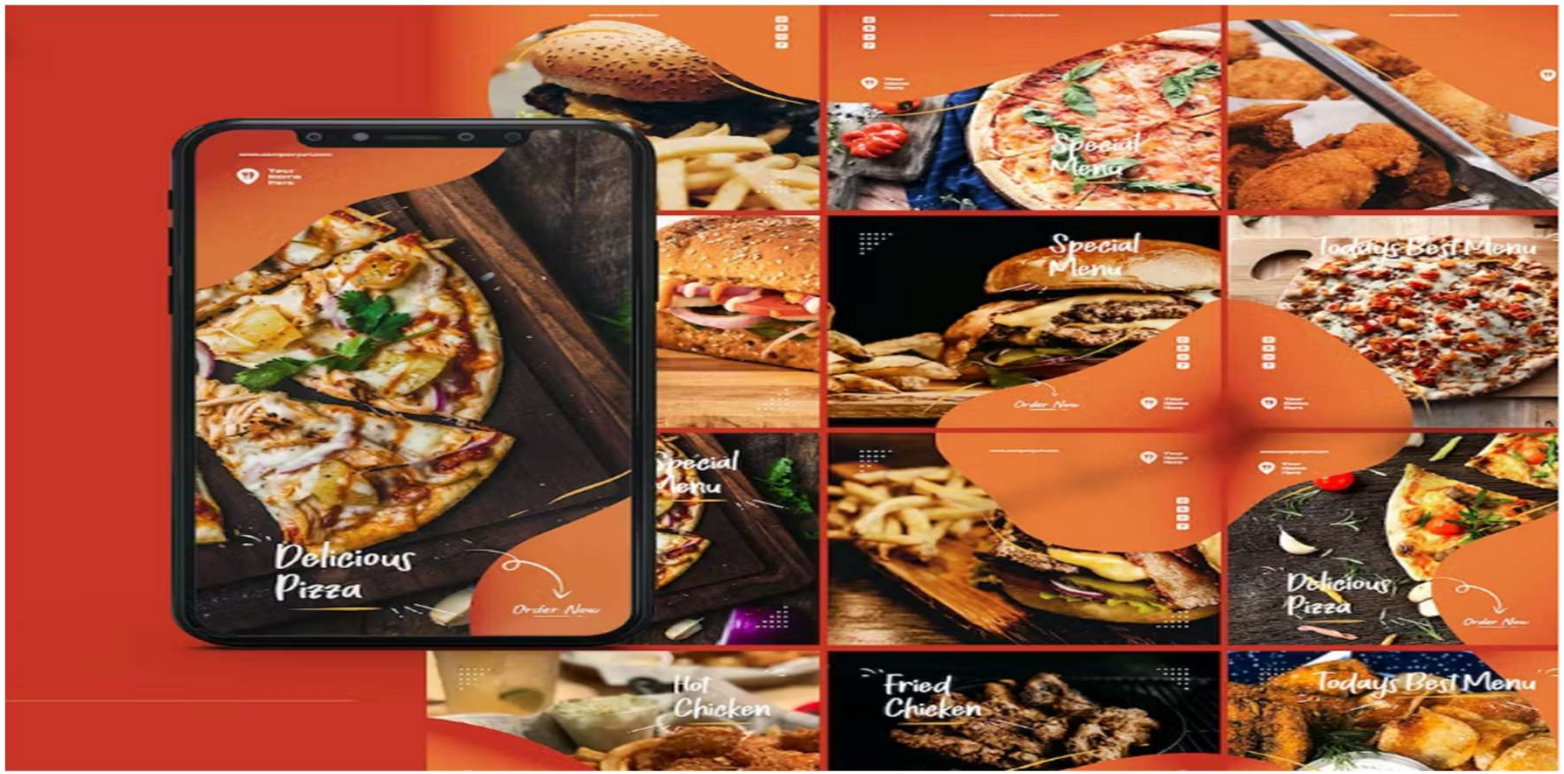


Consumer Response And The Power of New Digital Ads

DR. PRABIRENDRA CHATTERJEE

6th December, ANZMAC 2023 (Otago business school)

New digital ad formats

Instagram

Pinterest

TikTok

Facebook

Some sample ad specs

Landscape

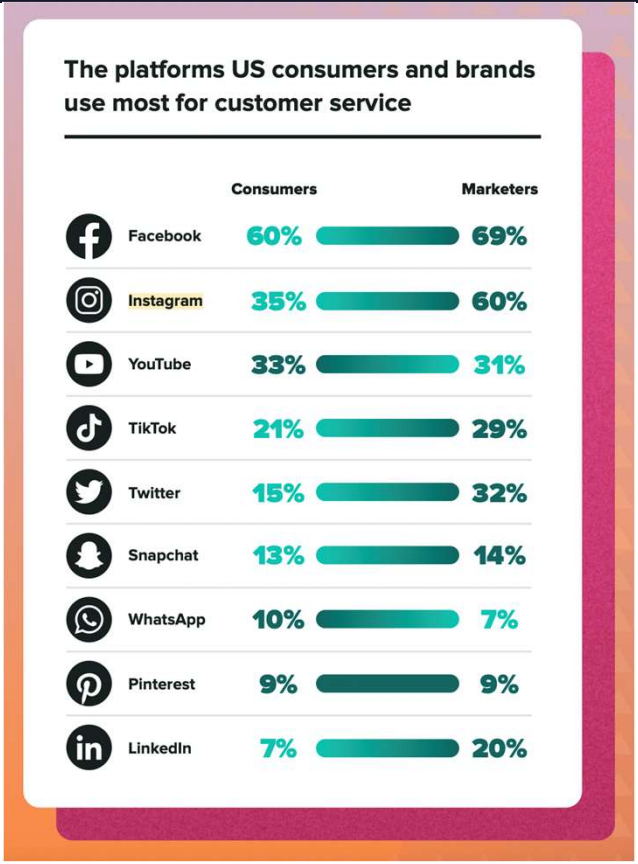
Width: 1200 pixels
Height: 628 pixels
Format: JPG or PNG
Aspect ratio: 1.91:1
File size: 30MB
Caption: 125 characters

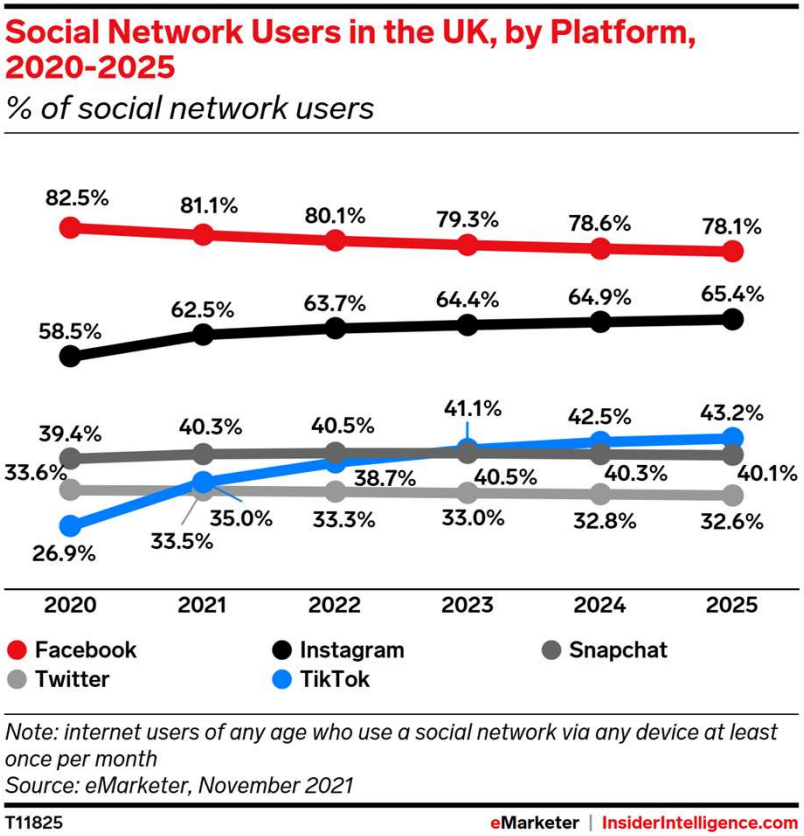
Square

Width: 1080 pixels
Height: 1080 pixels
Format: JPG or PNG
Aspect ratio: 1:1
File size: 30MB
Caption: 125 characters

- **Media:** Image
- **Width:** Minimum 600 pixels
- **Height:** 1000 pixels by 1500 pixels
- **Format:** PNG and JPEG
- **Aspect Ratio:** 2:3
- **Small Thumbnail:** 69 pixels by 69 pixels
- **Large Thumbnail:** 216 pixels by 146 pixels
- **Additional Note:** Pins should be vertically oriented so they appear fully on users' feeds.
- **Description copy:** Max 500 characters (prioritize first 1-2 sentences)

Performance of the new ad platforms





Advertising and public health

Public health advocates demand warning labels, ban on junk food ads

None of the legal frameworks or guidelines in India have the potential to stop most of the misleading advertisements of pre-packaged junk or foods high in fats, salt and sugar, says nutrition think tank NAPi

September 22, 2023 08:31 pm | Updated September 25, 2023 12:37 pm IST – NEW DELHI

Health emergency

The report says that, of the advertisements it examined, none provided the "most important information" as demanded by the Consumer Protection Act 2019, for a food product: the amount of sugar, salt, or saturated fat it contains.

Where are the calories?

Standout characteristics of new digital ads

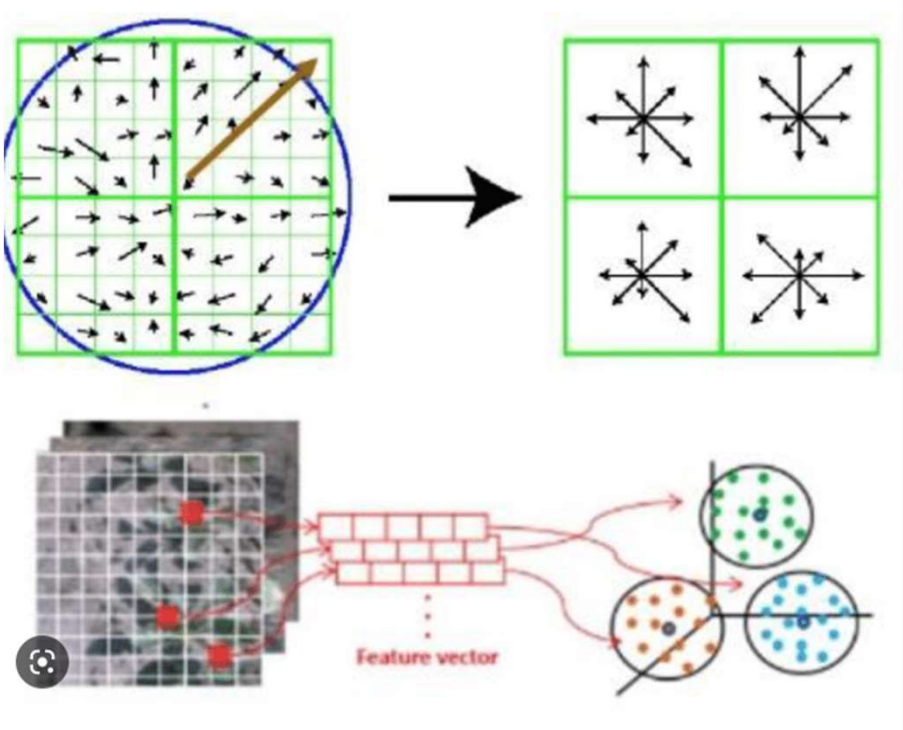
- High quality
- Bright colours
- Clear compositions
- Text overlay
- Lifestyle imagery
- Product focus
- Branding

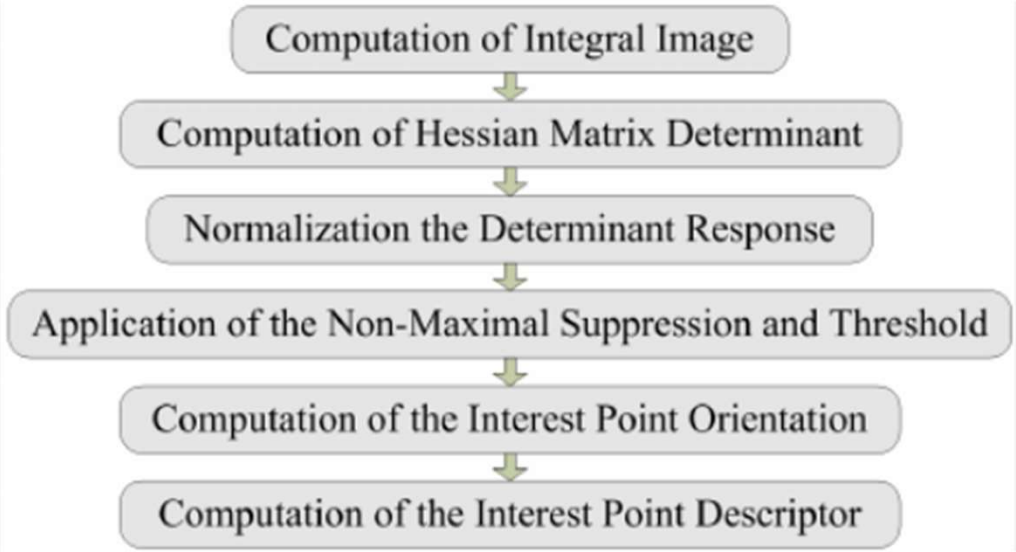
Research questions

- How are the new digital ads (Instagram ads) different from the banner ads in terms of hidden visual traits?
- Which of these hidden traits is/are most prominent in explaining the visual impact of the new digital ad images?
- How do these hidden traits, in presence or absence of some health information, affect ad likeability & product believability, and eventually consumer response (in terms of purchase and usage intention)?

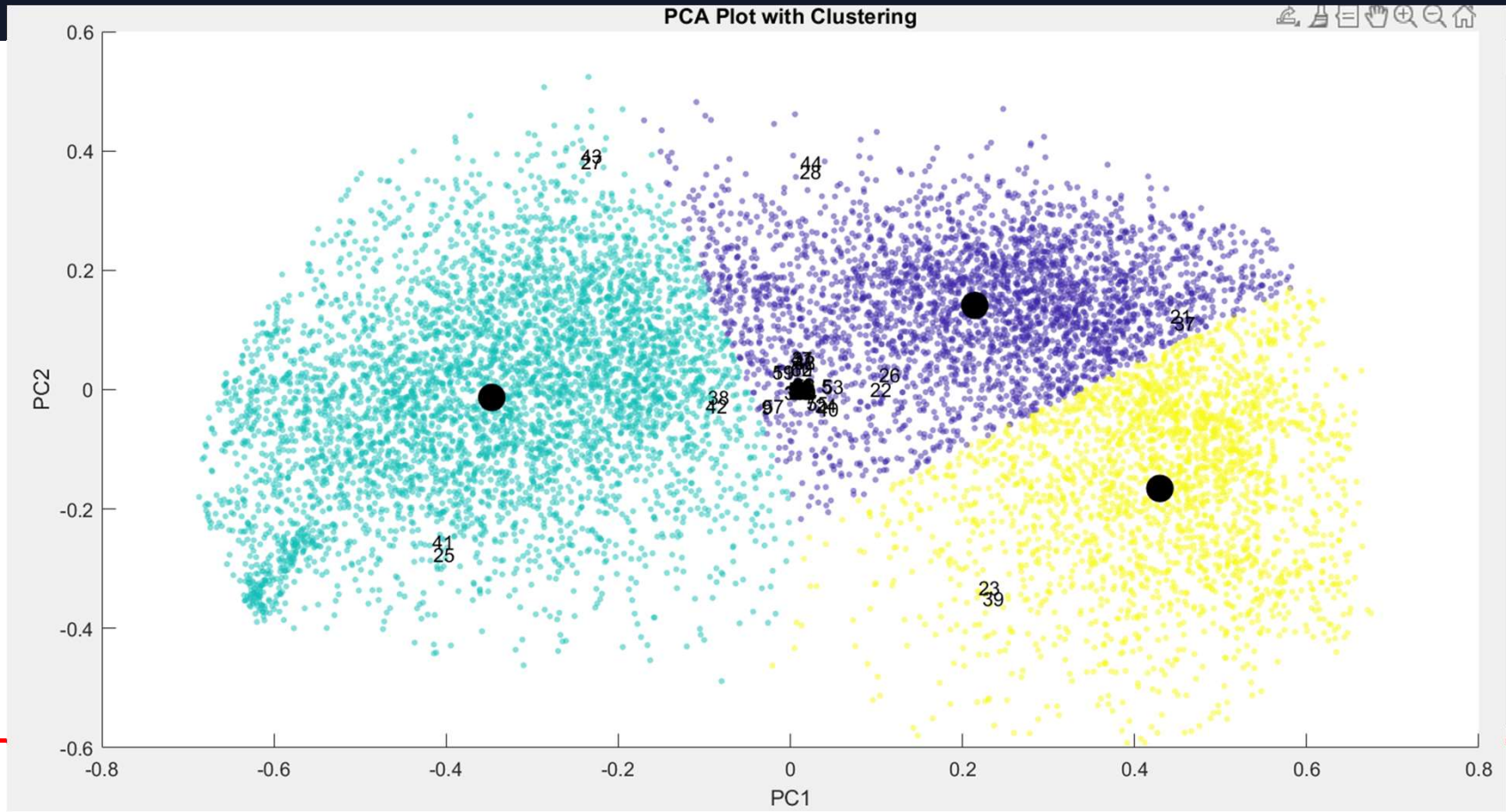
Original ad images

Use of Machine Learning in feature extraction





Hidden Features – high dimensional analysis (SURF)



explained

64x1 single

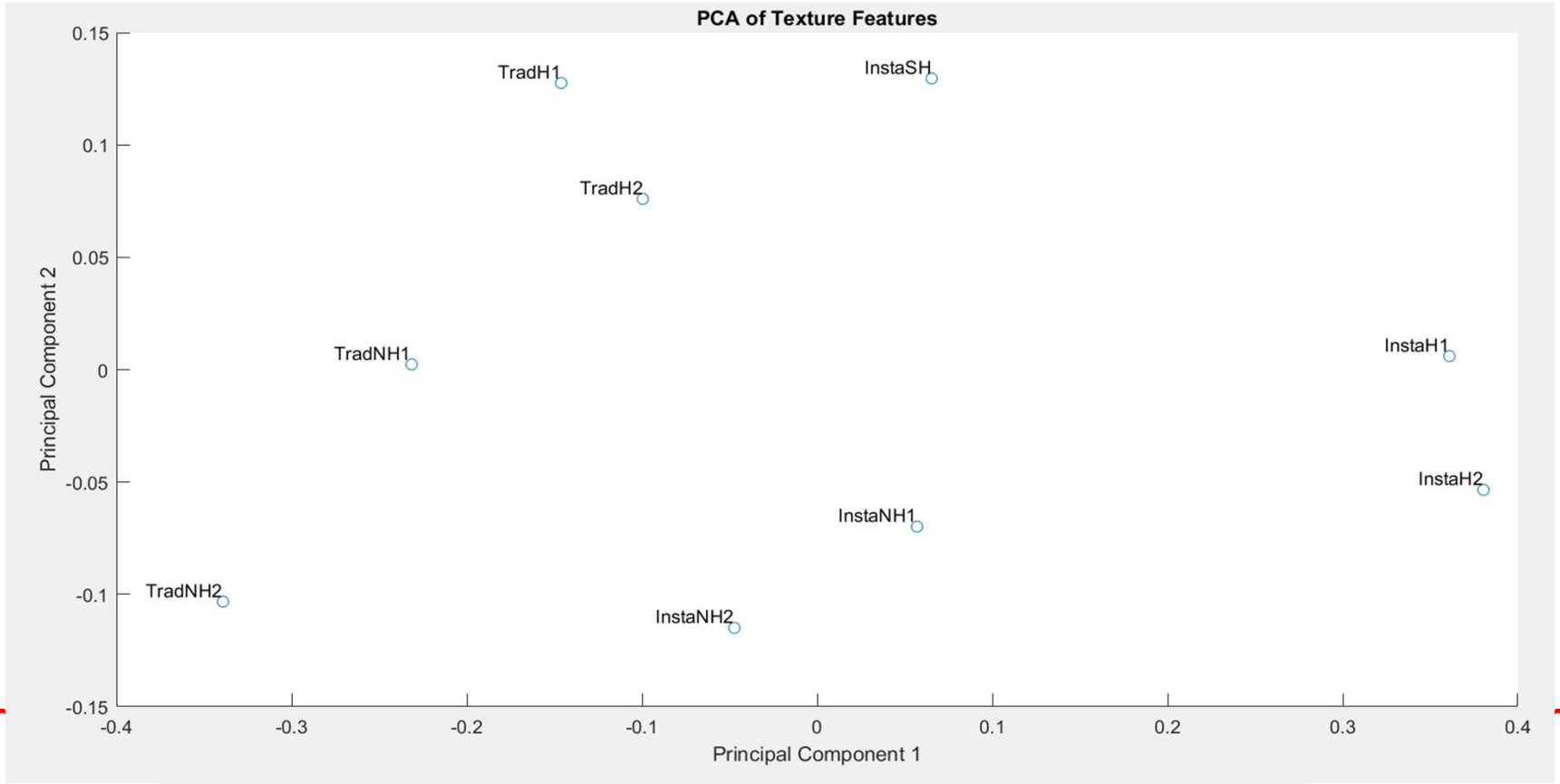
	1	2
1	42.8975	
2	9.0136	
3	7.4719	
4	6.2424	
5	5.6354	
6	4.4527	
7	3.9734	
8	3.1532	
9	2.6675	
10	2.4288	
11	2.2937	
12	1.5947	
13	1.3574	
14	1.2780	
15	1.0905	
16	0.4533	
17	0.4007	
18	0.3521	
19	0.2566	
20	0.2478	
21	0.2325	
22	0.2053	

Hidden Features – low dimensional analysis (GLCM)

explained

4x1 double

	1	2
1	89.8026	
2	9.6890	
3	0.3965	
4	0.1119	
5		
6		



GLCM image features

Property	Description	Formula
`"Contrast"`	Returns a measure of the intensity contrast between a pixel and its neighbor over the whole image. `Range = [0 (size(GLCM,1)-1)^2]` Contrast is 0 for a constant image. The property Contrast is also known as *variance* and *inertia*.	$\sum_{i,j} \lvert i-j \rvert^2 p(i,j)$
`"Correlation"`	Returns a measure of how correlated a pixel is to its neighbor over the whole image. `Range = [-1 1]` Correlation is 1 or -1 for a perfectly positively or negatively correlated image. Correlation is `NaN` for a constant image.	$\sum_{i,j} \frac{(i-\mu i)(j-\mu j)p(i,j)}{\sigma_i \sigma_j}$
`"Energy"`	Returns the sum of squared elements in the GLCM. `Range = [0 1]` Energy is `1` for a constant image. The property Energy is also known as *uniformity*, *uniformity of energy*, and *angular second moment*.	$\sum_{i,j} p(i,j)^2$
`"Homogeneity"`	Returns a value that measures the closeness of the distribution of elements in the GLCM to the GLCM diagonal. `Range = [0 1]` Homogeneity is 1 for a diagonal GLCM.	$\sum_{i,j} \frac{p(i,j)}{1+\lvert i-j \rvert}$

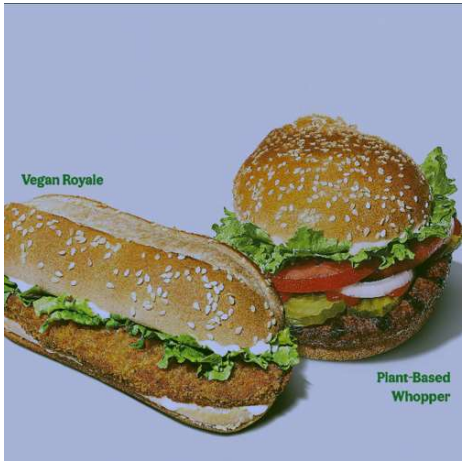
Contrast: Measures the local variation; a higher value indicates there are more significant differences in the local intensity values (possibly unseen in naked eyes). Explains almost 90% variation across 4 images shown earlier.

Energy: Measures the overall intensity of the image texture; a higher value indicates the texture is more uniform. The banner ads show more energy.

Machine Learning meets Behavioural Experiments

To test the impact of these hidden features now we will run experiments with pre-processed ad images to control for variables such as illumination, bold text overlay etc.

2 X 2 design: (High contrast, Low contrast) X (Some health info, No health info)



Survey questions – Time and Risk preference

In each row, you see two alternatives: you can win different amounts of money with stated probabilities (given in %). In each row you decide between Option A or Option B - thus please choose only one option in each row.

	Option A	Option B
A: gain of £40 with 10%, gain of £32 with 90%. B: gain of £77 with 10%, gain of £2 with 90%.	○	○
A: gain of £40 with 20%, gain of £32 with 80%. B: gain of £77 with 20%, gain of £2 with 80%.	○	○
A: gain of £40 with 30%, gain of £32 with 70%. B: gain of £77 with 30%, gain of £2 with 70%.	○	○

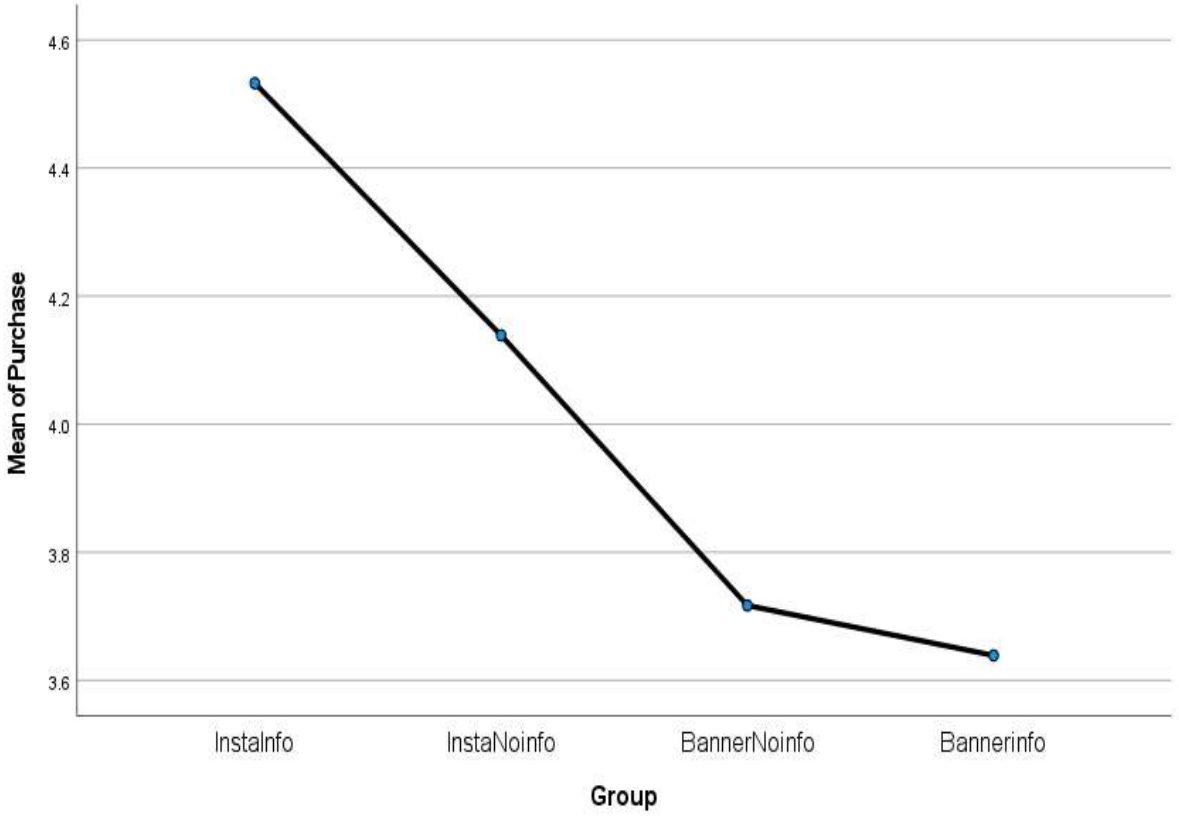
	Option A	Option B
A: gain of £40 with 40%, gain of £32 with 60%. B: gain of £77 with 40%, gain of £2 with 60%.	○	○
A: gain of £40 with 50%, gain of £32 with 50%. B: gain of £77 with 50%, gain of £2 with 50%.	○	○
A: gain of £40 with 60%, gain of £32 with 40%. B: gain of £77 with 60%, gain of £2 with 40%.	○	○
A: gain of £40 with 70%, gain of £32 with 30%. B: gain of £77 with 70%, gain of £2 with 30%.	○	○
A: gain of £40 with 80%, gain of £32 with 20%. B: gain of £77 with 80%, gain of £2 with 20%.	○	○
A: gain of £40 with 90%, gain of £32 with 10%. B: gain of £77 with 90%, gain of £2 with 10%.	○	○
A: gain of £40 with 100%, gain of £32 with 0%. B: gain of £77	○	○

Survey questions – ad likeability, purchase intention etc.

After seeing the image below, please consider the following statements and rate these on a scale of 1-7 where 1 represents 'Strongly disagree' and 7 represents 'Strongly agree'.

	1 (Strongly disagree)	2	3	4	5	6	7 (Strongly agree)
The ad image is artistic.	○	○	○	○	○	○	○
The ad image is trendy.	○	○	○	○	○	○	○
The ad image is contemporary.	○	○	○	○	○	○	○
The burger looks delicious.	○	○	○	○	○	○	○
The ad looks like an Instagram ad.	○	○	○	○	○	○	○
After seeing this ad, I would like to try the burger in the near future.	○	○	○	○	○	○	○
After seeing this ad, I would like to purchase the burger in the near future.	○	○	○	○	○	○	○

Model-free evidences - 1



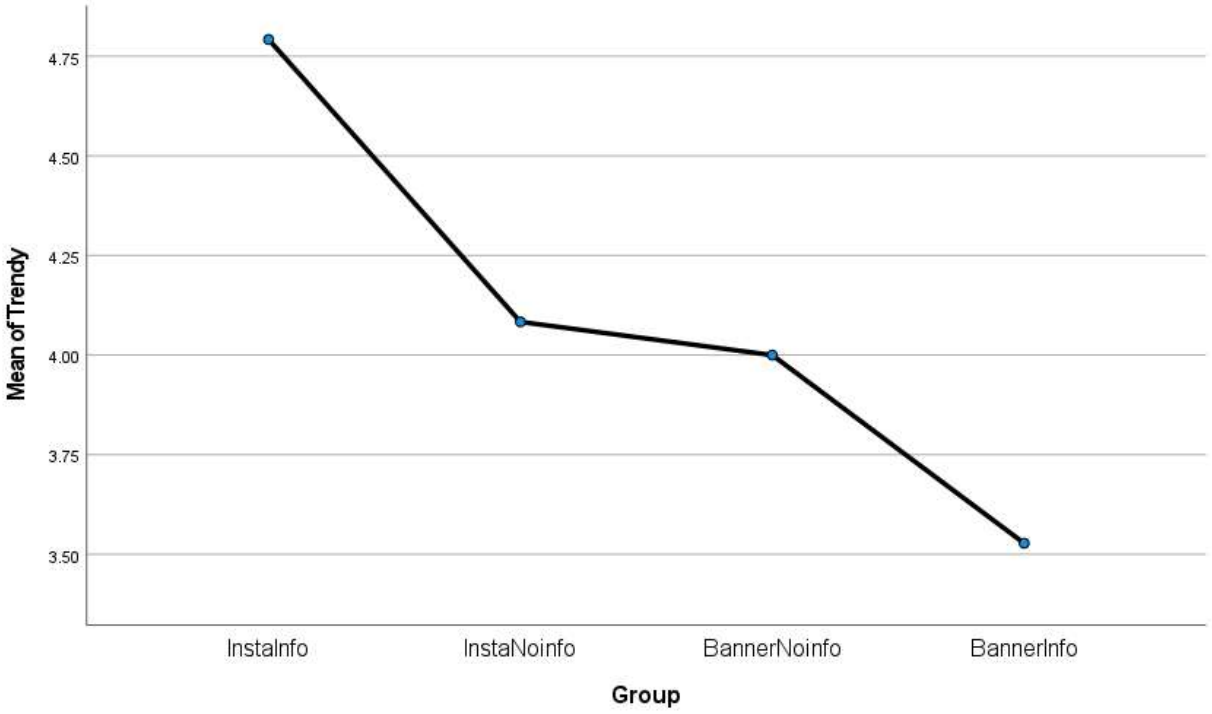
ANOVA

Purchase

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	46.065	3	15.355	4.913	0.002
Within Groups	1234.512	395	3.125		
Total	1280.576	398			

The average purchase intention for the ad images with higher contrast are substantially high.

Model-free evidences - 2



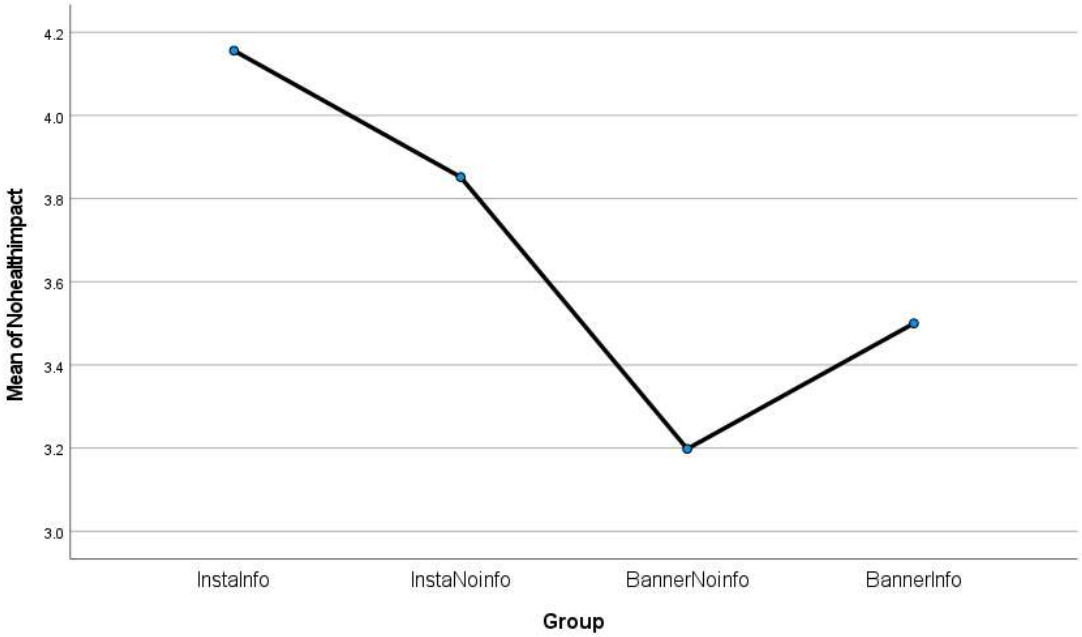
ANOVA

Trendy

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	72.253	3	24.084	9.891	0.000
Within Groups	961.842	395	2.435		
Total	1034.095	398			

The average trendiness for the ad images with higher contrast are substantially high.

Model-free evidences - 3



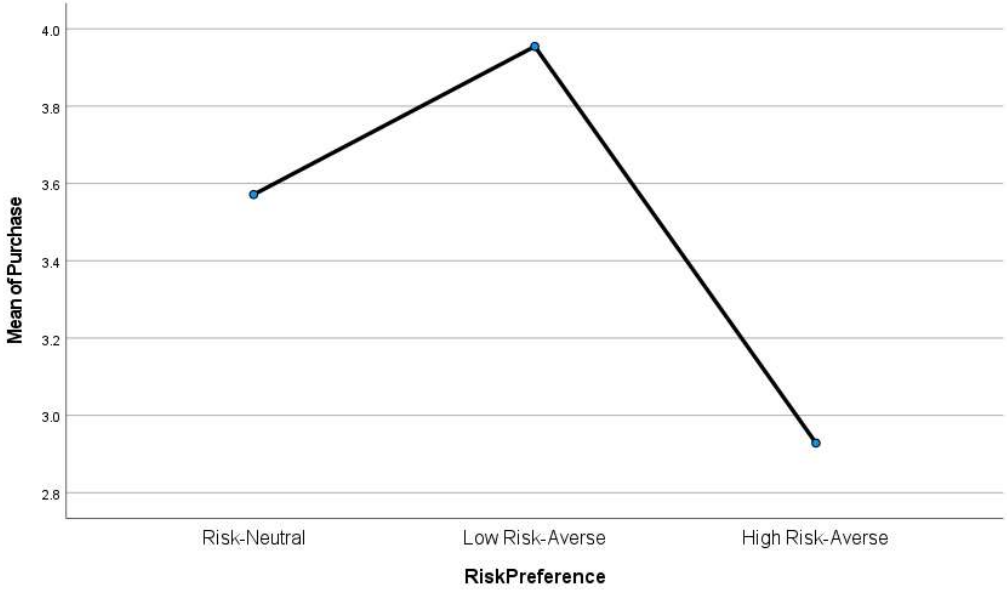
ANOVA

Nohealthimpact

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	48.150	3	16.050	6.498	0.000
Within Groups	975.599	395	2.470		
Total	1023.749	398			

Within cohorts, respondents favour ads with some health information more than ads with no information. However, the overall perception for ads with higher contrast are substantially more positive compared to the ads with lower contrast.

Risk preference and purchase intention



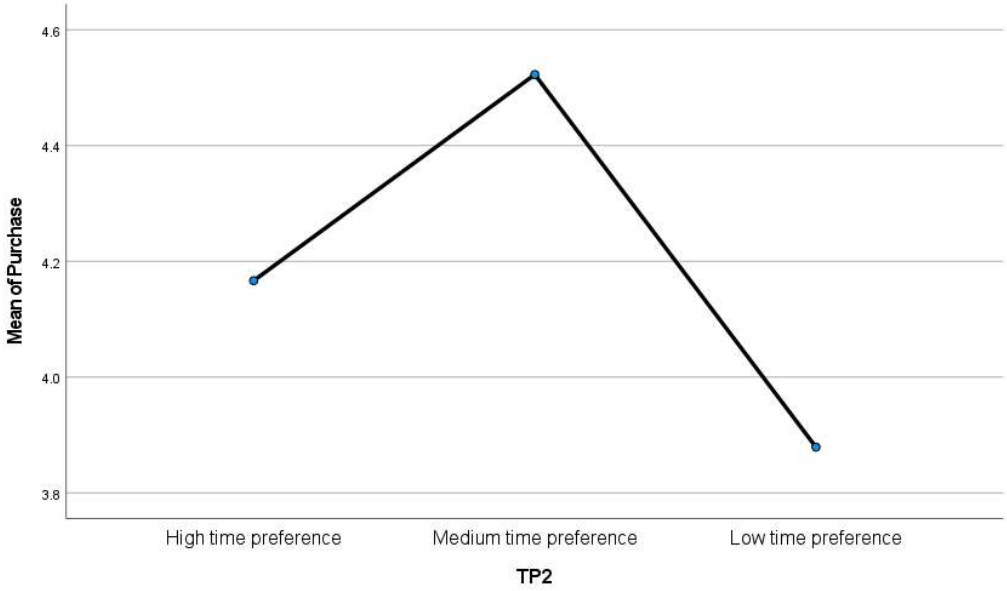
ANOVA

Purchase

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	20.767	2	10.384	3.343	0.039
Within Groups	326.149	105	3.106		
Total	346.917	107			

Risk preference affects when respondents see the banner ad with info. High risk-averse persons (who consistently choose lottery with lower payoffs) on average are willing to pay relatively little compared to low risk-averse or risk-neutral persons.

Time preference and purchase intention



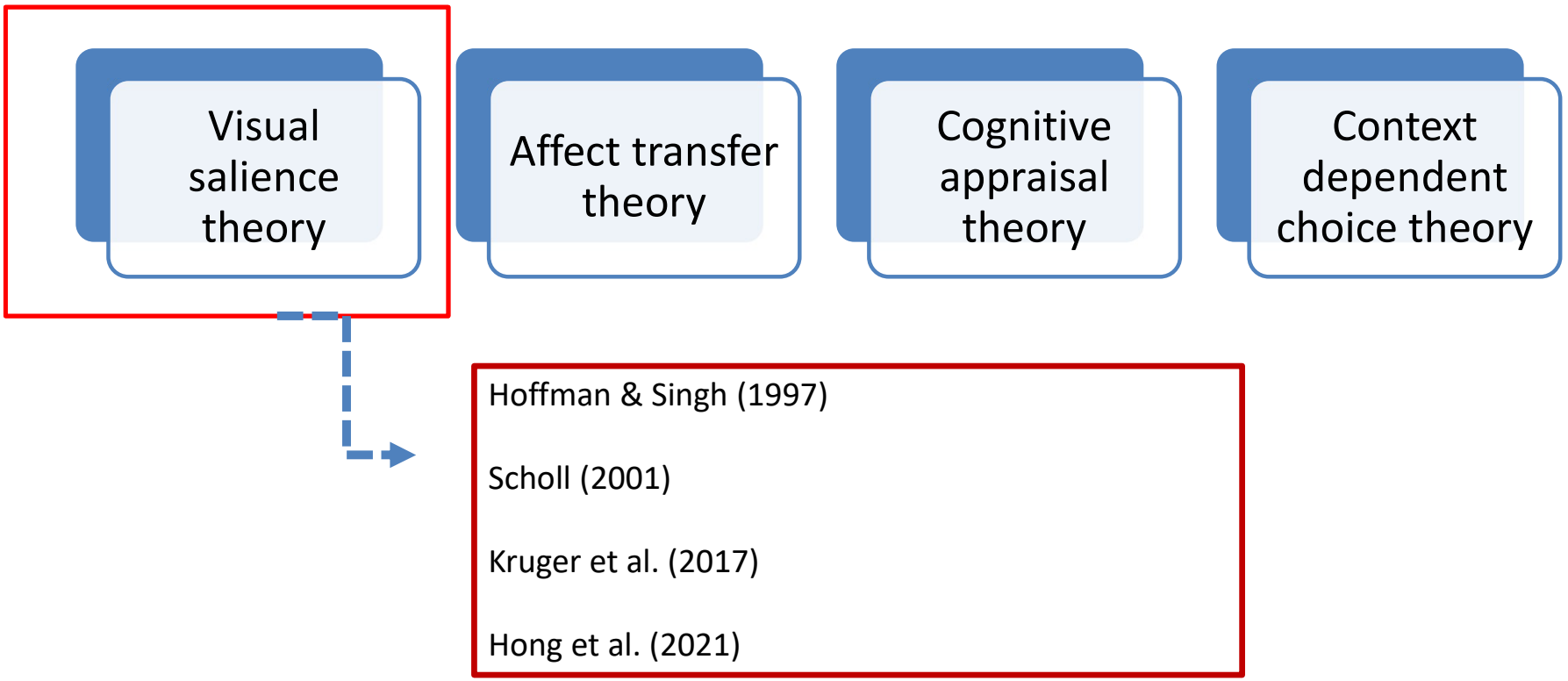
ANOVA

Purchase

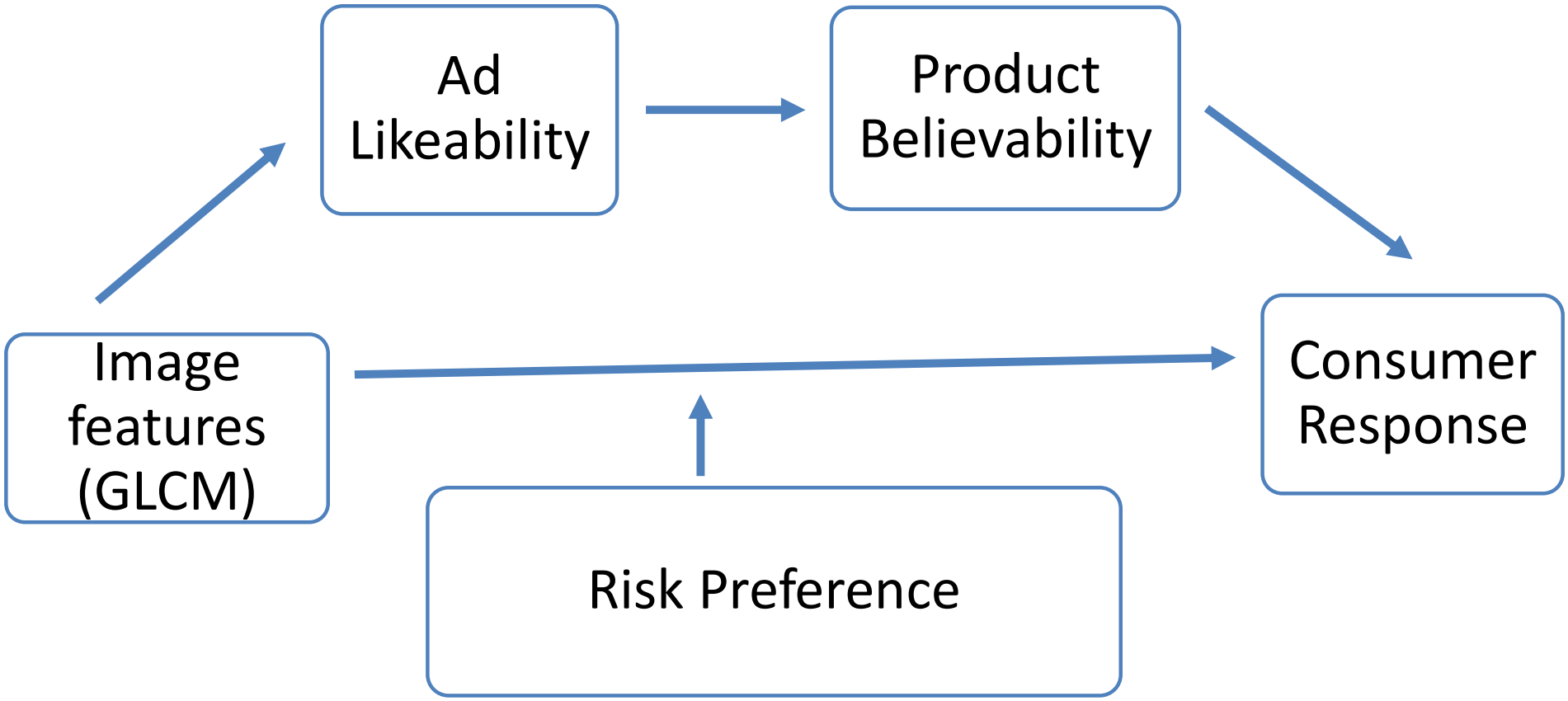
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	17.100	2	8.550	2.680	0.070
Within Groups	1263.477	396	3.191		
Total	1280.576	398			

Statistical significance only at the 90% level of confidence, otherwise just directional support for the claim that persons with low time preference (i.e., more patient persons) are less willing to purchase. There is no difference though across image categories.

Related theories



Model


Ad Likeability
Product Believability
Image features (GLCM)
Consumer Response
Risk Preference

PROCESS Results - 1

```
**************************************************************************
OUTCOME VARIABLE:
 Response

Model Summary
          R        R-sq         MSE           F         df1         df2           p
      .8198       .6721      1.0445    161.1325      5.0000    393.0000       .0000

Model
              coeff          se           t           p        LLCI        ULCI
constant      -.9665       .2341     -4.1285       .0000     -1.4267     -.5062
X1            -.1380       .1528      -.9031       .3670      -.4384      .1624
X2             .1869       .1574      1.1877       .2357      -.1225      .4963
X3            -.0630       .1560      -.4038       .6866      -.3696      .2437
Likeabil       .4734       .0510      9.2865       .0000       .3732      .5736
Believab       .7672       .0515     14.9010       .0000       .6659      .8684

Standardized coefficients
              coeff
X1            -.0778
X2             .1054
X3            -.0355
Likeabil       .3501
Believab       .5622
```

PROCESS Results - 2

********** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y **********

Relative total effects of X on Y

	Effect	se	t	p	LLCI	ULCI	c_ps
X1	-.3992	.2608	-1.5307	.1266	-.9120	.1135	-.2251
X2	-.7872	.2618	-3.0067	.0028	-1.3020	-.2725	-.4439
X3	-.8900	.2608	-3.4123	.0007	-1.4027	-.3772	-.5018

Relative indirect effects of X on Y

Group -> Likeabil -> Response

	Effect	BootSE	BootLLCI	BootULCI
X1	-.0661	.0886	-.2481	.0933
X2	-.2853	.0923	-.4811	-.1179
X3	-.3849	.1054	-.6051	-.1935

Group -> Believab -> Response

	Effect	BootSE	BootLLCI	BootULCI
X1	-.1304	.1200	-.3731	.0991
X2	-.4087	.1235	-.6584	-.1717
X3	-.0641	.1212	-.3036	.1736

Group -> Likeabil -> Believab -> Response

	Effect	BootSE	BootLLCI	BootULCI
X1	-.0648	.0856	-.2353	.0981
X2	-.2801	.0873	-.4616	-.1176
X3	-.3779	.0931	-.5656	-.2006

Results

- Complete mediation effect : the image features affect consumer response only through the mediators, ad likeability and product believability.
- All ads with low contrast have negative impact on ad likeability. Ad likeability is most affected when low contrast ads have some health information.
- Only low contrast ads with no health information negatively affect product believability.
- Overall, the negative impact (on consumer response) of low contrast ads with health information is highest (works via two channels: ad image -> product believability -> consumer response & ad image -> ad likeability -> product believability -> consumer response)
- For high contrast ads, the relative effect (on consumer response) of no health information over some health information is only directionally low.

Implications

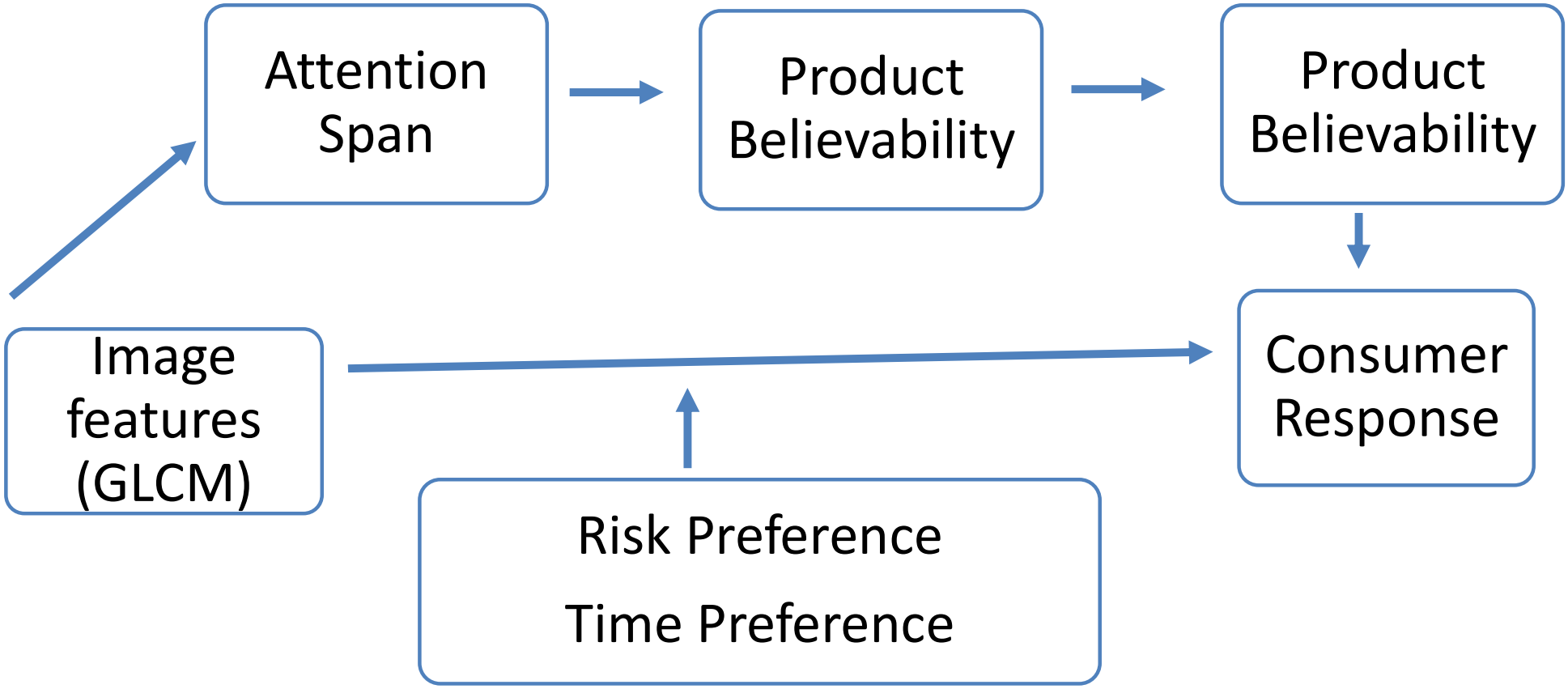
- There is a tradeoff between sharing and not sharing health/nutrition information in an ad image (with low contrast). Overall though the presence of health information adversely affects consumer response in the most severe way.

- Researchers and policymakers need to understand how other factors such as limited attention or limited knowledge is reducing the effectiveness of health/nutrition information.

- However, as our mediation model results show enhancing the ad likeability is of prime importance. If certain ads lack engaging image features, marketers might want to use other factors such as humour, emotion, authenticity etc. to improve on likeability dimension. Perhaps ad personalization would also be of significant importance.

- We also cannot overrule the possibility that new digital ad formats do contribute in making unhealthy food choices. Policy intervention in this regard would not be a remote possibility.

Future Work


Attention Span
Product Believability
Product Believability
Image features (GLCM)
Consumer Response
Risk Preference
Time Preference

Questions?

2024 Academy of Marketing Conference

Additional ad images