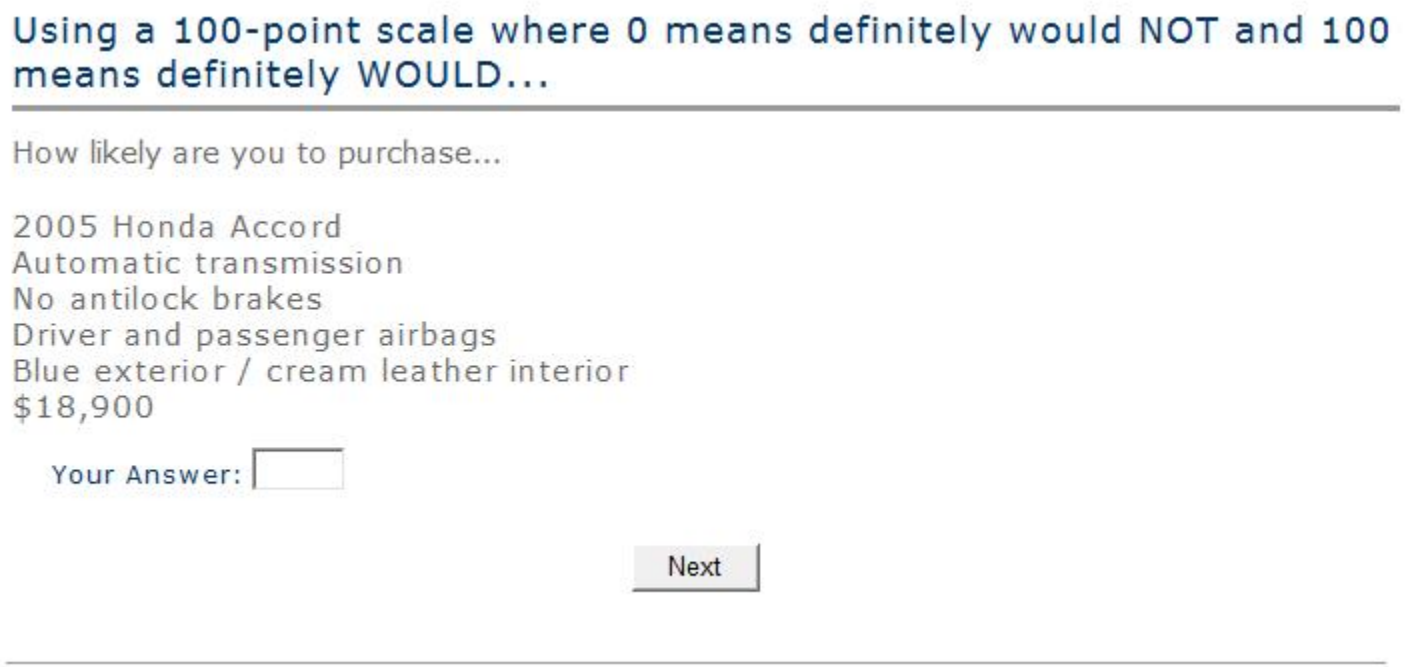
Which Conjoint Method Should I Use?

Presented by Aaron Hill, Sawtooth Software
Sawtooth Software Webinar – July 30, 2020

Conjoint Techniques

- Conjoint Value Analysis (CVA)
  - Original (1970's) traditional conjoint analysis (full profile, rating or ranking data on single or pairwise concepts)
- Adaptive Conjoint Analysis (ACA)
  - Computerized, adaptive conjoint analysis technique; very popular in the 80s and 90s
- Choice-based Conjoint (CBC)
  - Asks respondents to choose one of several product concepts (no ratings/rankings)
- Adaptive Choice-based Conjoint (ACBC)
  - Uses BYO + screening section + choice tasks to identify products that are most likely to be first considered by respondent and then chosen
- Menu-based Choice (MBC)
  - Analysis tool that allows researchers to model complex decisions, such as restaurant menus, multi-drug prescriptions, telecom bundling, etc.

Traditional Conjoint: Card-Sort Method (Six Attributes)



Strengths of Traditional Conjoint

- Good for both product design and pricing issues
- Can be administered on paper, computer/internet
- Shows products in full-profile, which many argue mimics real-world

Weaknesses of Traditional Full-Profile Conjoint

- Limited ability to study many attributes (more than about six results in respondent fatigue, long questionnaires)
  - For example, a five attribute conjoint with 3 levels per attribute results in about 22 to 33 conjoint tasks
  - An eight attribute study with 4 levels per task results in about 50 to 75 conjoint tasks!
- Limited ability to measure interactions and other higher-order effects (cross-effects)

When would you use CVA?

- Small sample size, small attribute list
- Simple studies with limited fielding resources
- Situations where you need to physically create a limited number of actual products
- Lone product in brand new market where you need to measure adoption rate, not choice between 2+ options
- Volumetric questions
- Designer – simple orthogonal designs

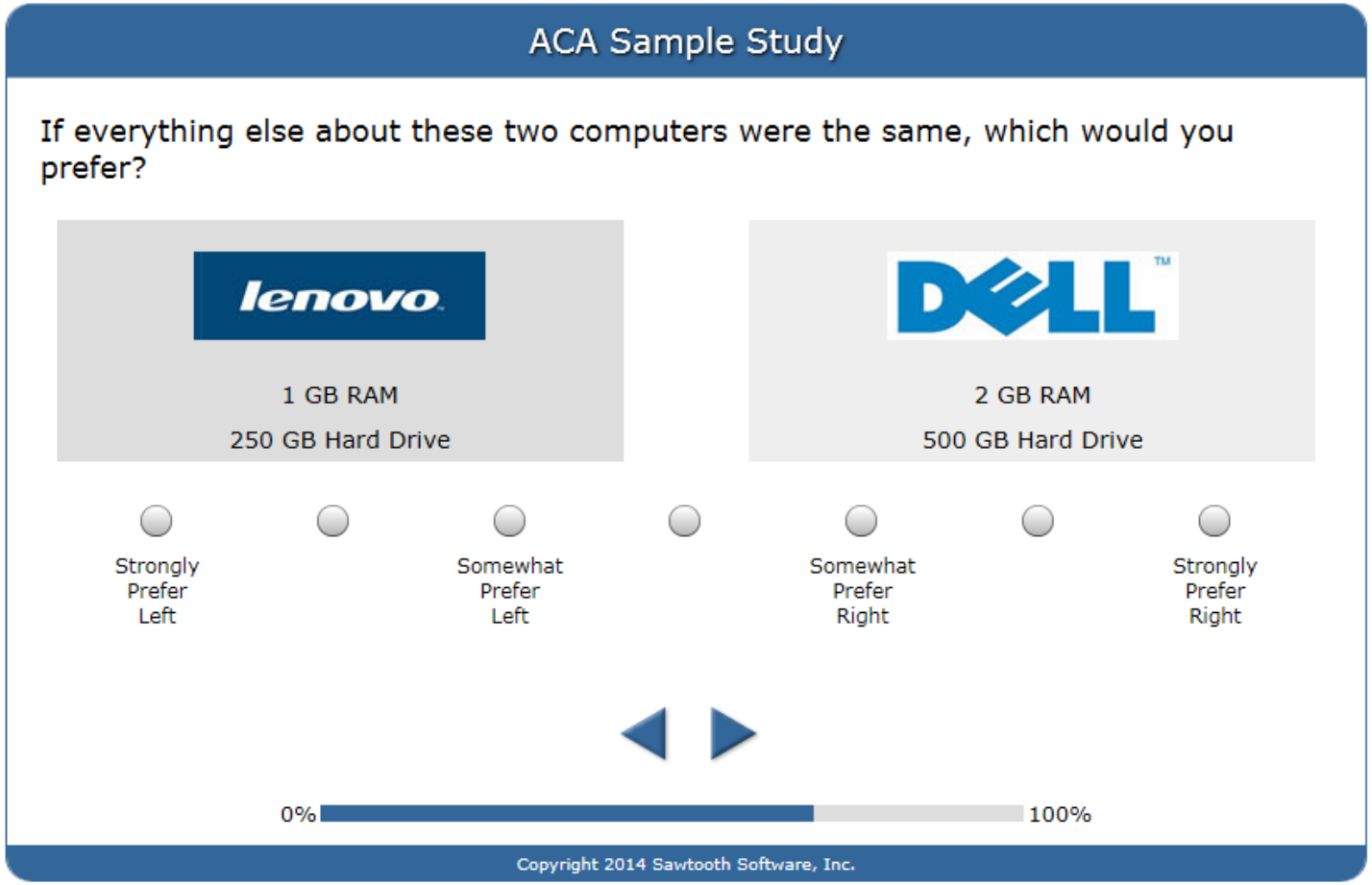
Adaptive Conjoint Analysis

- Developed in 1980s by Rich Johnson, Sawtooth Software
- Devised as way to study more attributes than was prudent with traditional full-profile conjoint
- Adapts to the respondent, focusing on most important attributes and most relevant levels
- Shows only a few attributes at a time (partial profile) rather than all attributes at a time (full-profile)

ACA Process

- Stage 1: Level preference ratings
- Stage 2: Attribute importance ratings
- Stage 3: Paired comparisons (partial profile)
- Stage 4: Calibration concepts

ACA Pairs Section



Strengths of ACA

- Ability to measure many attributes, without wearing out respondent
- Respondents find interview more interesting and engaging
- Efficient interview: high ratio of information gained per respondent effort

Weaknesses of ACA

- Partial-profile presentation less realistic than real world
  - Respondents may not be able to assume attributes not shown are “held constant”
- Often not good at pricing research
  - Tends to understate importance of price, and within each respondent assumes all brands have equal price elasticities
- Must be computer-administered (PC or Web)
- Doesn’t really match up well with how consumers make choices
  - Unnatural process for respondents

When would you use ACA?

- Lots of attributes, few respondents
- Attributes are ALL important
  - Medical patient preference research
  - HR benefits research
- Studies where price is NOT a factor

Choice Based Conjoint (CBC)

- Sometimes called discrete choice modeling
- Respondents choose concepts instead of rating or ranking
- Alternately, respondents may be asked to allocate “chips” across product concepts, or can indicate both best and worst concepts (Best Worst Case 3).

Choice Based Conjoint (CBC)

Which would you rather be in 30 years?

Income Status	Rich	Poor	Middle Class	
Hair Status	Bald	Full head of hair	Receding hairline	NONE: I would rather die than end up like any of these people.
Family	No family	Large family (10+ children)	One ex-spouse but two great kids	
	○	○	○	○

Strengths of CBC

- Easy for respondents to answer
- Flexible designs
  - Full or partial profile designs
  - Alternative-specific designs, including multiple fixed alternatives
  - Chip Allocation("Of your next ten purchases…")
  - Shelf-facing designs
  - Paper & pencil or computer administered
- Measure "None" alternative
- Works well for measuring price

Weaknesses of CBC

- Best to have large sample sizes (n=>200)
  - If your sample size is smaller, you'll need to keep your attribute list small and ask each respondent to answer more CBC tasks.
- Limited number of attributes – survey can become too cumbersome for respondents
  - But you can use partial profile designs or Adaptive CBC
- Not adaptive

When would you use CBC?

- Studies with relatively large (200 or more) sample sizes
- Most any situation not covered by the first two methods
- Pricing research
- Research on products that fill the same needs but don't necessarily have the same attributes
- Anywhere people make measurable choices
  - It's even been used to model snap judgements on topics like latent racism and other forms of discrimination

Adaptive Choice-Based Conjoint (ACBC)

- Stage 1: Respondents identify “best” product through “Build-Your-Own” task
- Stage 2: Concepts similar to the one specified in the “Build-Your-Own” task are shown, and respondents are asked whether they are acceptable or not
  - When base number of questions have been answered, software identifies items that may be “Must Have” or “Unacceptable” levels, and allows respondent to screen out those levels.
- Stage 3: Concepts marked as acceptable are entered into choice tournament, where winning concepts survive in subsequent choice tasks
- Stage 4: Calibration concepts

Strengths of ACBC

- Many of benefits of CBC, but can be done with smaller sample size
- Good choice if about 5 or more attributes
- Works well for measuring price
- Accommodates non-compensatory behavior
- More attributes
- More interaction leads to greater respondent involvement in survey
  - Better inputs = Better model

Weaknesses of ACBC

- Survey is often 2-3 times longer than a comparable CBC
- Currently no support for some CBC “goodies” (chip allocation, traditional none, etc.)
- More complex to program, analyze
- Must be administered on computer
- May be overkill for small-attribute studies (4 or fewer attributes)
- Doesn’t work very well if all your attributes are ordered, and you can’t build in a price penalty for choosing all the best levels in the BYO!

When would you use ACBC?

- Large attribute studies
- Studies where you need to adapt the attributes & levels to the respondent
  - Drop attributes
  - Include just their top brands, or only the brands available in their market, or the best features from a previous MaxDiff, or… The possibilities are endless
- Studies where you want to sum the component prices rather than having a free-ranging price attribute with fixed levels

Menu-Based Choice (MBC)

- With CBC, respondents make a single choice among pre-designed available options.

- With MBC, respondents make from zero to multiple selections of options on the way to building their preferred choice.

Examples of MBC (Multi-Select Binary)

Which of the following options would you buy? Select as many as you wish, or none of the items.

- ☑ Option A $12
- ❑ Option B $24
- ☑ Option C $7
- ❑ Option D $55
- ☑ Option E $3

Total Price of Selected Options: $22

Examples of MBC (Base Model + Configuration)

Which of the following would you buy? Select a Base Model, and then any add-on options you wish.

- ❍ Base Model 1 $200
- ◉ Base Model 2 $275
- ❍ Base Model 3 $550

- ☑ Option A $12
- ❑ Option B $24
- ☑ Option C $7
- ❑ Option D $55
- ☑ Option E $3

Total Price of Selections: $297

Examples of MBC (Standard BYO/Configurator)

Please select the PC you'd be most likely to purchase:
⦿ Dell ($500) ❍ IBM ($600) ❍ Compaq ($550) ❍ Acer ($525)
❍ 100 GB Hard Drive ($0) ⦿ 200 GB Hard Drive ($60) ❍ 500 GB Hard Drive ($90)
❍ 1 MB RAM ($0) ❍ 2 MB RAM ($80) ⦿ 4 MB RAM ($150)
⦿ Base Processor ($0) ❍ Enhanced Processor ($250)
❍ 17-inch screen ($0) ⦿ 19-inch screen ($40) ❍ 21-inch screen ($90)
❍ No office ($0) ❍ Office ($200) ⦿ Office + Access ($240)
❍ 90-day warranty ($0) ❍ 180-day warranty ($50) ⦿ 365-day warranty ($100)

Examples of MBC (Simple Fast-Food Menu)

Below are three different restaurant options with menu items and their respective prices.
Please select what you would typically choose from the items from one restaurant.
Please keep in mind that you cannot choose items from more than one restaurant.

McDonalds	Burger King	Wendy's
❑ Big Mac $2.25	❑ Whopper $3.25	❑ Classic Double $2.75
❑ Large French Fries $1.75	❑ Large French Fries $1.49	❑ Biggie Fries $1.49
❑ Large Drink $1.49	❑ Medium Drink $0.99	❑ Biggie Drink $1.45
❑ Big Mac Extra Value Meal $4.99	❑ Whopper Value Meal $5.25	❑ Classic Double Combo Meal $5.25

Examples of MBC (Another Fast-Food Menu)

Menu Scenario #1: Please imagine you pulled into a fast-food restaurant to order dinner for <u>just yourself</u>. If this were the menu, what (if anything) would you purchase?

❑ Deluxe Hamburger Value Meal -Deluxe Hamburger -Medium fries -Medium drink $3.99	❑ Chicken Sandwich Value Meal -Chicken Sandwich -Medium fries -Medium drink $5.59	❑ Fish Sandwich Value Meal -Fish Sandwich -Medium fries -Medium drink $3.99

(Only order sandwiches, fries or drinks from this area if you did not pick a value meal above.)

Sandwiches:
- ❑ Deluxe Hamburger $1.99
- ❑ Chicken Sandwich $3.59
- ❑ Fish Sandwich $1.99

Fries:
- ❑ Small $0.79
- ❑ Medium $1.49
- ❑ Large $1.69

Drinks:
- ❑ Small $0.99
- ❑ Medium $1.69
- ❑ Large $2.19

Salads:
- ❑ Cobb dinner salad $4.79
- ❑ Grilled chicken salad $4.39

Healthy Sides:
- ❑ Carrots/Celery with Ranch dressing $1.19
- ❑ Apple slices/Grapes with dipping sauce $0.99

Desserts:
- ❑ Apple/Cherry/Berry pie $0.99
- ❑Cookies $1.19

Total Price:_____

❑ I wouldn't buy anything from this menu.
I'd drive to a different restaurant, or do something else for dinner.

MBC Examples (Medical Instruments)

Please review the information below and make your selection by either selecting each of the products individually from one manufacturer or the other, or selecting all products from one brand as a bundle (all from Brand A or Brand B).

	Brand A			Brand B		
Frequency of Sales Rep Contact:	Weekly			Monthly		
Telephone Technical Support Availability:	12 hours a day, 5 days a week			24 hours a day, 7 days a week		
Contract Compliance Requirement:	50%			90%		
	Scalpels	Forceps	Sutures	Scalpels	Forceps	Sutures
Overall Quality:	Superior	Expected	Expected	Superior	Expected	Superior
End User Preference:	Good	Preferred	Good	Preferred	Good	Good
Individual Product Price:	5% Less	5% higher	Current	5% Higher	Current	10% Lower
To Make Your Selection…						
Choose one of each product here →	❑	❑	❑	❑	❑	❑
OR	Price for Scalpels, Forceps, and Sutures together from Brand A 20% Lower			Price for Scalpels, Forceps, and Sutures together from Brand B 10% Lower		
Select all products from one brand here →	❍			❍		

MBC Examples (Pharma)

Both the patient profile and the drug profiles vary!

Given a patient with the following characteristics:

Hypertension
Age 45-55
Male

What drug or combination of drugs would you prescribe for this patient with Type II diabetes?

Drug A	Drug B	Drug C
Side effects X Dosing A Effectiveness E ❑	Side effects Y Dosing B Effectiveness F ❑	Side effects Z Dosing C Effectiveness G ❑

Strengths of MBC

- Allows you to model interrelated multi-part decisions
- Other forms of complex choice models are also supported
  - Polytomous logit
  - Dependent choices
  - Can also model simpler choice experiments

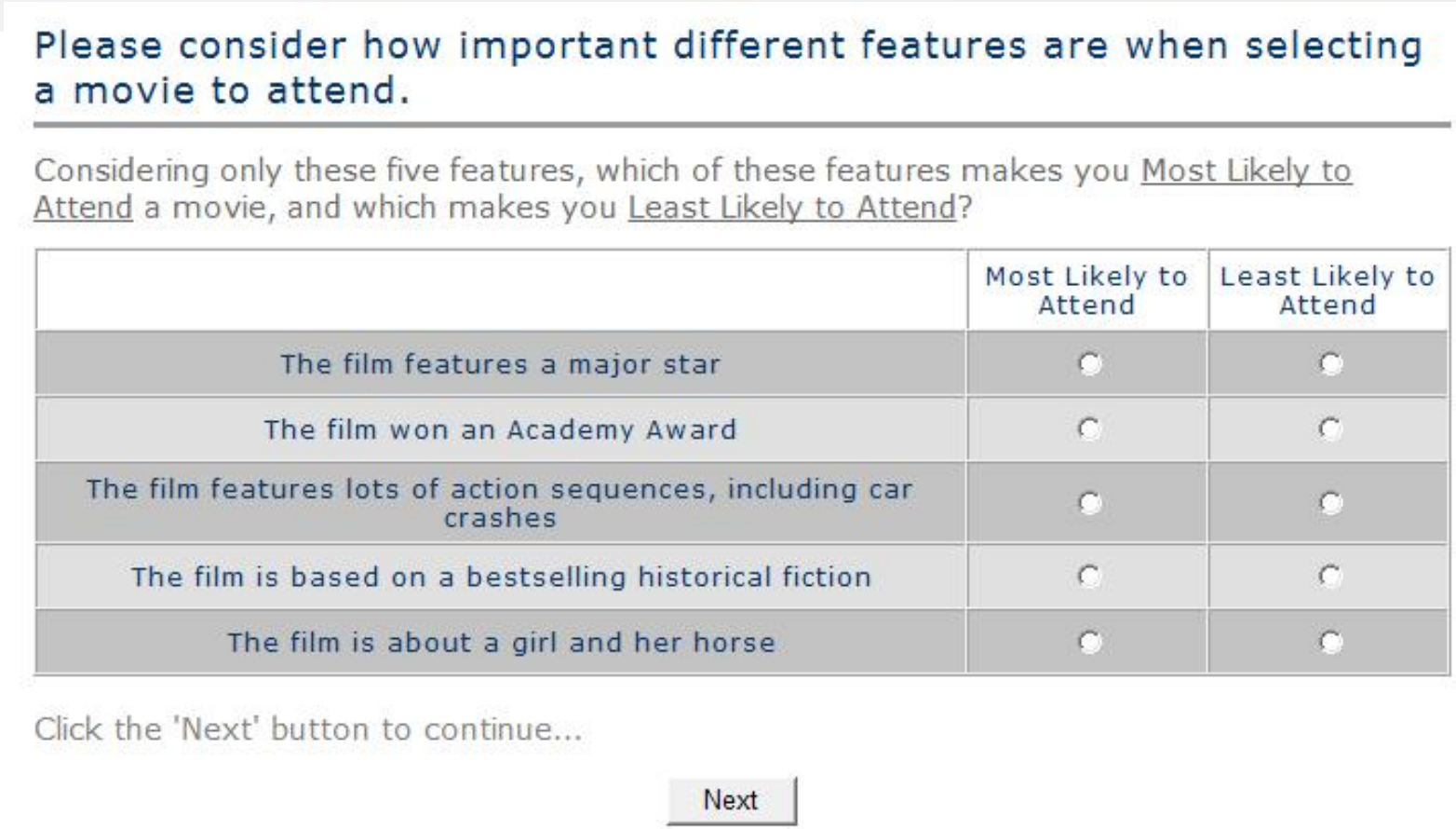
Weaknesses of MBC

- No interviewing platform! You have to create the interview/design/etc. yourself.
- Complex – can result in dozens of independent models for each item in the experiment
  - Model form is often not known ahead of time, so it requires time to experiment
- Typically requires large sample size. It's not uncommon to need 600-1000 respondents!

When would you use MBC?

- Situations where the respondent designs their own product bundle
- Telecom – choose cellphone provider, cable provider, streaming services, premium channels, internet, etc.
- Situational choices (e.g. “Where do you look for information when you need a plumber, it’s 3AM, and your power is out?”)
- Menus. It’s not called “Menu Based Choice” for nothing!

MaxDiff



Please consider how important different features are when selecting a movie to attend.

Considering only these five features, which of these features makes you Most Likely to Attend a movie, and which makes you Least Likely to Attend?

	Most Likely to Attend	Least Likely to Attend
The film features a major star	○	○
The film won an Academy Award	○	○
The film features lots of action sequences, including car crashes	○	○
The film is based on a bestselling historical fiction	○	○
The film is about a girl and her horse	○	○

Click the 'Next' button to continue...

Next

MaxDiff

- MaxDiff – roughly comparable to a One-Attribute, multi-level CBC
- Respondents typically shown 2-6 items at a time, asked to indicate which is best and which is worst.
- Task is repeated many times, showing a different set of items in each task.
- Resulting model provides ratio-scaled scores for each item

Strengths of MaxDiff

- Easy for respondents to answer
- Fixed designs possible (supports paper-and-pencil interviewing)
- Often better than standard rating or ranking exercises
  - Ratings often end up in ties
  - Rankings are difficult to manage with more than about 7 items

Weaknesses of MaxDiff

- Best to have large sample sizes (n=>200)
- Resulting model is not additive
  - Can’t add the score for one item to the score for another item to find the value of offering both

When would you use MaxDiff?

- Replacement for ratings scale type questions
- Product development – “When considering the following possible new features, which would be most valuable to you and which would be least valuable?”
- Advertising statements
- Potential replacement for conjoint analysis (structure as Best Worst Case 2)

Extensions to MaxDiff

- MaxDiff can feed into ACBC attributes
- Scores on the Fly allows you to add followup questions
- Methods for dealing with larger lists
  - Sparse – items may show up fewer than 1 time per respondent
  - Express – out of large list, respondent may only see 20 or so items
  - Bandit – asks preferred items more often for subsequent respondents; winners move on, while losers appear less frequently

Method	Minimum Sample Size	Attributes	Levels	Pricing?	Complexity (do atts freely combine?)	Fielding	Typical Use
CVA	Small	Up to 6-7	Up to 4-5	Yes, but limited	No	Paper, computer	Small attribute studies, situations where objective is to measure purchase likelihood or other direct scale elicitation, small sample size studies; may be used to generate generalized designs; situations where small, fixed design is required.
ACA	Small	Up to 30	Up to 15, but usually no more than 5	Not recommended	No	Computer only	Large attribute studies; situations where objective is to measure purchase likelihood.
CBC	Large	Standard: up to 6-7 Advanced: up to 250 (30 pre-Version 8)	Standard: up to 15, but usually no more than 5 Advanced: up to 250	Yes	Yes	Paper, computer	Competitive scenarios where choice is among multiple alternatives; pricing studies; alternative-specific studies; chip allocation studies; shelf-facing studies; fixed alternatives/competitors; many other…
ACBC	Small	Any	Any	Yes	Some	Computer	Pricing studies; large number of attributes; focus is on finding best product; allow respondents or situation to determine which attributes/levels are shown.
MaxDiff	Medium	No Attributes	Usually up to 30-40	N/A	No	Paper, computer	Lists of brands, positioning statements, specific product concepts, flavors, etc.
MBC	Very Large	Any	Any	Yes	Yes	Paper, computer	Multi-part decisions; complex models; bundling; mixed designs (CVA &CBC together).

Thank You!

Aaron Hill

Vice President of Analytics

Sawtooth Software

aaron@sawtoothsoftware.com

801-477-4700