

Cross-Cultural Differences between Italian and UK Consumer Preferences for ‘Big Top’ Nectarines in Relation to Cold Storage

Sarah R. Christofides ¹, Anita Setarehnejad ², Ruth Fairchild ², Innocenzo Muzzalupo ³, Leonardo Bruno ⁴, Antonella Muto ⁴, Adriana Chiappetta ⁴, Maria B. Bitonti ⁴, Carsten T. Müller ¹, Hilary J. Rogers ^{1,*} and Natasha D. Spadafora ^{4,5}

¹ School of Biosciences, Cardiff University, Sir Martin Evans Building, Museum Avenue, Cardiff, CF10 3AX, UK

² Department of Healthcare and Food, School of Health & Sport Sciences, Cardiff Metropolitan University, Cardiff, CF5 2YB, UK

³ Centro di Ricerca Foreste e Legno, Consiglio per la Ricerca in Agricoltura e L'analisi Dell'economia Agraria, 87036 Rende, Italy

⁴ Department of Ecology, University of Calabria, 87036 Rende, Italy

⁵ Department of Chemical, Pharmaceutical and Agricultural Sciences, University of Ferrara, 44121 Ferrara, Italy

* Correspondence: rogershj@cf.ac.uk

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Prior to running the taste panel interested participants will be asked:

- Do you eat stone fruit (peaches)? If yes, continue. If no, thank them.
- Have you had any past allergic reactions to fruit? If no, continue. If yes, no thank you.
- Would you like to taste some ripe stone fruit for a university research project? If yes, continue and give the form below. If no, thank them.

Ask consumer to read information sheet and sign consent form.

CONSUMER TEST of PEACHES

Ethics Protocol number **CSHS/9492 for preference testing**

Ethics application number **Sta-1353/SREC 1906-02**

This taste panel will ask your opinion (like/dislike) of three different samples of peach and what you like or dislike about each. So that we can classify your answers we will also ask you a few questions about yourself and your fruit buying/consumption habits.

All of the answers you give are anonymous and cannot be traced back to you when you return your questionnaire. The anonymous data we collect will be retained for further analysis.

If you return this questionnaire to us then we presume you are consenting to your anonymous answers being used in publications, presentations and teaching, from this point forward (e.g. we do not intend to destroy the data).

If you do not wish your data to be included in this study then please do not return the questionnaire to us.

Please circle the answer that best represents you or indicate if other:

Q1. Gender Male Female

Q2. Age Range (years)

18-29

30-39

40-49

50-59

60 or older

Q3. Choose one option that best describes your ethnic group or background

..... **a Caucasian**

..... **b Asian**

..... **c Hispanic**

..... **d Black**

..... **e Native American**

..... **f Other (please describe)**

Q4. How would you describe your nationality?

Q5. How often do you eat peaches in the UK in season e.g. summer?

More than once per week

Once per week

1-3 times per week

Less than once per month

Q6. When selecting peaches do you look for specific named varieties? Yes /No

If yes, state which varieties.....

Q7. When selecting peaches what are the most important factors for your choice? Please choose as many as relevant.

Ripeness/ Colour/ Size/ Shape/ Price / Aroma/ Texture when picked up/ Taste/other

Q8. Please taste the samples in the order stated below and indicate your overall liking for each sample
using the chart provided, where **1 equals extremely disliked and 9 equals extremely liked.**

Sample	Extremely Disliked								Extremely liked
xxx	1	2	3	4	5	6	7	8	9
xxx	1	2	3	4	5	6	7	8	9
xxx	1	2	3	4	5	6	7	8	9

Q9. For each sample circle all the descriptors that best describe each peach

Varieties	<i>Choose the most appropriate descriptors by circling all that apply</i>
xxx	Peachy aroma, Sweet, Acid, Bitter, Astringent, Juicy, Crunchy, Chewy/Fibrous skin, Firm flesh, Soft flesh
xxx	Peachy aroma, Sweet, Acid, Bitter, Astringent, Juicy, Crunchy, Chewy/Fibrous skin, Firm flesh, Soft flesh
xxx	Peachy aroma, Sweet, Acid, Bitter, Astringent, Juicy, Crunchy, Chewy/Fibrous skin, Firm flesh, Soft flesh

Many thanks for your time.

If you are happy for your data to be included in the study please return this questionnaire to the researchers.

If you have further questions about the study please contact:

Dr Hilary Rogers rogershj@cf.ac.uk

CONSUMER TEST

Consumatore N.

LuogoData ... / ... /

.....

Chiedere se il consumatore mangia frutti di drupacee (pesche e/o nettarine).

Se sì, continua. Se no, grazie

Chiedi se il consumatore desidera assaggiare qualche frutto maturo per un progetto di ricerca Universitario.

Se sì, continua. Se no, grazie

Fai domande demografiche

D.1 Genere

..... *a* Maschio

..... *b* Femmina

D2. Razza

..... *a* Caucasica Nazionalità

..... *b* Asiatica Nazionalità

..... *c* Spagnola Nazionalità

..... *d* Nera Nazionalità

..... *e* Nativo americano Nazionalità

..... *f* altro Nazionalità

D3. Fascia d'età

..... *a* Sotto 19

..... *b* 20-29

..... *c* 30-39

..... *d* 40-49

..... *e* 50-59

..... *f* 60 o più

D4. Professione

..... *a* Studente

..... *b* Impiegato

D5. Con quale frequenza mangi pesche di stagione in Italia, ad es. estate?

- **a** Più di una volta a settimana
- **b** Una volta a settimana
- **c** 2-3 volte a settimana
- **d** Meno di una volta al mese

D6. Preferenza di una varietà specifica?

- **a** Sì
- **b** No

D7. Quando selezioni le pesche quali sono i fattori implicanti nella scelta delle pesche?

(Si prega di scegliere come tanti quanto rilevanti).

-**a** Gusto
- **b** Maturazione
- **e** Colore
- **d** Dimensione
- **e** Forma
- **f** Prezzo
- **g** Aroma
- **h** Consistenza
- **i** Altro

I campioni devono essere preparati a parte lontano dalla vista del consumatore e serviti in bicchieri di plastica con coperchio (un pezzo per campione).

Dì al consumatore che assaggerà quattro campioni di frutta matura. Per ogni campione chiedi se lui / lei "Mi piace", "Non mi piace" o "Mi è indifferente".

Chiedigli il grado di gradimento / sgradimento: *leggermente, moderatamente, molto o estremamente*. Fagli sorvegliare dell'acqua in bottiglia.

Ripeti la prova con il secondo, terzo, quarto, ... campione (appena raccolto, X day a 1C e 4°C)

Consumatore N.

LuogoData ... / ... /

Varietà	Estremamente sgradevole	Molto sgradevole	Moderatamente sgradevole	Appena sgradevole	Indifferente	Appena gradevole	Moderatamente gradevole	Molto gradevole	Estremamente gradevole
	1	2	3	4	5	6	7	8	9
Big Top 1									
Big Top 2									
Big Top 3									

Varietà	Scegli i descrittori più adeguati:
Big Top 1	Dolce, Acida, Astringente, Succosa, Croccante, Consistente, Dura, Tenera, Fragrante, Aromatica, Amara, Fibrosa
Big Top 2	Dolce, Acida, Astringente, Succosa, Croccante, Consistente, Dura, Tenera, Fragrante, Aromatica, Amara, Fibrosa

Big Top 3	Dolce, Acida, Astringente, Succosa, Croccante, Consistente, Dura, Tenera, Fragrante, Aromatica, Amara, Fibrosa
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Table S1. Participant information

		Site				
	information Participants	CF 1 103	CF 2 101	IT 155	Tot 359	% 100
Gender	Male	39	48	87	174	48.47
	Female	58	53	68	179	49.86
	non disclosed gender	6	0	0	6	1.67
Age	18–29 years	19	33	113	165	45.96
	30–39 years	30	19	12	61	16.99
	40–49 years	21	25	10	56	15.60
	50–59 years	24	20	15	59	16.43
	60+ years	9	4	5	18	5.01
Ethnicity	Caucasian	91	89	122	302	84.12
	Asian	5	3	8	16	4.46
	Hispanic	0	2	11	13	3.62
	Black	2	1	14	17	4.74
	Other	3	4	0	7	1.95
	NA	2	2	0	4	1.11
Nationality	British	87	69		156	43.45
	Italian		3	113	116	32.31
	Other	16	29	42	87	24.23

Table S2. Results of univariate tests on whether the frequency of purchase and nation (Italy vs UK) affects the importance of each characteristic in influencing the decision to purchase.

	Aroma		Best before		Blemishes		Colour		Other		Price		Retailer	
	LR	<i>P</i>	LR	<i>P</i>	LR	<i>P</i>	LR	<i>P</i>	LR	<i>P</i>	LR	<i>P</i>	LR	<i>P</i>
Gender	1.05	>0.999	0.38	>0.999	1.99	0.92	0.4	>0.999	1.2	0.992	3.29	0.992	4.3	0.4
Country	13.6	0.001	35.1	0.001	18	0.01	0.1	0.929	5.8	0.159	20.4	0.001	2.4	0.8
Frequency	10.8	0.078	3.9	0.834	3.35	0.89	1.4	0.991	0.9	0.998	1.11	0.998	0.6	1
Country: Frequency	0.59	0.998	1.4	0.993	1.09	0.99	0.3	0.998	0	0.998	2.89	0.948	2	1
	Ripeness		Shape		Size		Taste		Texture		Variety			
	LR	<i>P</i>	LR	<i>P</i>	LR	<i>P</i>	LR	<i>P</i>	LR	<i>P</i>	LR	<i>P</i>		
Gender	10.6	0.213	0.48	>0.999	0.27	>0.999	1.4	>0.999	0.3	>0.999	2.99	0.999		
Country	32.6	0.001	0.35	0.929	16.3	0.08	53	0.001	6.5	0.306	56	0.001		
Frequency	5.08	0.63	0.56	0.998	3.36	0.89	0.3	0.998	0.6	0.998	7.09	0.335		
Country: Frequency	0.17	0.998	6.17	0.444	0.15	1	1.7	0.99	2.3	0.984	6.24	0.444		

Comparisons are based on likelihood ratio tests. *P* values are adjusted using a step-down resampling procedure.

Table S3. Top candidate models ($\Delta\text{AICc} < 2$) used in model averaging to predict peach ratings based on peach characteristics.

Rank	Terms	DF	logL	AICc	ΔAICc	Weight
1	Acid + Aroma + Astringent + Bitter + Crunchy + Juicy + Sweet	17	-1566.99	3168.67	0	0.26
2	Acid + Aroma + Astringent + Bitter + Crunchy + Fibrous + Juicy + Sweet	18	-1566	3168.77	0.1	0.25
3	Acid + Aroma + Astringent + Bitter + Crunchy + Juicy + Soft + Sweet	18	-1566.63	3170.02	1.35	0.13
4	Aroma + Astringent + Bitter + Crunchy + Juicy + Sweet	16	-1568.73	3170.06	1.39	0.13
5	Acid + Aroma + Astringent + Bitter + Crunchy + Fibrous + Juicy + Soft + Sweet	19	-1565.61	3170.07	1.4	0.13
6	Aroma + Astringent + Bitter + Crunchy + Fibrous + Juicy + Sweet	17	-1567.93	3170.55	1.89	0.1

DF = degrees of freedom, LogL = log-likelihood, AICc = Akaike's information criterion with the small sample bias adjustment, ΔAICc = difference in AICc between the current model and the best model, Weight = Akaike weight.

Table S4. Co-occurrence of peach characteristics.

<i>Comparison</i>	<i>Both</i>	<i>Char1</i>	<i>Char2</i>	<i>Neither</i>	<i>OddsRatio</i>	<i>P</i>	<i>P.adj</i>
Aroma vs Sweet	171	97	343	466	2.39	<0.001	<0.001
Aroma vs Acid	19	249	110	699	0.49	0.005	0.010
Aroma vs Bitter	8	260	81	728	0.28	<0.001	<0.001
Aroma vs Astringent	6	262	51	758	0.34	0.007	0.015
Aroma vs Juicy	95	173	161	648	2.21	<0.001	<0.001
Aroma vs Crunchy	148	120	435	374	1.06	0.724	0.740
Aroma vs Fibrous	38	230	80	729	1.50	0.055	0.083
Aroma vs Firm	133	135	416	393	0.93	0.622	0.683
Aroma vs Soft	53	215	84	725	2.13	<0.001	<0.001
Sweet vs Acid	21	493	108	455	0.18	<0.001	<0.001
Sweet vs Bitter	10	504	79	484	0.12	<0.001	<0.001
Sweet vs Astringent	12	502	45	518	0.28	<0.001	<0.001
Sweet vs Juicy	185	329	71	492	3.89	<0.001	<0.001
Sweet vs Crunchy	250	264	333	230	0.65	0.001	0.001
Sweet vs Fibrous	50	464	68	495	0.78	0.241	0.312
Sweet vs Firm	228	286	321	242	0.60	<0.001	<0.001
Sweet vs Soft	108	406	29	534	4.89	<0.001	<0.001
Acid vs Bitter	18	111	71	877	2.00	0.017	0.029
Acid vs Astringent	8	121	49	899	1.21	0.673	0.722
Acid vs Juicy	14	115	242	706	0.36	<0.001	<0.001
Acid vs Crunchy	73	56	510	438	1.12	0.573	0.645
Acid vs Fibrous	10	119	108	840	0.65	0.291	0.364
Acid vs Firm	68	61	481	467	1.08	0.708	0.740
Acid vs Soft	4	125	133	815	0.20	<0.001	<0.001
Bitter vs Astringent	7	82	50	938	1.60	0.317	0.385
Bitter vs Juicy	11	78	245	743	0.43	0.009	0.017
Bitter vs Crunchy	54	35	529	459	1.34	0.222	0.303
Bitter vs Fibrous	16	73	102	886	1.90	0.033	0.053
Bitter vs Firm	53	36	496	492	1.46	0.097	0.142
Bitter vs Soft	4	85	133	855	0.30	0.012	0.023
Astringent vs Juicy	4	53	252	768	0.23	0.001	0.003
Astringent vs Crunchy	26	31	557	463	0.70	0.219	0.303
Astringent vs Fibrous	6	51	112	908	0.95	>0.999	>0.999
Astringent vs Firm	32	25	517	503	1.25	0.496	0.573
Astringent vs Soft	2	55	135	885	0.24	0.038	0.059
Juicy vs Crunchy	94	162	489	332	0.39	<0.001	<0.001

Juicy vs Fibrous	18	238	100	721	0.55	0.022	0.036
Juicy vs Firm	75	181	474	347	0.30	<0.001	<0.001
Juicy vs Soft	87	169	50	771	7.92	<0.001	<0.001
Crunchy vs Fibrous	51	532	67	427	0.61	0.014	0.025
Crunchy vs Firm	363	220	186	308	2.73	<0.001	<0.001
Crunchy vs Soft	21	562	116	378	0.12	<0.001	<0.001
Fibrous vs Firm	54	64	495	464	0.79	0.243	0.312
Fibrous vs Soft	18	100	119	840	1.27	0.380	0.450
Firm vs Soft	13	536	124	404	0.08	<0.001	<0.001

Both = number of responses which were 'yes' for both characters; Char1 = number of responses which were 'yes' only for the characteristic on the left hand side; Char2 = number of responses which were 'yes' only for the character on the right hand side; Neither = number of responses which were 'no' for both characters. Fisher's exact tests are presented for each pair; adjusted P-values were corrected by the Benjamini-Hochberg method. Significant pairs are indicated in bold.

Table S5. Univariate test results from the *manyglm* model regressing site and treatment against peach characteristics.

	Acid		Aroma		Astringent		Bitter		Crunchy	
	LR	<i>P</i>	LR	<i>P</i>	LR	<i>P</i>	LR	<i>P</i>	LR	<i>P</i>
Site	3.78	0.38	91.71	0	1.13	0.8	0.11	0.96	131.6	0
Treatment	3.41	0.2	25.91	0	9.36	0.04	19.6	0	18.86	0
Site: Treatment	15.7	0.03	21.4	0.01	9.33	0.21	8.03	0.22	26.84	0
	Fibrous		Firm		Juicy		Soft		Sweet	
	LR	<i>P</i>	LR	<i>P</i>	LR	<i>P</i>	LR	<i>P</i>	LR	<i>P</i>
Site	21.6	0	103.5	0	24.91	0	92.3	0	16.56	0.01
Treatment	5.21	0.15	8.9	0.04	20.83	0	34.4	0	40.96	0
Site: Treatment	3.55	0.52	31.06	0	31.27	0	11.6	0.13	25.95	0

Comparisons are based on likelihood ratio tests. *P*-values are adjusted for multiple testing via a step-down resampling procedure.

Table S6. Difference in how each character affected sensorial rating, in relation to consumer characteristics.

Character	Predictor	LR Chisq	D.F.	Pr(>Chisq)	P.adj
Aroma	Aroma	0.33	1	0.566	0.885
Aroma	Country	0.387	1	0.534	0.885
Aroma	Frequency	2.559	4	0.634	0.937
Aroma	Gender	0.001	1	0.973	0.985
Aroma	Aroma:Country	NA	0	NA	NA
Aroma	Aroma:Frequency	0.23	3	0.973	0.985
Sweet	Taste	1.593	1	0.207	0.655
Sweet	Ripeness	5.731	1	0.017	0.468
Sweet	Country	0	1	0.985	0.985
Sweet	Frequency	0.4	4	0.982	0.985
Sweet	Gender	1.941	1	0.164	0.655
Sweet	Taste:Country	1.041	1	0.308	0.747
Sweet	Taste:Frequency	1.454	3	0.693	0.971
Sweet	Ripeness:Country	2.25	1	0.134	0.655
Sweet	Ripeness:Frequency	10.451	3	0.015	0.468
Acid	Taste	0.135	1	0.714	0.971
Acid	Country	0.044	1	0.833	0.985
Acid	Frequency	3.053	3	0.384	0.869
Acid	Gender	2.047	1	0.152	0.655
Acid	Taste:Country	2.25	1	0.134	0.655
Acid	Taste:Frequency	2.699	3	0.44	0.885
Bitter	Taste	4.014	1	0.045	0.538
Bitter	Country	1.288	1	0.256	0.697
Bitter	Frequency	9.611	4	0.048	0.538
Bitter	Gender	1.559	1	0.212	0.655
Bitter	Taste:Country	5.356	1	0.021	0.468
Bitter	Taste:Frequency	0.31	3	0.958	0.985
Astringent	Taste	2.611	1	0.106	0.655
Astringent	Country	1.494	1	0.222	0.655
Astringent	Frequency	2.128	3	0.546	0.885
Astringent	Gender	0.023	1	0.878	0.985
Astringent	Taste:Country	0.166	1	0.684	0.971
Astringent	Taste:Frequency	4.349	2	0.114	0.655
Juicy	Texture	0.01	1	0.92	0.985
Juicy	Ripeness	1.8	1	0.18	0.655
Juicy	Country	1.636	1	0.201	0.655
Juicy	Frequency	3.923	4	0.416	0.885
Juicy	Gender	4.028	1	0.045	0.538

Juicy	Texture:Country	1.569	1	0.21	0.655
Juicy	Texture:Frequency	4.56	4	0.335	0.787
Juicy	Ripeness:Country	0.067	1	0.795	0.985
Juicy	Ripeness:Frequency	2.63	3	0.452	0.885
Crunchy	Texture	0.007	1	0.931	0.985
Crunchy	Country	3.012	1	0.083	0.655
Crunchy	Frequency	3.182	4	0.528	0.885
Crunchy	Gender	0.312	1	0.576	0.885
Crunchy	Texture:Country	0.095	1	0.758	0.985
Crunchy	Texture:Frequency	1.639	4	0.802	0.985
Fibrous	Texture	0.457	1	0.499	0.885
Fibrous	Country	0.4	1	0.527	0.885
Fibrous	Frequency	0.999	4	0.91	0.985
Fibrous	Gender	0.141	1	0.707	0.971
Fibrous	Texture:Country	1.434	1	0.231	0.655
Fibrous	Texture:Frequency	2.025	3	0.567	0.885
Firm	Texture	0.003	1	0.957	0.985
Firm	Country	1.067	1	0.302	0.747
Firm	Frequency	2.858	4	0.582	0.885
Firm	Gender	0.037	1	0.847	0.985
Firm	Texture:Country	2.255	1	0.133	0.655
Firm	Texture:Frequency	3.674	4	0.452	0.885
Soft	Texture	0	1	0.984	0.985
Soft	Ripeness	2.09	1	0.148	0.655
Soft	Country	1.63	1	0.202	0.655
Soft	Frequency	3.189	4	0.527	0.885
Soft	Gender	0.004	1	0.952	0.985
Soft	Texture:Country	1.7	1	0.192	0.655
Soft	Texture:Frequency	1.328	4	0.857	0.985
Soft	Ripeness:Country	1.226	1	0.268	0.702
Soft	Ripeness:Frequency	1.936	3	0.586	0.885

Each sensorial character was regressed against respondents' country, gender, frequency of purchase and which characteristics they named as important in purchase decisions. For each sensorial characteristic, only relevant purchase characteristics were included in the model, e.g. texture and ripeness were included in the model for softness whereas aroma was not.

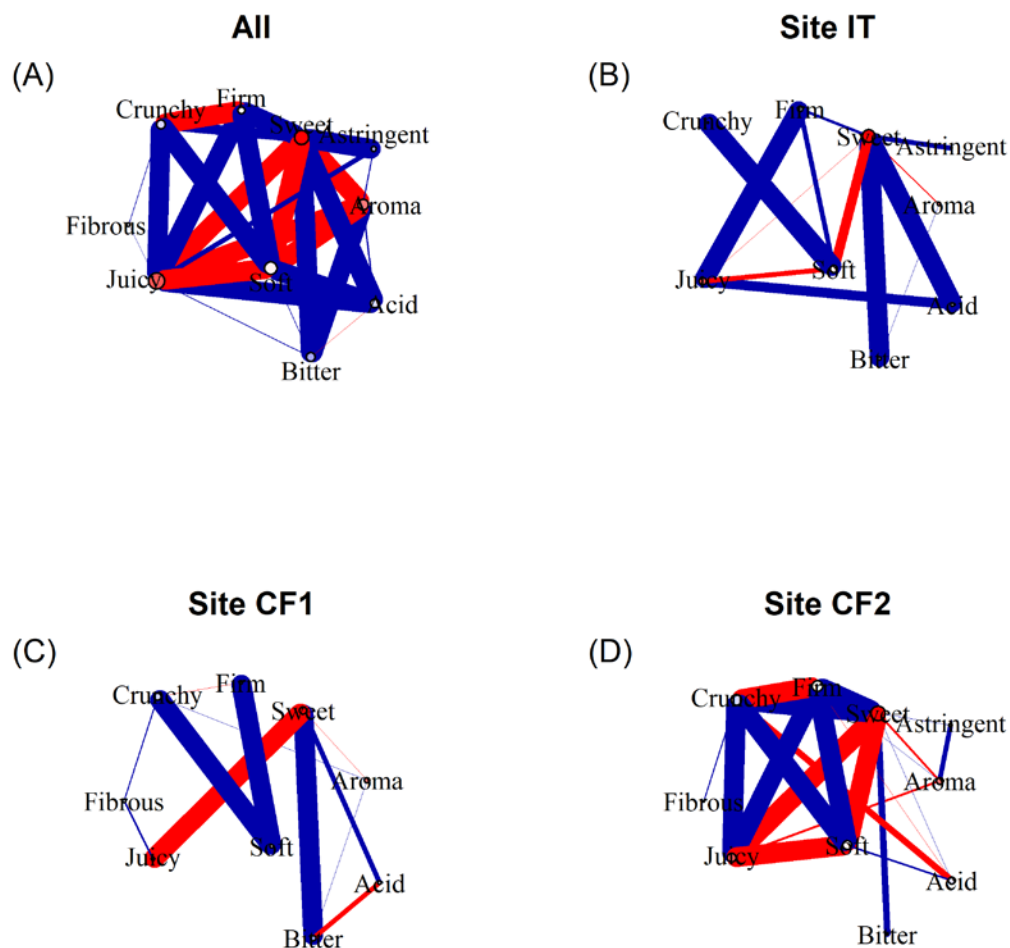


Figure S1. Co-occurrence frequency of peach characteristics by site. (A) all sites together, (B) site IT, (C) site CF1, (D) site CF2. Only significant associations are shown; for a full list see Table S4. Edge widths are inversely proportional to P values (thick edges indicate low P values). Red edges indicate that a pair of nodes co-occurred more often than expected by chance; blue edges indicate they co-occurred less often than expected by chance. Node colour for each characteristic is proportional to the corresponding parameter value in Figure 5: blue indicates a negative effect on hedonic rating and red a positive effect, while the strength of colour corresponds to the strength of the effect.