit gives the total number of points awarded to it over all categories.

From this Hobnob has the most points with 239, closely followed by the Jammie Dodger on 229 and the Digestive on 224. The lowest is the Bourbon on 188

Dunkability is often the lowest category due to two participants not giving data in this. However this shows the Ginger Nut, Bourbon and Hobnob are exceptional in this category still gaining high scores.

There is no one category that is always giving the highest scores,

Radar Graphs

Radar graphs can be used to show the strengths and weaknesses of each biscuit

Radar graph for Digestives, Maryland Cookie and Bourbon
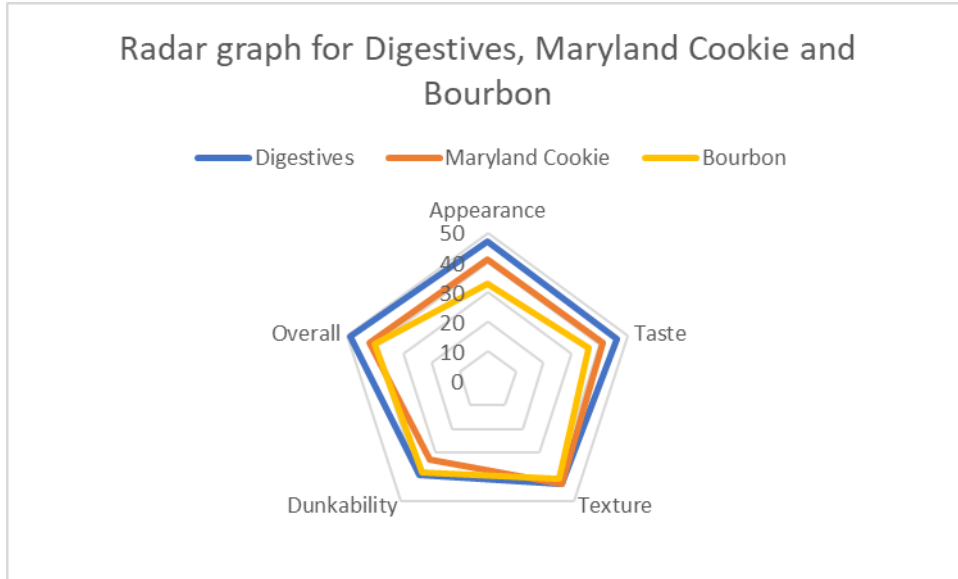
From looking at the Digestive, Bourbon and Maryland Cookie, we can see that other than a draw with the Maryland on Texture, Digestives are higher than the other two on all categories, proving them to be the superior biscuit.

Texture is the weakest point for the Digestive and is very similar to the others, while the Bourbon lacks on appearance and taste.

Radar graph for Custard Cream and Jammie Dodger
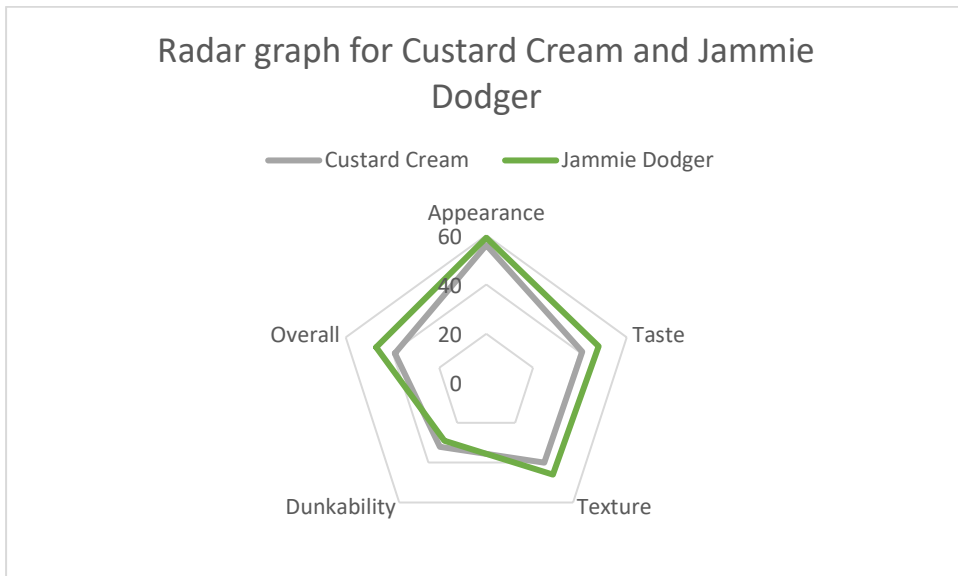
Taking a look at the Custard Cream and the Jammie Dodger we can see that these are both very strong in their appearance, but very weak in Dunkability. The Jammie

Dodger is superior in all but Dunkability, with a significant margin in Taste Texture and Overall.

Radar graph for Ginger Nut and Hobnob
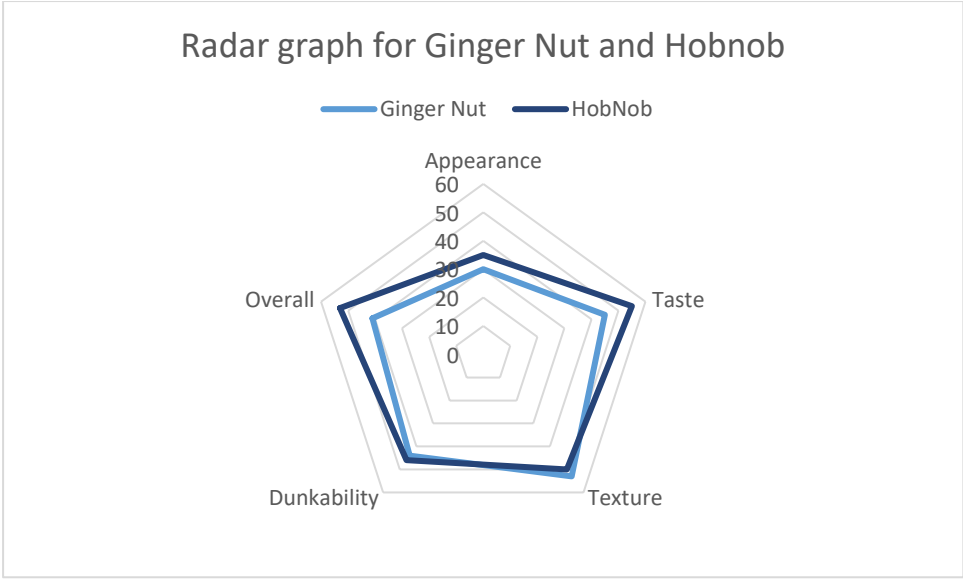
In contrast Ginger Nut and HobNob are very low on their appearance. The Hobnob is strongest in Tate and Overall, and the Ginger nut is strongest in Texture – the only category in which it surpasses the HobNob.


Radar graph for Digestive Hobnob and Jammie Dodger
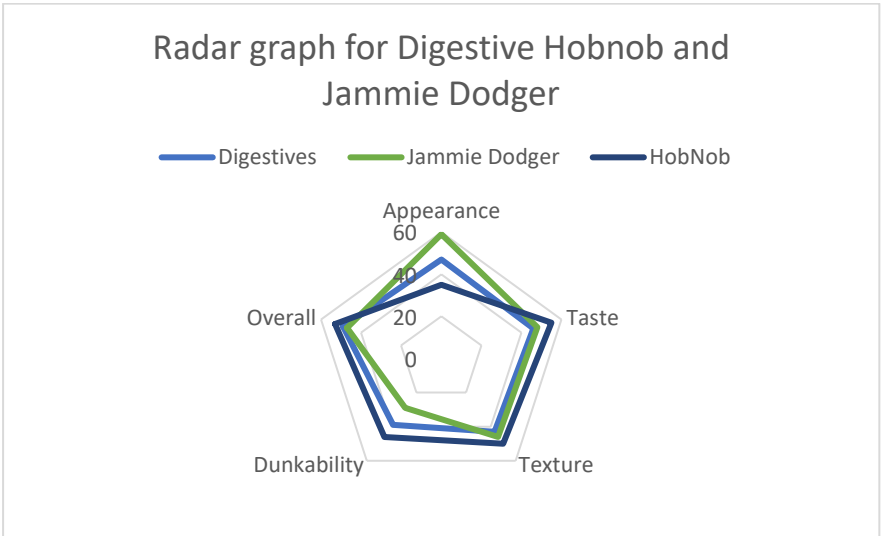
Looking at the Digestive, Jammie Dodger and Hobnob on the same graph we can see that they mainly differ in Appearance, and Dunkability and in the inverse order between them.
Other than appearance, Hobnob remains the highest in the rest of the attributes.

Correlations

When sorted by taste we can see that the ratings across the categories mostly correlate with each other with the exception of appearance (though a biscuit is for eating, not for looking at!)
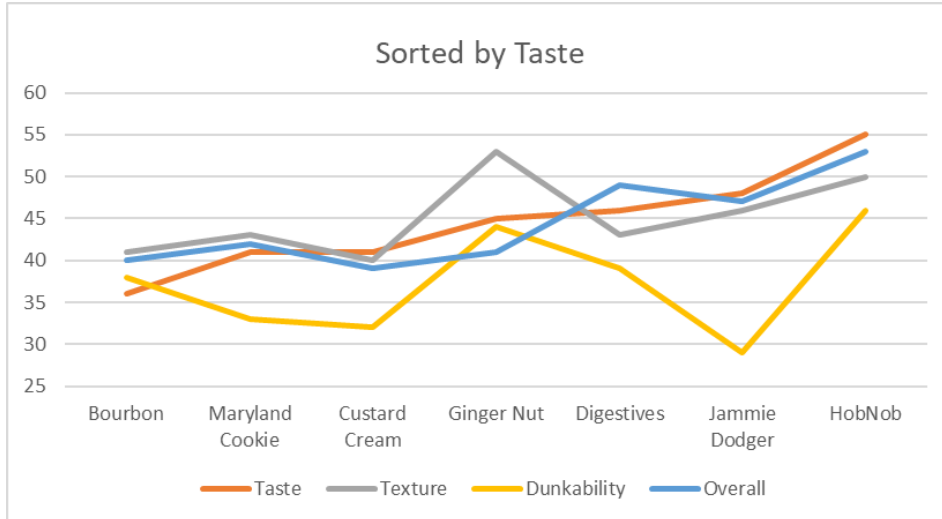

the outliers to this is the dunkability of the Jammie Dodger as well as the Ginger Nut with a high dunkability and texture.

There is minimal corelation between a biscuits taste and its appearance
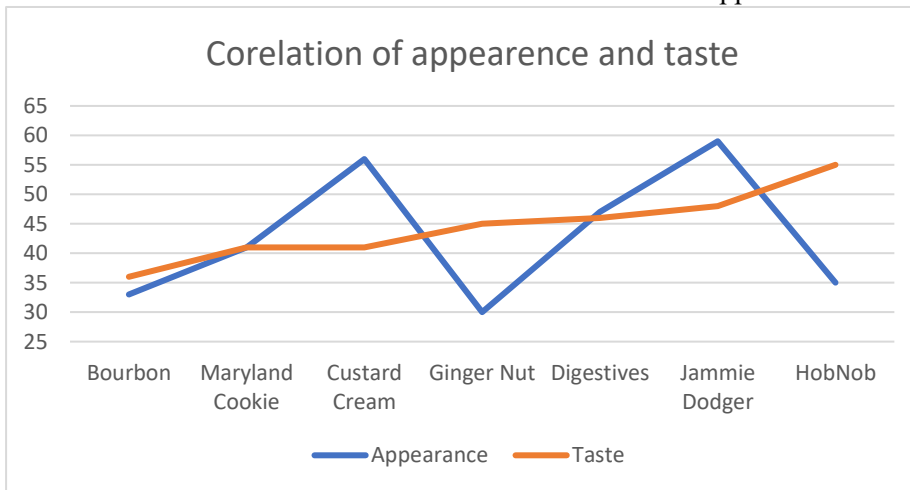
If ignoring Appearance we can see that the highest total score is held by the Hobnob with the Ginger Nut now having the second highest score and the Jammie Dodger dropping in to 4th behind the Digestive.

Total scores of biscuits with different groups of catagories
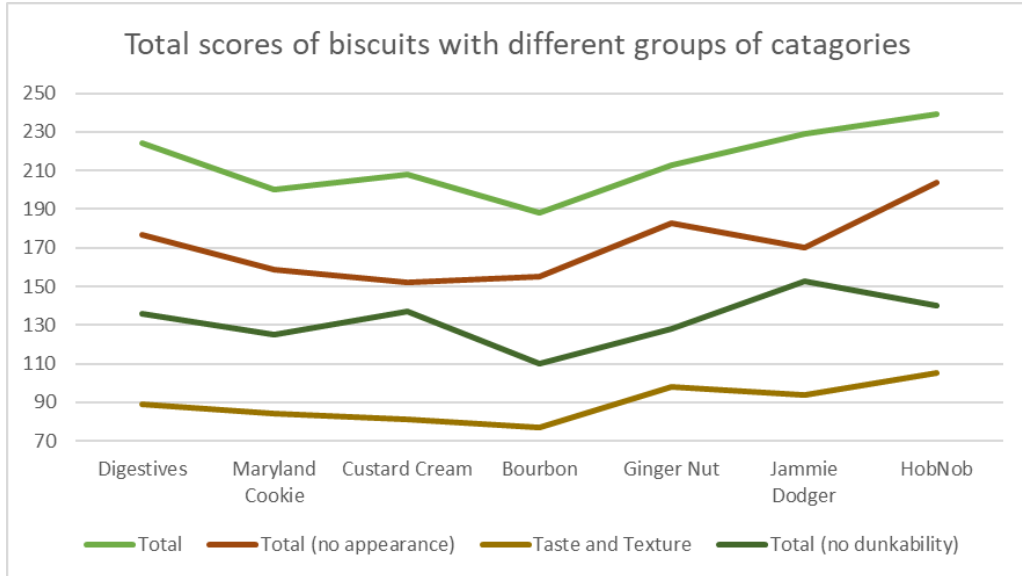
As seen in the data not all people dunk biscuits in tea, if this is unimportant then the Jammie Dodger becomes the highest total scoring biscuit followed by the Hob nob and Custard Cream.

If just looking at the Tate and Texture then Hobnob, Ginger nut and Jammie Dodger are the highest scorers.

Participant preferences

Looking at the tastes of the different people taking part,
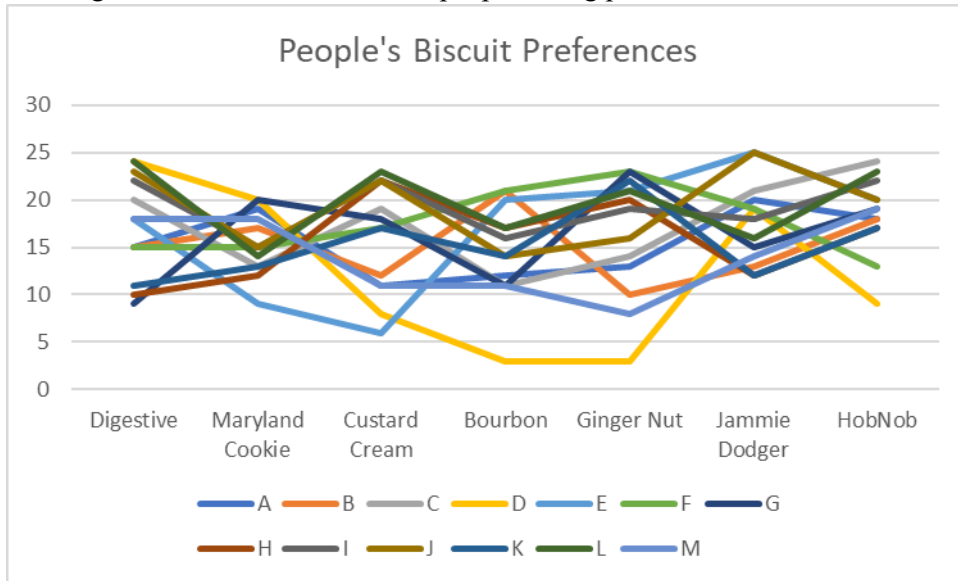
There is no clear corelation for all people involved with a wide range of opinions over each of the biscuits. The widest range is the Ginger Nut, with a 20 point difference between its highest and lowest given scores, the Maryland Cookie has the smallest range of opinions with an 11 point difference.
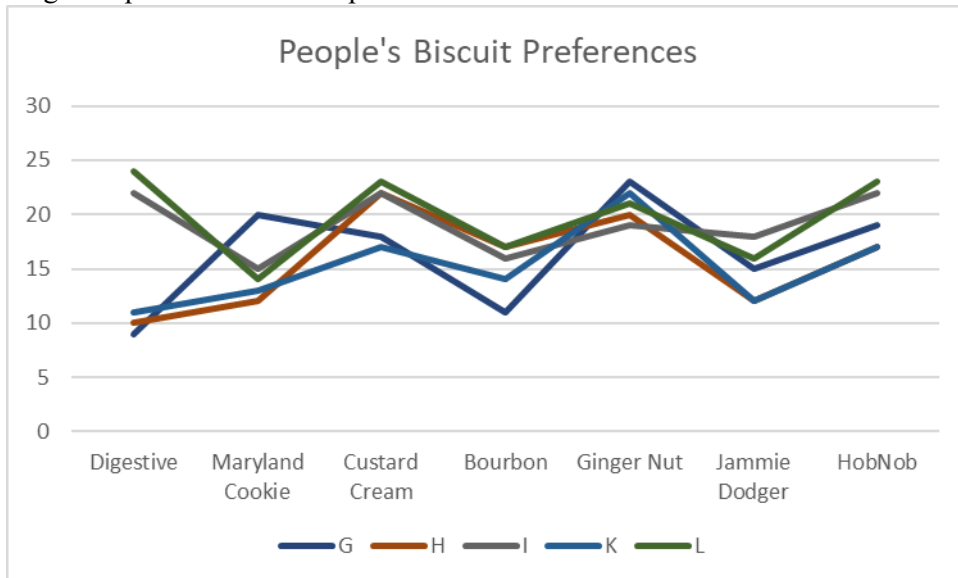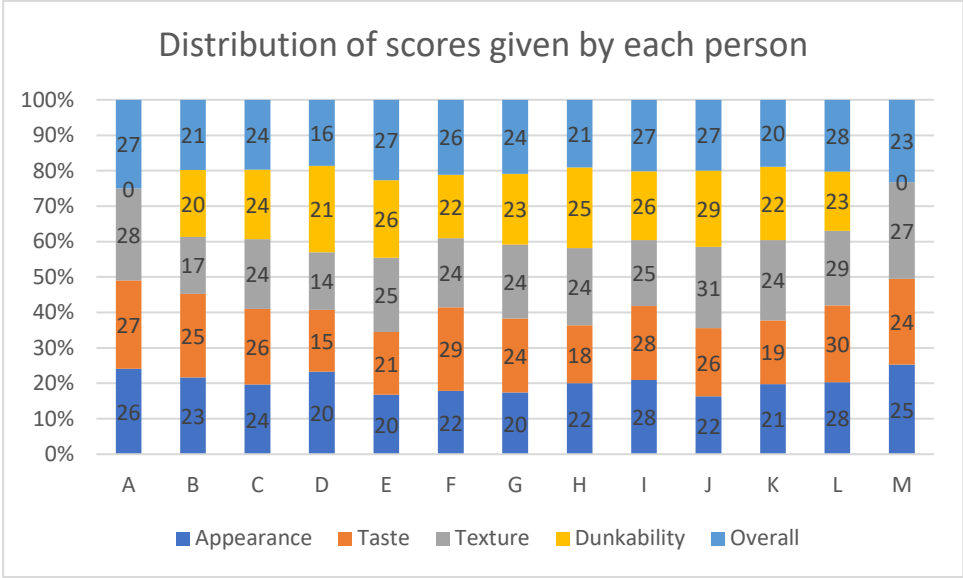

G,H,I,K and L all corelate with each other liking the Ginger Nut and HobNob, but giving low scores to the Jammie Dodger, However they are split on opinions of the Digestive

People's Biscuit Preferences
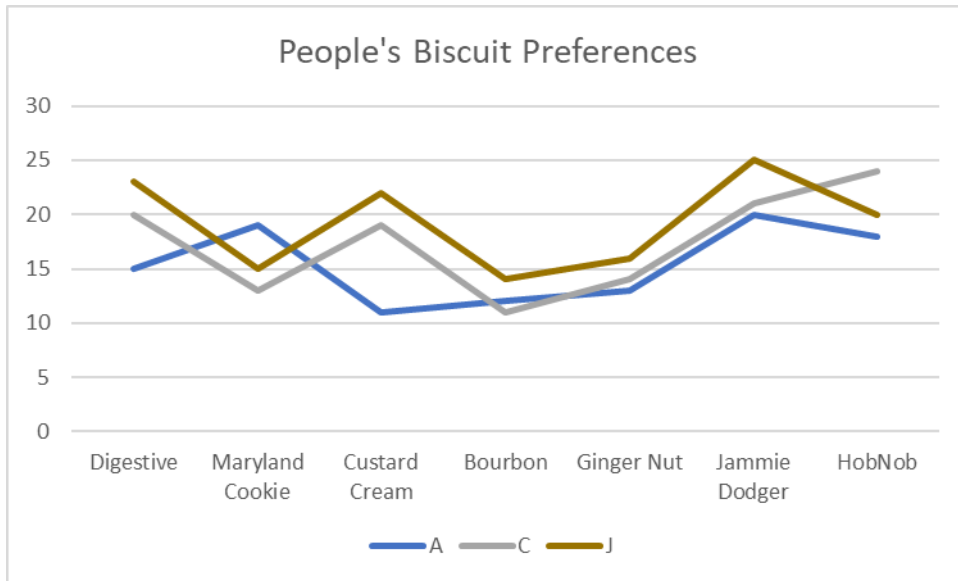
A,C and J also correlate with each other, liking the Jammie Dodger. Additionally J and C have very similar opinions only differing with their thoughts of the HobNob

People's Biscuit Preferences
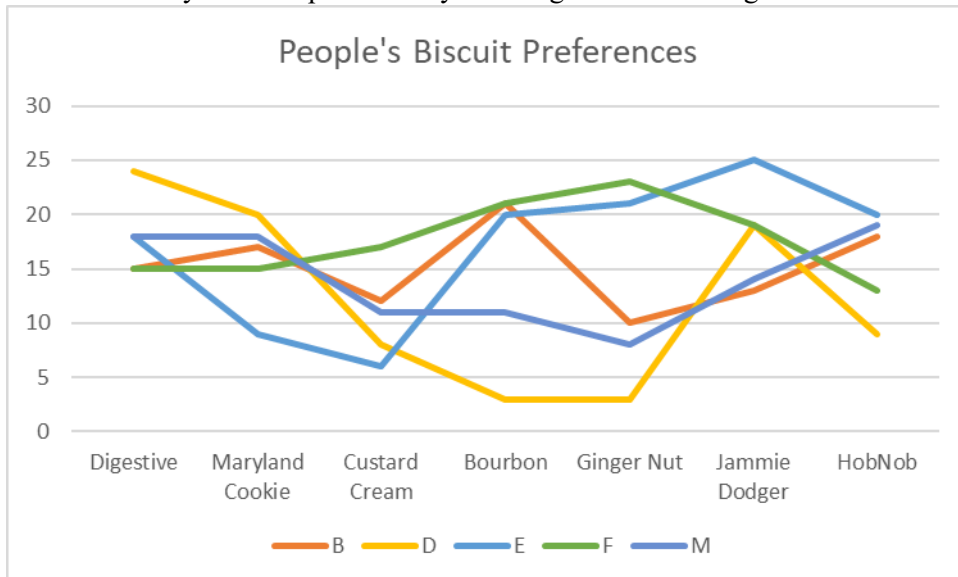
B, D, E, F & M have limited corelation with other participants, however all have very similar thoughts on the Maryland Cookie. E, F & M also rate the Bourbon quite high.

Distribution of scores given by each person

	A	B	C	D	E	F	G	H	I	J	K	L	M
Overall	27	21	24	16	27	26	24	21	27	27	20	28	23
Dunkability	0	20	24	21	26	22	23	25	26	29	22	23	0
Texture	28	17	24	14	25	24	24	24	25	31	24	29	27
Taste	27	25	26	15	21	29	24	18	28	26	19	30	24
Appearance	26	23	24	20	20	22	20	22	28	22	21	28	25

Legend: ■ Appearance ■ Taste ■ Texture ■ Dunkability ■ Overall

Scores seem mostly evenly distributed among the categories with none standing out as dominant

Value

|	Cost (pack)	Biscuits per pack	price per biscuit
Digestive	£1.90	16	£0.12
Maryland Cookie	£1.35	20	£0.07
Custard Cream	£0.60	34	£0.02
Bourbon	£0.58	22	£0.03
Ginger Nut	£1.50	25	£0.06
Jammie Dodger	£0.85	8	£0.11
HobNob	£1.90	14	£0.14

When sorted by the total scores given we can see that the better biscuits corelate with the price. Any biscuits with a price bar provide a good value for its score, with bars above the line being expensive.
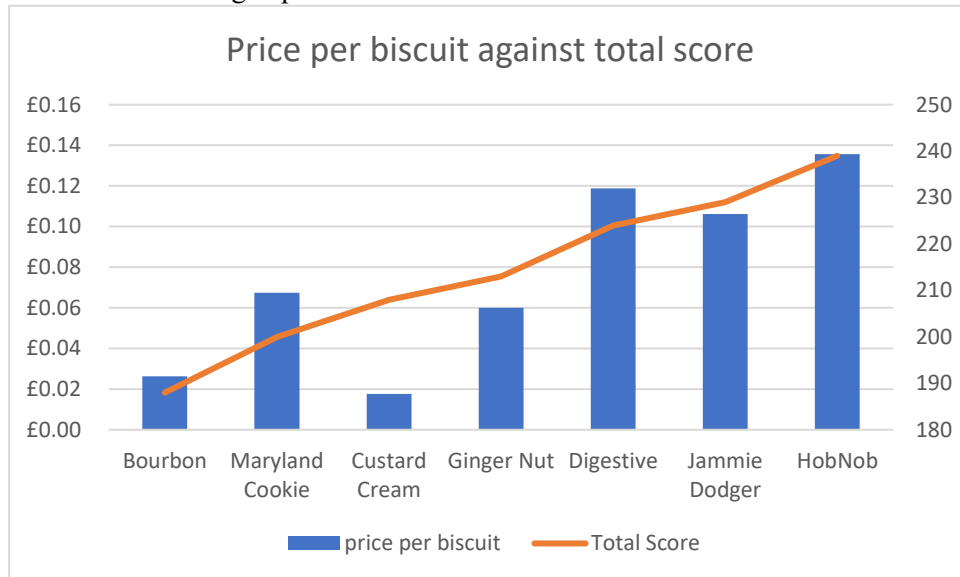
the Maryland Cookie is an outlier to the corelation and is a very expensive biscuit compared to its total score as is the Digestives while the Custard Cream and Ginger Nut are a relatively good value (despite scoring lower)

Biscuits per pack against Score
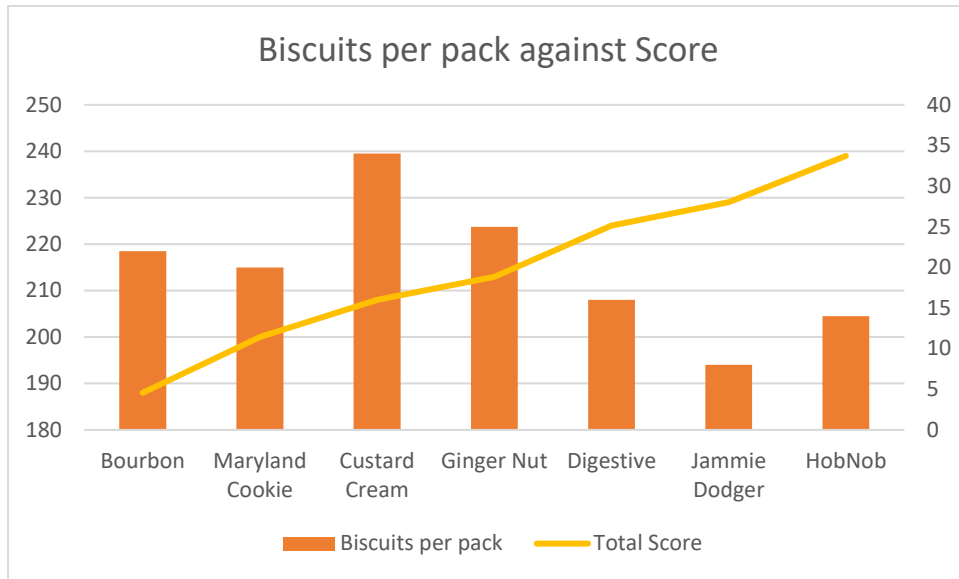
Unfortunately the biscuits with the higher score tend to be the ones with fewer biscuits in the pack, resulting in more trips to the shop and running out more frequently.


Biscuits per pack against Score
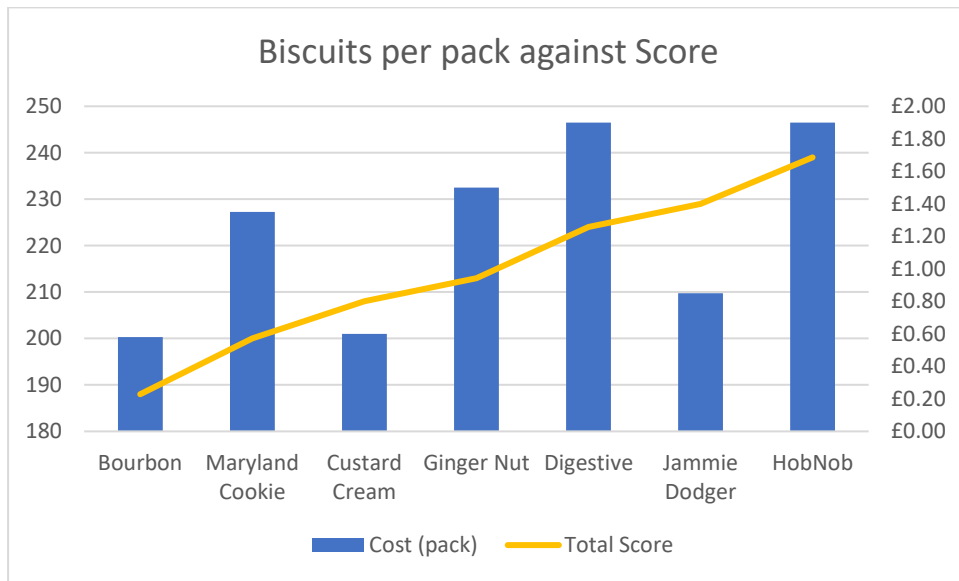
There is also a comparatively high threshold cost for Digestives and Ginger Nuts, since Jammie Dodgers only contain 8 biscuits this gives a low threshold cost of 85p

6 Conclusion

Conclusion. Having the highest total score, as well as continuing to score well with the removal of Appearance, and just looking at Taste and Texture, the Hobnob is the best biscuit. The radar graphs also prove this to be an all round biscuit only lacking in appearance. And consistently scoring higher then its peers in other categories. The Hobnob also has the 3rd smallest range in total points given by participants, while this is still a large range, it shows that it has less of a difference of opinion than most of the other biscuits tested. These are the most expensive biscuit at 14p per biscuit however going by the graph of value to price this is a fair price for the quality provided.

Bonus Graph.

4 people rated both Prawn Cocktail crisps and Biscuits, with Texture being a category on both experiments, this graph shows this data.

Texture ratings over Biscuits and Prawn Cocktail Crisps
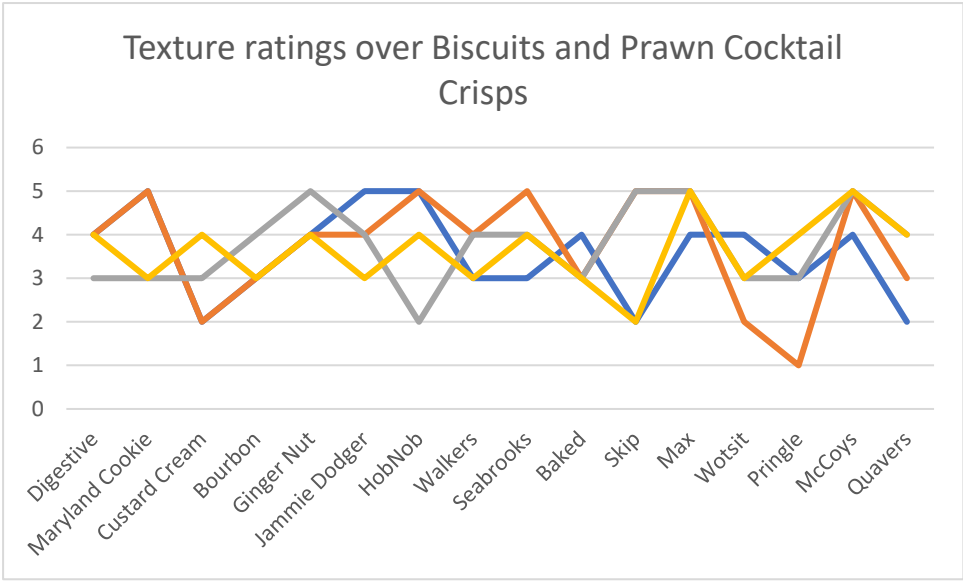
Interestingly Blue and Orange share identical opinions on almost all of the biscuits.