

Business Risk Assessment from the Application of Discrimination Testing

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The business problem

- Need to change a process or a formula or an ingredient

- Should we go ahead with this change?
  - What is the business risk associated with this change?
    - ❖ Would this change cause a perceptible difference?

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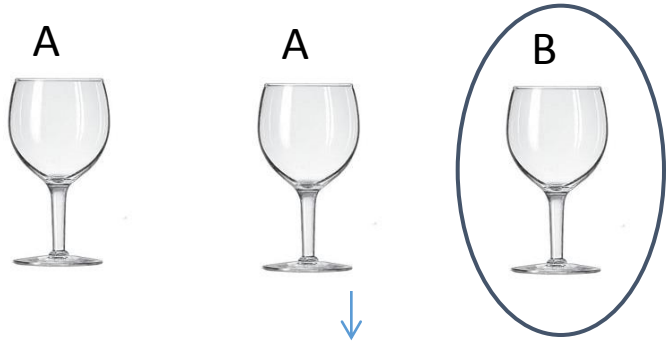
The Triangle Test: Traditional Approach



Calculate the number of panelists who picked the odd sample correctly

Obtain a p value and compare to criterion

0.05 > P value >0.05

Samples are significantly different

Samples are not significantly different

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The business problem

- Need to change a process or a formula or an ingredient

- Should we go ahead with this change?
  - What is the business risk associated with this change?
    - ❖ What is the consumer risk associated with this flavor profile change?
    - ❖ What is the size of the sensory difference and does it matter?

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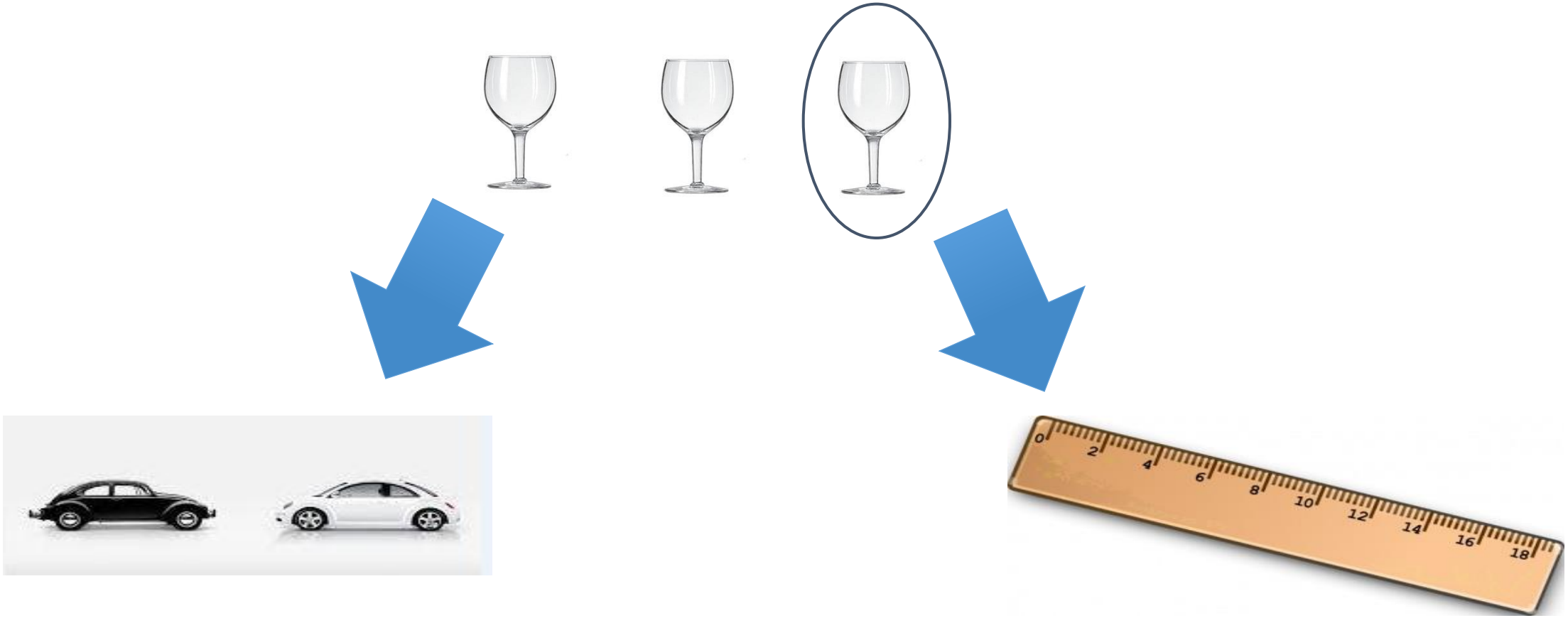
Quantifying the size of the difference



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Developing a ‘Scale’ for sensory differences

- Objective:
  - Use the same ruler across all projects
- Criteria:
  - Easy to communicate to upper management
  - Business relevant / Help assess consumer risk
  - Stable across discrimination methods

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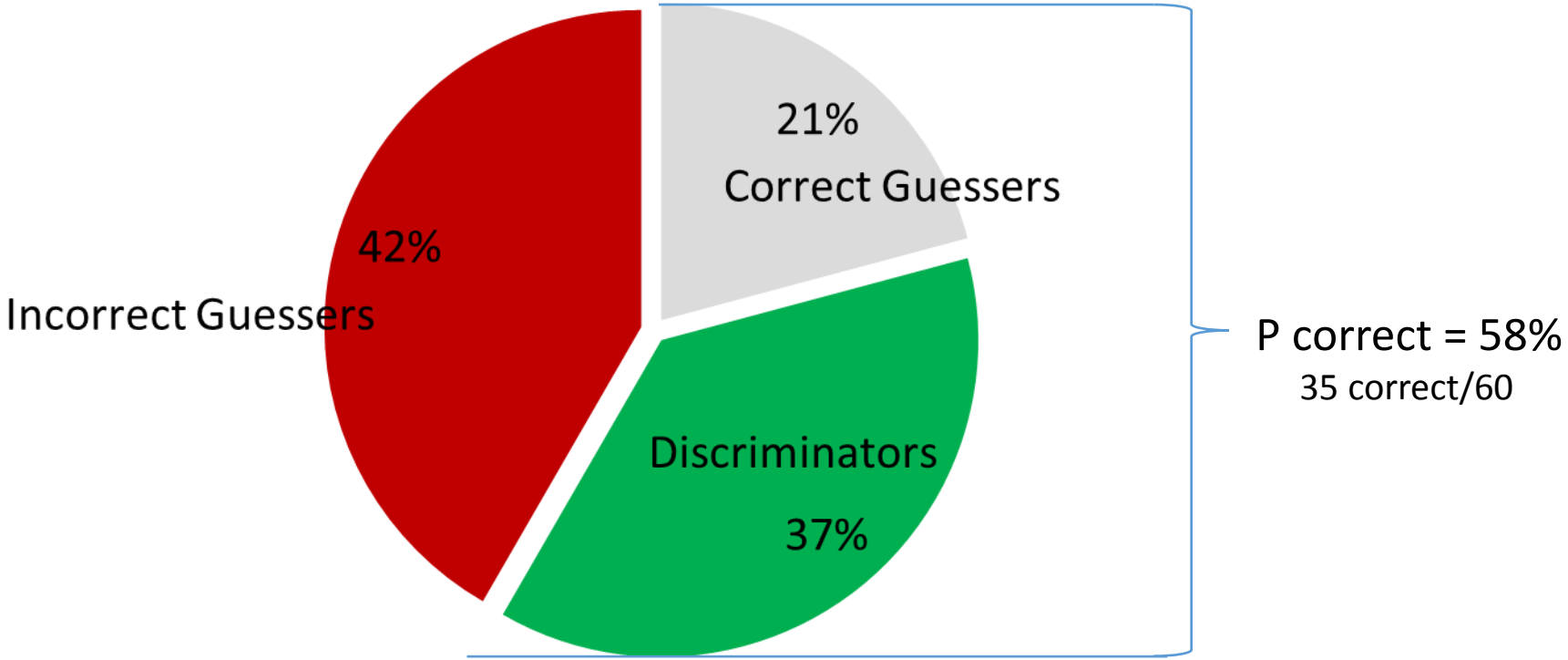
Some Common Analysis Options - Percentage Discriminators - Pd



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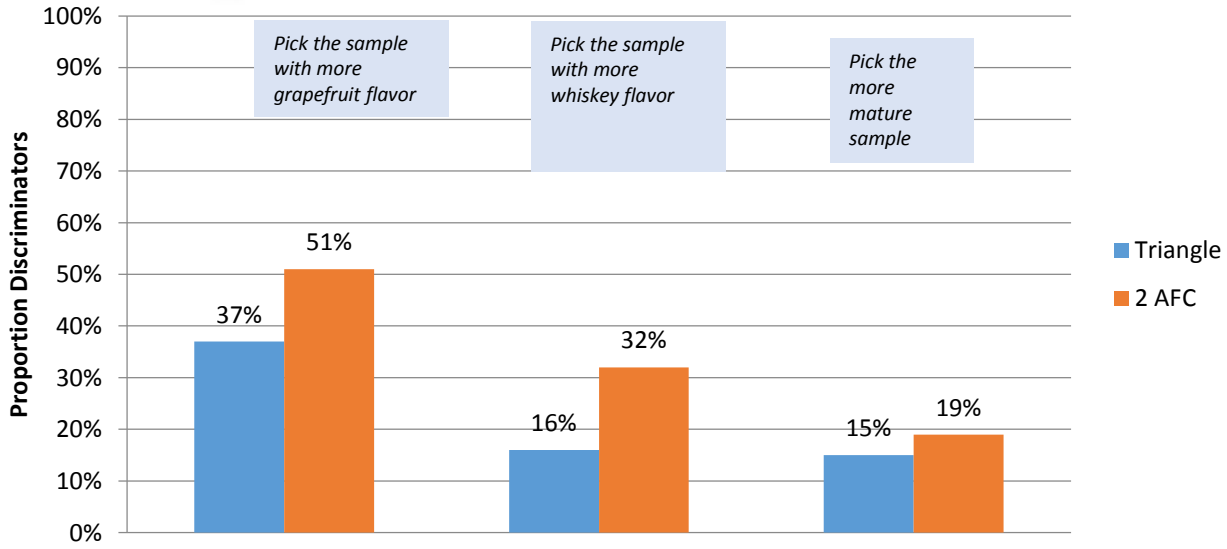
Percentage Discriminators - Pd

- Ease of Communication
- Business Relevance
- Stability across methods









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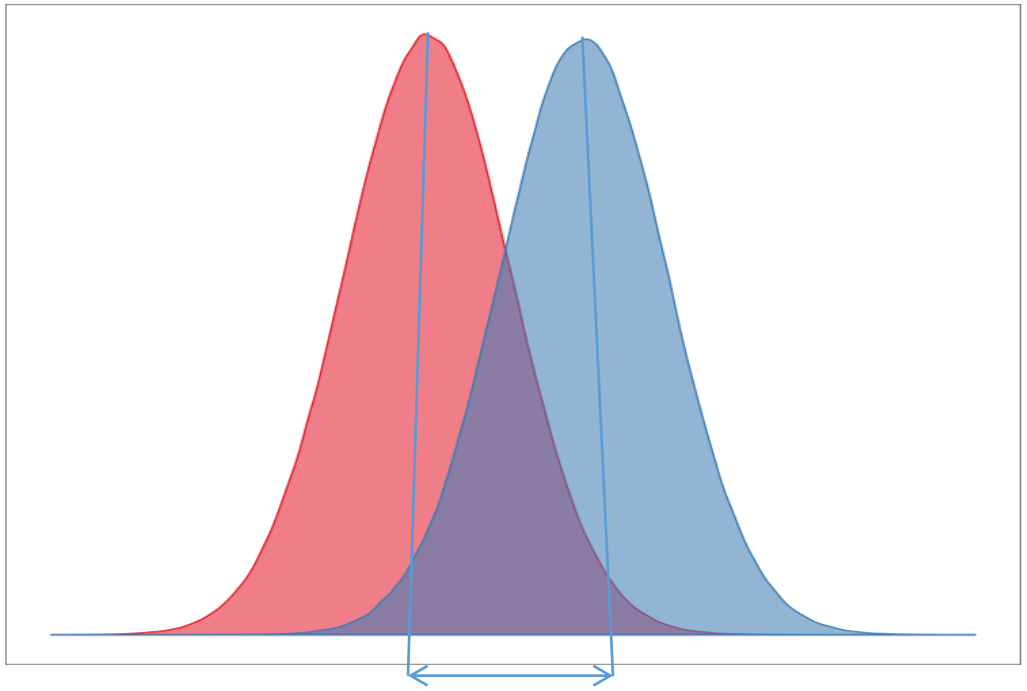
Some Common Analysis Options - Discriminal Distance d’



d’
(discriminal distance)

35 correct / 60
Pc = 58%

TABLE 3. PROBABILITY OF A CORRECT RESPONSE ($\times 10^4$) AS A FUNCTION OF δ FOR THE TRIANGULAR METHOD

δ	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	3333	3333	3334	3334	3335	3336	3337	3338	3339	3341
0.1	3343	3344	3347	3349	3351	3354	3357	3360	3363	3366
0.2	3370	3374	3378	3382	3386	3390	3395	3400	3405	3410
0.3	3415	3421	3427	3432	3439	3445	3451	3458	3464	3471
0.4	3478	3486	3493	3501	3508	3516	3524	3533	3541	3550
0.5	3558	3567	3576	3586	3595	3604	3614	3624	3634	3644
0.6	3654	3665	3676	3686	3697	3708	3719	3731	3742	3754
0.7	3766	3778	3790	3802	3814	3827	3839	3852	3865	3878
0.8	3891	3905	3918	3932	3945	3959	3973	3987	4001	4016
0.9	4030	4045	4059	4074	4089	4104	4119	4134	4149	4165
1.0	4180	4196	4212	4228	4244	4260	4276	4292	4309	4325
1.1	4342	4358	4375	4392	4409	4426	4443	4460	4477	4494
1.2	4512	4529	4547	4564	4582	4600	4618	4636	4654	4672
1.3	4690	4708	4726	4745	4763	4782	4800	4819	4837	4856
1.4	4875	4893	4912	4931	4950	4969	4988	5007	5026	5045
1.5	5065	5084	5103	5122	5142	5161	5180	5200	5219	5239
1.6	5258	5278	5297	5317	5337	5356	5376	5396	5415	5435
1.7	5455	5474	5494	5514	5534	5554	5573	5593	5613	5633
1.8	5653	5672	5692	5712	5732	5752	5771	5791	5811	5831
1.9	5851	5870	5890	5910	5930	5950	5969	5989	6009	6028
2.0	6048	6068	6087	6107	6127	6146	6166	6185	6205	6224

d’ = 1.87

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Discriminal Distance d’

- Ease of Communication
- Business Relevance
- Stability across methods



Samples	Triangle d'	2-AFC d'
Test 1 (Grapefruit flavor)	1.87	0.98
Test 2 (Whiskey flavor)	1.14	0.58
Test 3 (Maturity)	1.08	0.36

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Scale Development at Brown Forman

- Compromise stability across methods
  - Always rely on the same discrimination method
  - 60-member triangle
- Scale Definition
  - Business-facing side: names of levels on scale
  - Technical-facing side: linking the data to the levels on the scale

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Scale Development at Brown Forman

Noticeable	Pd = 30% - 35%
Very Small	Pd = 20% - 25%
Threshold	Pd = 10% - 15%
Too Small to be Noticeable	Pd = 5% or less

Business facing side

Technical facing side

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Adding Business Relevance to the Scale



Adding benchmarks to the scale takes time

Adding a criterion based on benchmarks

Noticeable	Consumer Complaint 2005
Very Small	Changes X& Y together
Threshold	Process Change Y implemented 2010 Batch to batch variability
Too Small to be Noticeable	Formula Change X implemented 2008

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Presenting Results

Noticeable	Consumer Complaint 2005
Very Small	Changes X& Y together Change considered 2016
Threshold	Process Change Y implemented 2010 Batch to batch variability
Too Small to be Noticeable	Formula Change X implemented 2008

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Conclusions

- Focus on assessing the size of the sensory difference
- Develop a scale with clear definitions
- Consistently use the scale
- Build benchmarks
- Present results in the context of relevant benchmarks

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