



SenseAsia 2016

The 2nd Asian Sensory and Consumer Research Symposium
15-17th May 2016 • Hyatt on the Bund, Shanghai, China



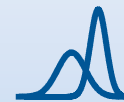
The 9-Point Scale and Hedonic Ranking: Some re-Appraisals and Alternatives



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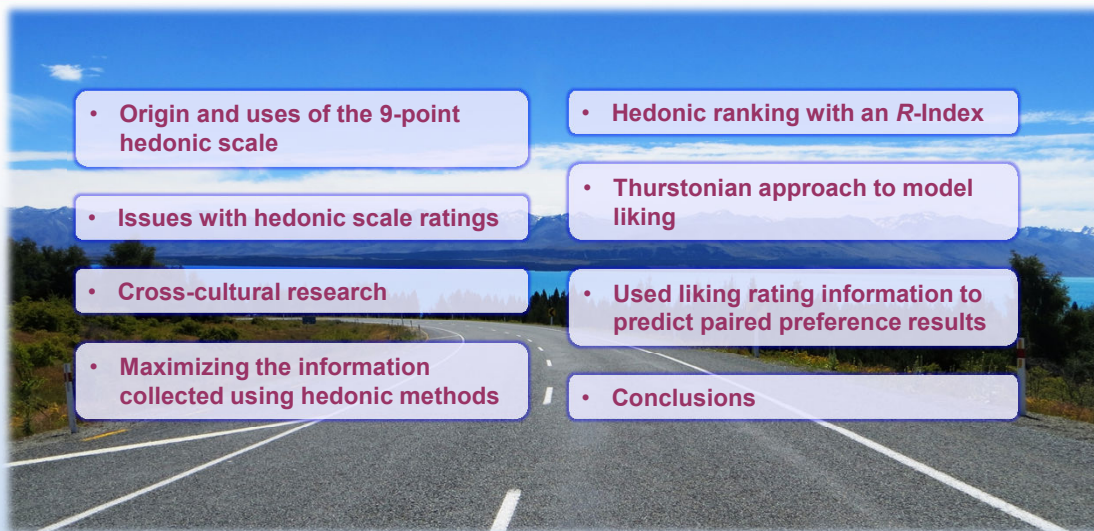


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1/36

Where are we going?



- Origin and uses of the 9-point hedonic scale

- Hedonic ranking with an *R*-Index

- Issues with hedonic scale ratings

- Thurstonian approach to model liking

- Cross-cultural research

- Used liking rating information to predict paired preference results

- Maximizing the information collected using hedonic methods

- Conclusions

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2/36

9-Point Hedonic Scale

Dislike Extremely	Dislike Very much	Dislike Moderately	Dislike Slightly	Neither Like nor Dislike	Like Slightly	Like Moderately	Like Very much	Like Extremely
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U.S. Army Quartermaster Food and Container Institute



900 U.S. Soldiers rated 51 words on a scale

9 POINT HEDONIC SCALE. CATEGORIES WHICH WERE CHOSEN

SCALE VALUES (STANDARD DEVIATION)

Best of all	Like fairly well	Not pleasing
Favorite	Like	Don't care for it
Like extremely 4.16 (1.62)	Like moderately 1.12 (0.61)	Dislike moderately - 1.20 (0.41)
Like intensely	OK	Poor
Excellent	Average	Dislike
Wonderful	Mildly like	Don't like
Strongly like	Fair	Bad
Like very much 2.91 (0.60)	Acceptable	Highly unfavorable
Mighty fine	Only fair	Strongly dislike
Especially good	Like slightly 0.69 (0.32)	Dislike very much - 2.49 (0.64)
Highly favorable	Neither like nor dislike	Very bad
Like very well	Neutral	Terrible
Very good	Like not so well	Dislike intensely
Like quite a bit	Like not so much	Loathe
Enjoy	Dislike slightly - 0.59 (0.27)	Dislike extremely - 4.32 (1.86)
Preferred	Mildly dislike	
Good		
Welcome		
Tasty		
Pleasing		

Jones, Peryam & Thurstone. (1955). Development of a Scale for Measuring Soldiers' Food Preferences. Food Research. 20, 512-520-



9-Point Hedonic Scale

Dislike Extremely	Dislike Very much	Dislike Moderately	Dislike Slightly	Neither Like nor Dislike	Like Slightly	Like Moderately	Like Very much	Like Extremely
1	2	3	4	5	6	7	8	9

U.S. Army Quartermaster Food and Container Institute



9-Point Hedonic Scale

Dislike Extremely	Dislike Very much	Dislike Moderately	Dislike Slightly	Neither Like nor Dislike	Like Slightly	Like Moderately	Like Very much	Like Extremely
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Like the least

Like the most

Do not like

Like very much

Dislike extremely

Like extremely

Dislike

Like

1 2 3 4 5 6 7 8 9





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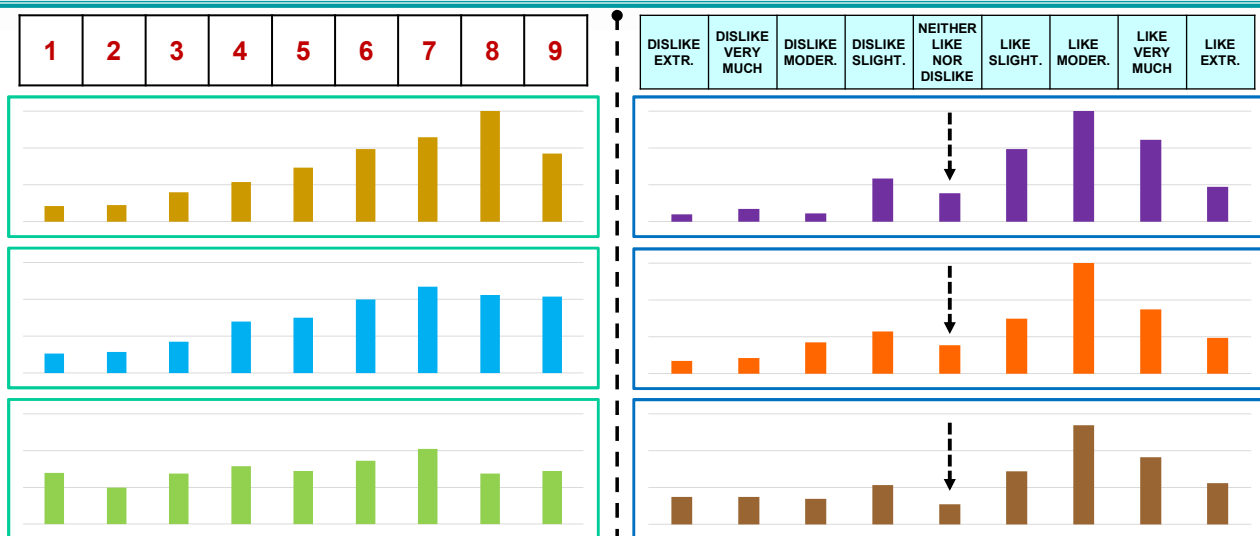
Issues with the 9-Point Hedonic Scale

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7/36

Scale Effect on Score Distributions



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8/36

1	2	3	4	5	6	7	8	9
Dislike Extremely	Dislike Very much	Dislike Moderately	Dislike Slightly	Neither Like nor Dislike	Like Slightly	Like Moderately	Like Very much	Like Extremely

RELATIVE

NUMBERS

ABSOLUTE

WORDS

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Issues with the 9-Point Hedonic Scale

Cross-Cultural Research

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10/36

Cross-Cultural Research

- There is a need to compare product performances among different countries

Dislike Extremely	Dislike Very much	Dislike Moderately	Dislike Slightly	Neither Like nor Dislike	Like Slightly	Like Moderately	Like Very much	Like Extremely
1	2	3	4	5	6	7	8	9

CROSS-CULTURAL USE OF THE 9-POINT HEDONIC SCALE

In previous work with 'words only', smaller ranges found for Koreans, Thais, Taiwanese, both in native country and in USA

LilyYeh *et al.*
FQP, 1998, 9, 413-419.

CROSS-CULTURAL USE OF THE 9-POINT HEDONIC SCALE

In East Asia, judges tend to use a smaller range of words and numbers than in USA.

Emily Yao *et al.*
J. Sensory Studies, 2003, 18, 115-139



USA (Davis, CA) vs. China (Weihai, Shandong)

YAO-HUA FENG

- 200 university students and staff from each country



- 9-point scale: words only

Dislike Extremely	Dislike Very much	Dislike Moderately	Dislike Slightly	Neither Like nor Dislike	Like Slightly	Like Moderately	Like Very much	Like Extremely
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- 4 jelly beans: Taste



- 9-point scale: numbers only

1	2	3	4	5	6	7	8	9
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- 5 ballpoint pens: Examine & write



- 4 toothbrushes: View & hold





USA (Davis, CA) vs. China (Weihai, Shandong) (Cont.)

Range: Most liked - Least liked

Dislike Extremely	Dislike Very much	Dislike Moderately	Dislike Slightly	Neither Like nor Dislike	Like Slightly	Like Moderately	Like Very much	Like Extremely
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1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---

Mean ranges: Words only

- Jelly beans USA 6.0 China 5.0
- Ballpoint pens USA 6.0 China 5.6
- Toothbrushes USA 5.9 China 5.4



Mean ranges: Numbers only

- Jelly beans USA 5.9 China 5.2
- Ballpoint pens USA 5.9 China 5.9.....NS
- Toothbrushes USA 6.3 China 6.1.....NS



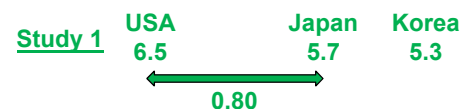
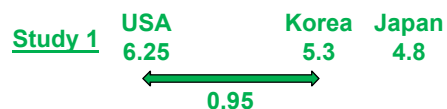
Comparison with Other South Asian Countries



Range: Most liked - Least liked

Dislike Extremely	Dislike Very much	Dislike Moderately	Dislike Slightly	Neither Like nor Dislike	Like Slightly	Like Moderately	Like Very much	Like Extremely
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1	2	3	4	5	6	7	8	9
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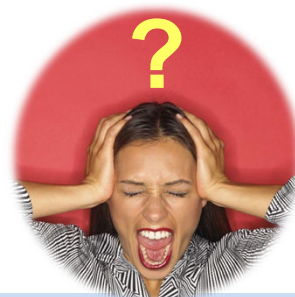



Dislike Extremely	Dislike Very much	Dislike Moderately	Dislike Slightly	Neither Like nor Dislike	Like Slightly	Like Moderately	Like Very much	Like Extremely
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1	2	3	4	5	6	7	8	9
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The brain processes hedonic word scales and number scales differently.
They are not interchangeable.


So how should we analyze the data from
the words only version
and
the numbers only version
of the 9-point hedonic scale?




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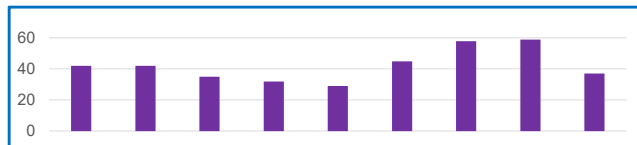


Maximizing the Information Collected Using Hedonic Methods

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How You Could Use the Words Scale

Dislike Extremely	Dislike Very much	Dislike Moderately	Dislike Slightly	Neither Like nor Dislike	Like Slightly	Like Moderately	Like Very much	Like Extremely
----------------------	----------------------	-----------------------	---------------------	--------------------------------	------------------	--------------------	-------------------	-------------------



Mean

5.2



5.2

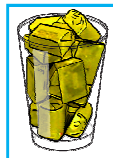
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17/36

How You Could Use the Numbers Scale

1	2	3	4	5	6	7	8	9
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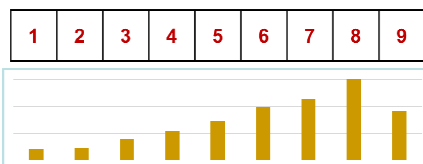
Market Loser



Market Middle



Market Leader



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18/36



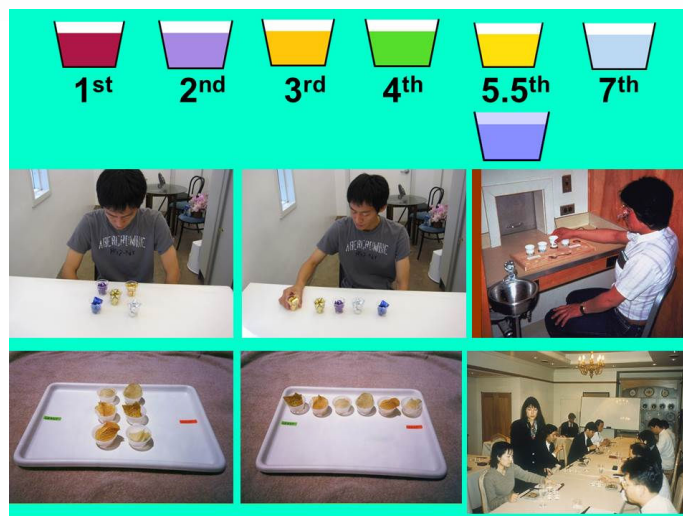
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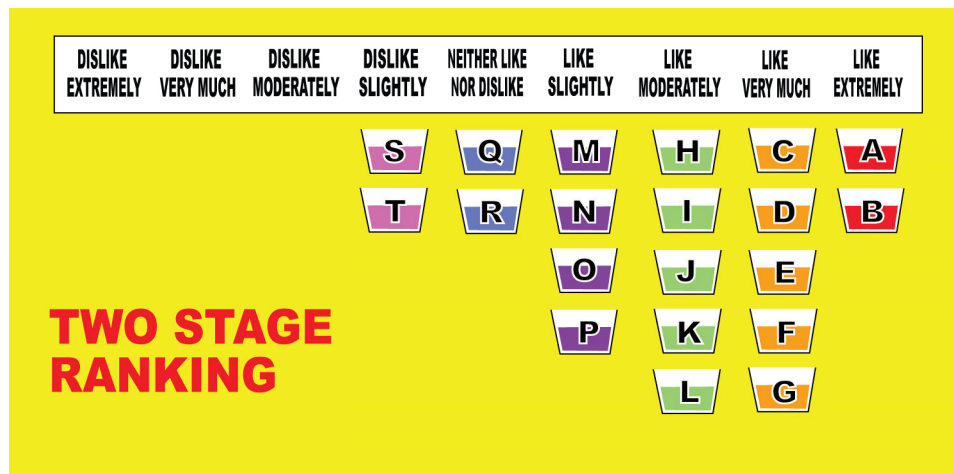
Hedonic Ranking



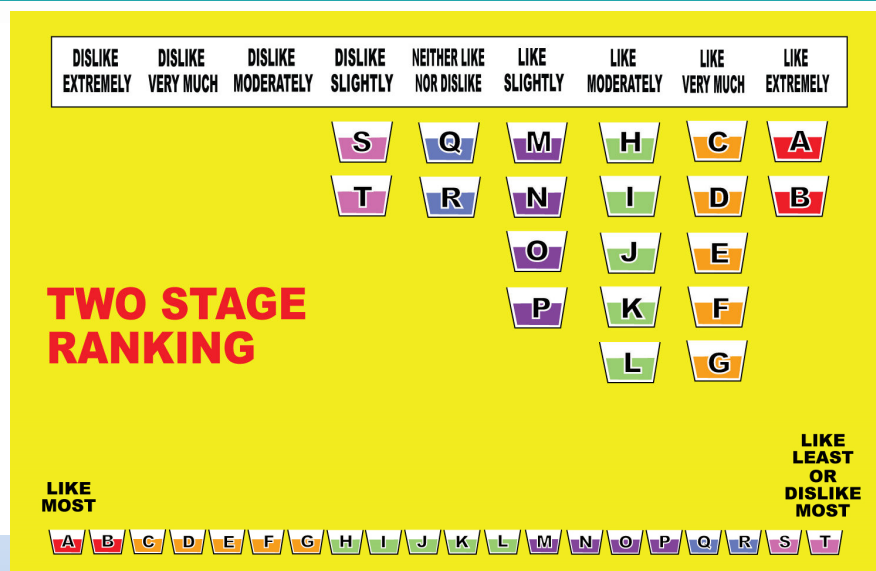
Ranking is User Friendly



Using Ranking with the 9-Point Hedonic Scale



Using Ranking with the 9-Point Hedonic Scale (Cont.)





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Hedonic Ranking

John Brown's *R*-Index

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23/36

R_{JB} Calculation



	1 st	2 nd	3 rd	4 th
Consumer 1	A	B	C	D
Consumer 2	B	A	C	D
Consumer 3	A	C	B	D
Consumer 4	A	B	C	D
Consumer 5	C	A	B	D
Consumer 6	B	A	C	D
Consumer 7	A	B	C	D
Consumer 8	A	C	B	D
Consumer 9	C	A	B	D
Consumer 10	A	C	B	D

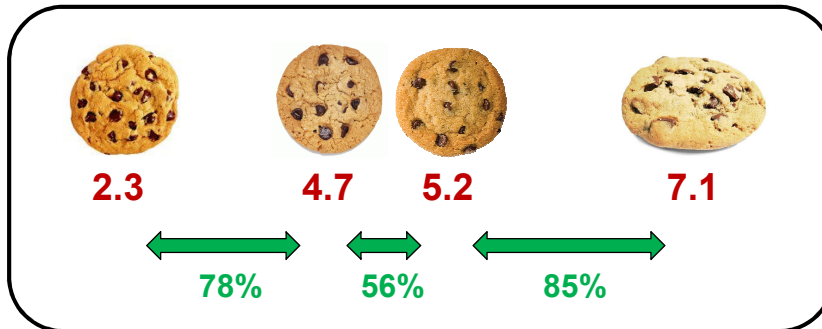
Percentage of times	
A beats B	80%
A beats C	80%
A beats D	100%
B beats C	50%
B beats D	100%
C beats D	100%

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24/36

Getting Ranking R-Indices from the 9-Point Hedonic Scale



Mean scale values

R-Index values



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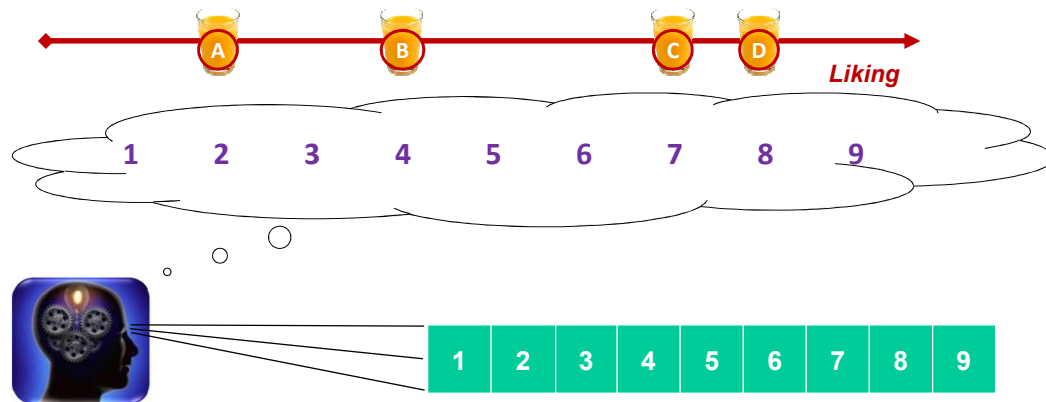


Using Thurstonian Models



Ideas Behind the Models

- Response bias will cause numbers not to be equally spaced

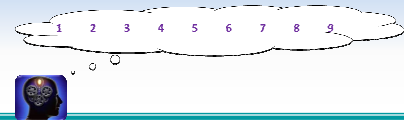


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27/36

Ideas Behind the Models (Cont.)



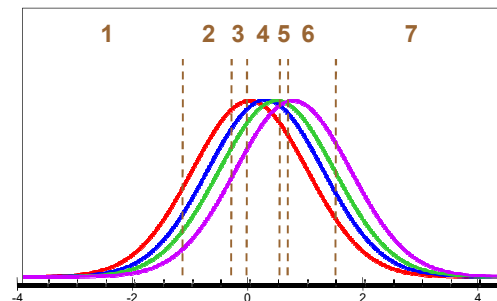
d' Values

0% 0.00

20% 0.22

40% 0.46

100% 0.72

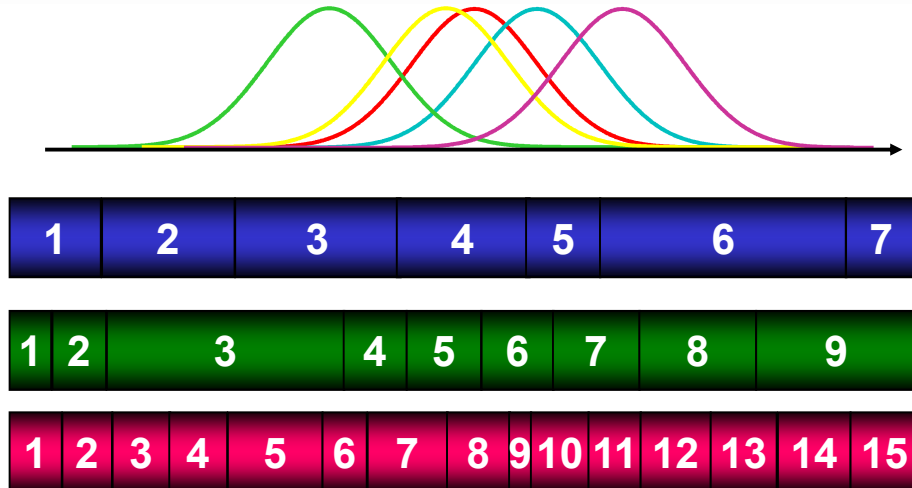


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28/36

Ideas Behind the Models (Cont.)



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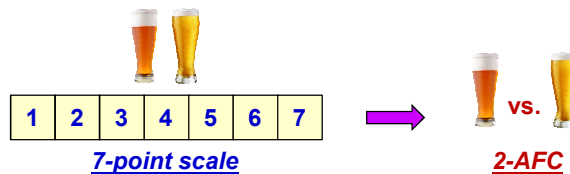
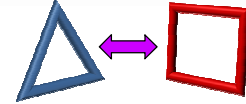


Predicting Preference from Liking Ratings

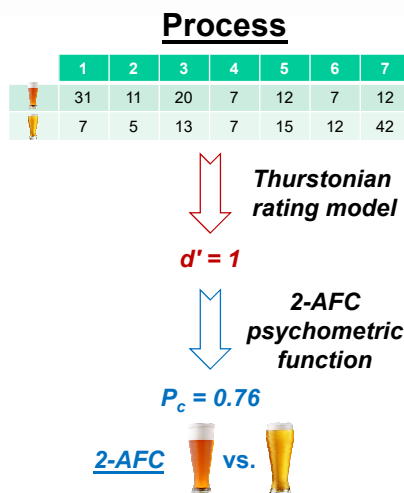


Linking Intensity Ratings to Discrimination Results

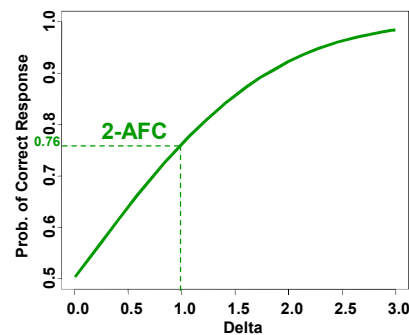
- Thurstonian modeling allows the linkage of results from different methodologies
- Consequently it also permits the prediction of results of one method from the data collected with another
- For instance 2-AFC results can be predicted from intensity rating data



Linking Intensity Ratings to Discrimination Results (cont.)

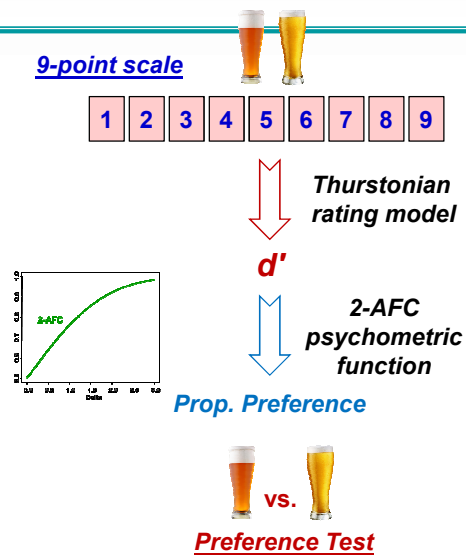


2-AFC psychometric function



Application to Liking Rating and Preference Splits

- This approach can be used to predict preference results from hedonic liking ratings
- Liking can be collected on a categorical hedonic scale
- A preference test is a 2-AFC performed on a hedonic continuum
- Therefore, preference strength (preference splits) can be predicted from hedonic rating results



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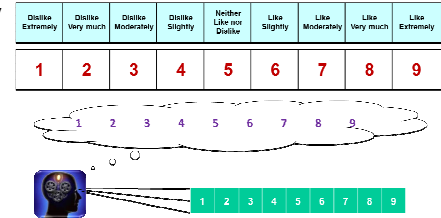


Conclusions



Conclusions

- The 9-point hedonic scale is broadly used in sensory and consumer science
- Consumer psychological bias will result in absolute values variation depending on the scale used
- Approaches are available to remove the effect of the bias
 - Use a ranking *R*-Index
 - Use a Thurstonian modelling approach
- Modeling the consumer behavior also permits the predictions across scales and the possibility of predicting product preference from liking ratings



Conclusions (Cont.)



J. Food Science & Agriculture 2015. 95, 2167-2178

Sukanya Wichchukit & Michael O'Mahony



The 9-point hedonic scale and hedonic ranking in food science: some reappraisals and alternatives

Thank You For Your Attention

Any Questions?

