Advanced Topics in CBC

Part 1

Agenda

- Lightning Review of CBC
- Dual Response None
- Constant Sum/Chip Allocation
- Conditional Pricing/Display
- Alternative Specific

Choice-Based Conjoint (CBC)

- It became popular in marketing research in the early 90's, and now makes up about 75% of conjoint-type research
- Rather than rate options, respondents are simply asked to choose which they prefer

Tourism Example

If these were your only choices for vacation packages, which would you choose? Or would you choose to not go on vacation?

1/10

Destination:	San Francisco, CA	Washington, DC	Las Vegas, NV	None: I would prefer not to go on vacation rather than choose any of these.
Number of Nights:	5 nights	3 nights	7 nights	
Accomodation:	Luxury (5 star)	Upscale (3 star)	Deluxe (4 star)	
Hotel Type:	Boutique (with distinct style)	Resort (usually with spa, golf, etc.)	Business	
Car Rental:	Full-Size	None included	Compact	
Price (per person):	$1,380	$810	$1,500	

Source: Orme, Bryan (2015), "Perceptual Choice Experiments: Enhancing CBC to Get from Which to Why," Sawtooth Software Conference Proceedings, Orem, UT.

Why do we like it?

- Simpler for respondents because it is more like what they typically do in real life
  - We get better data if our data-gathering technique more closely matches reality
  - Less respondent fatigue caused by unfamiliar scales
- Probabilities In : Probabilities Out
- Flexible Design and Analysis
  - Extensible to diverse applications (menu-ing, availability issues for products, dissimilar products or competing categories of products, etc.)

DUAL RESPONSE NONE

Dual Response None: An Alternative

- Rather than including “None” as concept, split the question up into two questions:
  - First, ask respondents to choose between alternatives, not including the “None” option
  - Second, ask whether they would really buy the product they just selected as best.

Dual Response "None" Example

Which of the following computers would you prefer?

1/10

Apple	Dell	Lenovo
500 MHz	1 GHz	800 MHz
256 Meg RAM	128 Meg RAM	64 Meg RAM
21" Monitor	15" Monitor	17" Monitor
$1,500	$1,000	$1,250

Given your knowledge of the market, would you actually buy the option you selected above?

- Yes
- No

Benefits of Dual Response None

- More information, more efficient
  - Learn about preferences (even if all alternatives are poor) with greater precision
  - It increases the utility of the None (None threshold is higher), resulting in larger share of preference for None in the market simulator
  - Many researchers believe that the higher None threshold is actually more realistic than the traditional None weight

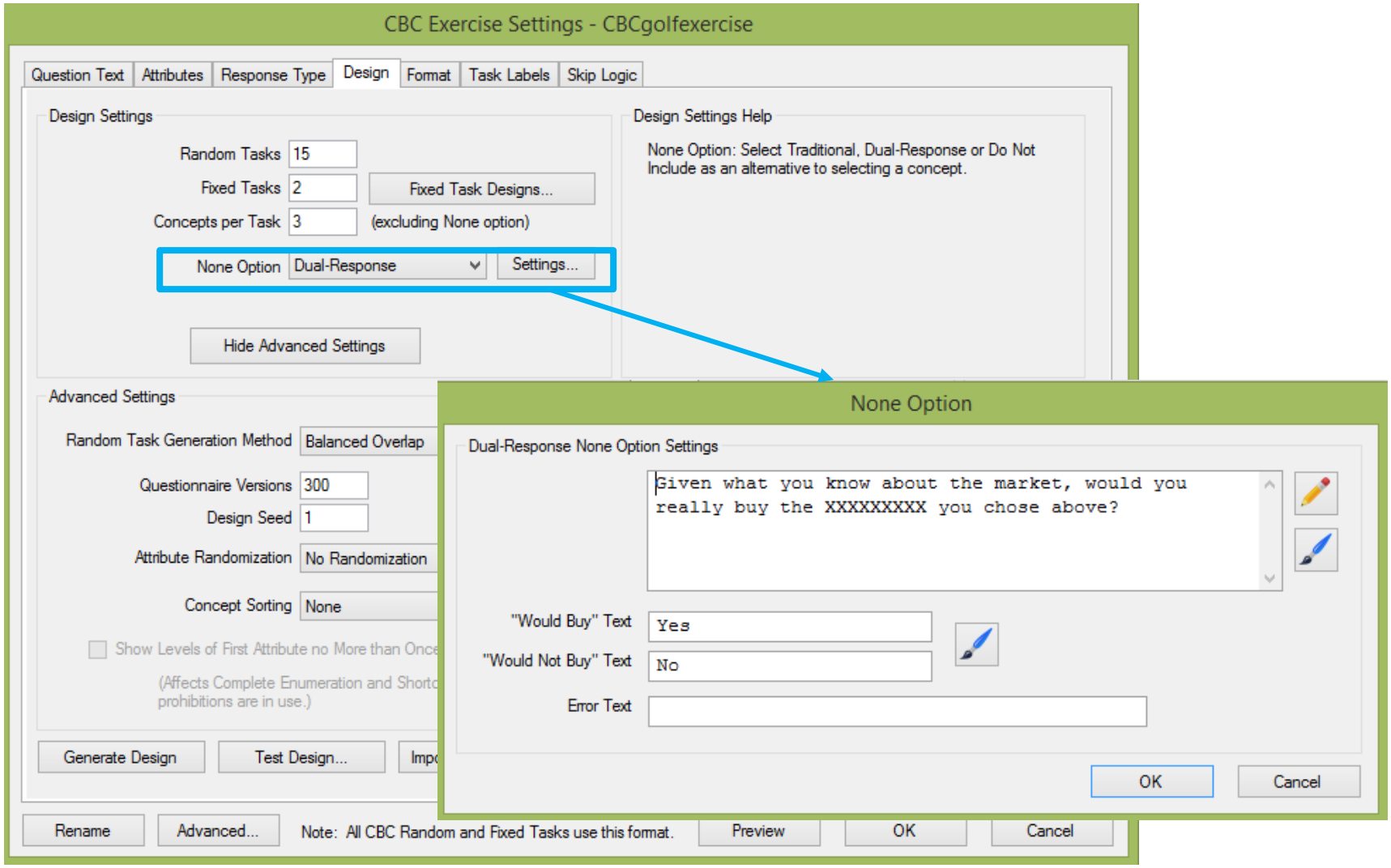
Benefits of Dual Response None

- Respondents don't feel obligated to choose a product just to be helpful
  - Dual response leads to "None" choices 3-4 times higher than traditional CBC task that includes a None option. (Brazell et al. 2003)
  - The prevailing hypothesis is that respondents want to help us as researchers, and feel that answering None in traditional CBC tasks is not helpful.
- Reduces incentive to "click through" just to get done
- Better information leads to better individual level utilities

Are There Drawbacks?

- It does take longer – twice as many questions to answer
- Still doesn't necessarily lead to accurate "take rates"
- Can't be used for chip allocation

Lighthouse Studio Settings



Can I use a 5-point scale instead?

- The use of the 5-point Dual-Response scale has been discussed at previous Sawtooth Software events by both Jon Pinnell and Kevin Karty. The benefit of using a 5-point scale, these researchers have described, is to be able to leverage the common 5-point purchase intent scale.
- For more info, see Kevin Karty's (with Bin Yu) 2012 Sawtooth Software Paper entitled, "Much Ado About Nothing" (2012 Conference Proceedings.)
- See here how to do this in Lighthouse Studio

CONSTANT SUM / CHIP ALLOCATION

Issues with Standard CBC Tasks

- Limited information
  - We know what's preferred, but not how much it's preferred over others
  - Once they've read all descriptions, it seems a shame to let them off so easily!
- Assumptions limit options
  - Single purchase
  - No variety seeking behavior
  - Usage situations are always identical

Chip Allocation CBC

- Rather than asking respondents to “Pick the best one”, request that they allocate “chips” based on some criteria
  - Chips can be boxes of cereal, patients at a doctor’s office, etc.
  - Criteria can limit decision space or leave open ended
    - Limited Space: Of the next 20…
    - Unlimited: How many boxes of cereal on your NEXT trip to the store…

Chip Allocation Example

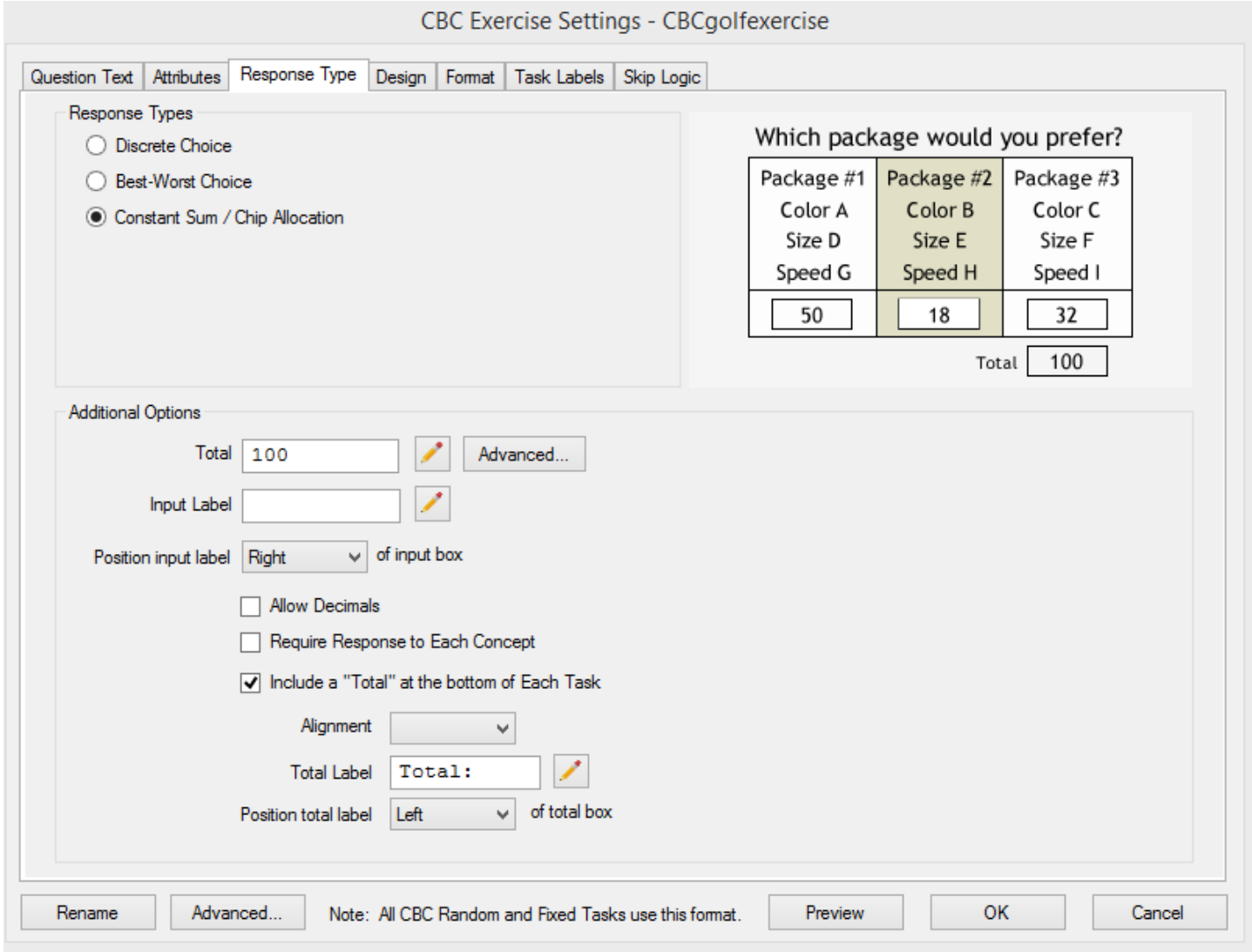
For the next several questions, pretend that you are purchasing soft drinks for a party with 20 of your friends. When you get to the store, these are the only choices available. How many of each of these soft drink packages are you likely to purchase?

Fill in the quantity purchased below each item. If you wouldn't purchase any, enter "0".

1/10

Coke 6 pack $1.79	Mountain Dew 12 pack $3.79	Store Brand Orange 12 pack $3.19
A&W Root Beer 6 pack $1.49	Store Brand Lemon Lime 6 pack $2.09	Pepsi 12 pack $2.59

Lighthouse Studio Settings



Benefits of Chip Allocation

- More data from one choice task
- Can decrease sample size requirements
- Potential to gather volume purchase data
- Allows respondents to indicate preference for profiles that have some benefit or that are valuable for certain usage situations, but may not be their primary choice

Drawbacks of Chip Allocation

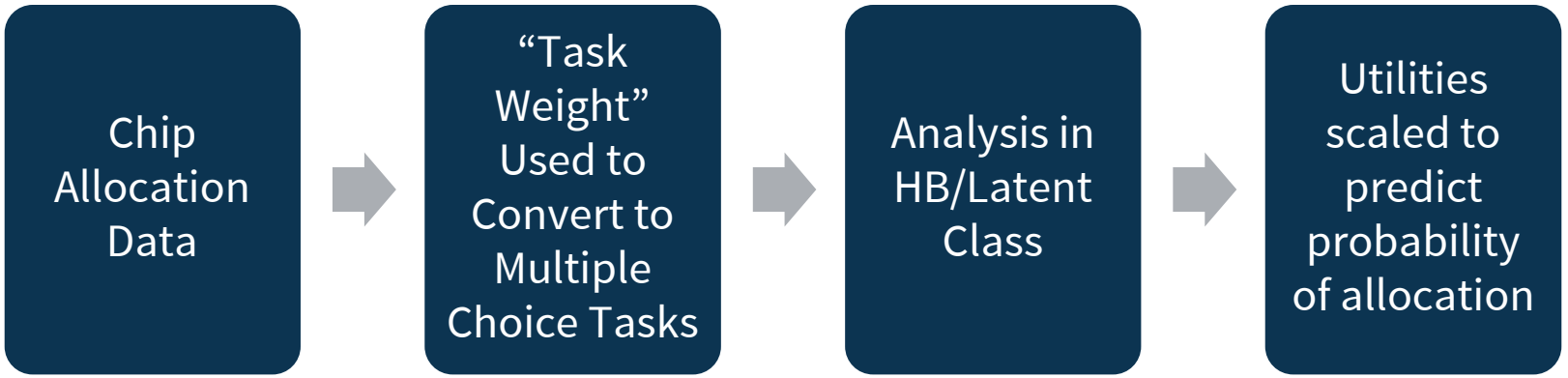
- More work for respondents
  - Have to know how to evaluate AND ADD!
- No information on why they allocated chips to multiple products
  - Doctors: different patient characteristics, insurance inequalities, equally good products, combination therapies, etc.
- In analysis, how do you count choices?
  - Is 60/40 split actually 60 votes, 6 votes, or 1 vote with 60% likelihood?

So When Should You Use It?

- Designs that require CBC but may not have large enough sample
  - Pharmaceutical studies
  - Alternative-Specific Designs
- Situations where respondents will make multiple purchases in a single transaction
  - Soda pop at grocery store
- Repeated decisions are par for the course
  - Doctors prescribing medication

Analysis

- Requires HB or Latent Class!
- Tasks are weighted based on user defined settings in analysis program
- Resulting utilities are **scaled the same as standard CBC**



How to Model Volumetric CBC?

- We don't know the "best" solution to this, but one approach that occurs to us is this:
  - Don't include a "None" in the survey, but modify the .CHS file to include a "None" concept.
  - For each respondent, scan for the task that has the largest volume purchased (across all concepts). Call that amount "V". Set "None" allocation to zero for that task.
  - For each respondent, for each other task, set "None" equal to V minus the total volume allocated for that task.
  - Estimate with CBC/HB.
  - Run weighted market simulations, where each respondent is weighted by V (this could easily be set up in Excel, with volume as the simulation output rather than shares of preference).

Tool For Modifying .CHS Files

- For volumetric forecasting (described on previous slide), we have a tool available on our website to easily modify the .CHS file
  - Volumetric CBC .CHS Converter

CONDITIONAL PRICING/DISPLAY

Varying Prices / Features

- Conjoint Analysis assumes that all attributes are independent, freely combined.

- But what about…
  - Luxury Goods vs. Standard Goods
  - Size/Speed Differences
  - Large Difference in Feature Sets
  - Interwoven Attributes, such as packaging and brand image

- How would you solve this?

Three Options

- Ignore It
  - If price ranges for products are quite similar, you may be better off just showing some products at sometimes unrealistic prices.
- Alternative-Specific Designs (more later)
  - Nested attributes – some attributes apply to certain concepts and not others
- Conditional Pricing/Display
  - Attributes are still assumed to be independent, but product combinations are presented to respondent in a more realistic way

CBC with Conditional Pricing

- If the brands differ quite widely in their price ranges, you can include a conditional pricing "look-up" table:

	Low	Medium	High
Brand 1	$12	$15	$18
Brand 2	$20	$25	$30
Brand 3	$16	$20	$24

- When the survey runs, CBC inserts the appropriate price depending on the brand

- The internal design matrix still reflects just 3 levels of price!

Conditional Pricing Tables: Proportionality

	Low	Medium	High
Brand 1	$7.50	$10.00	$12.50
Brand 2	$15.00	$20.00	$25.00

- Note in this table that there is a constant percentage change in price from low to medium to high price.

- This is useful, because following the theory of elasticity: % change in quantity demanded divided by % change in price, we give ourselves a good chance of fitting the model well using only main effects (three price utilities, plus the intercept accounted for in the brand attribute)

Recommendations

- Specify price changes as near-constant percentage changes from an average price, for example:

	Low	Medium	High
Brand 1	0.75X	X	1.25X
Brand 2	0.75Y	Y	1.25Y
Brand 3	0.75Z	Z	1.25Z

- Give yourself the best chance of fitting a good model using just main effects
  - If interaction effects aren't significant, then you can save degrees of freedom and model properly with main effects only
  - If you don't use a near-proportional table, it increases the likelihood that you have to estimate interactions

Non-Proportional Conditional Pricing Tables

- As long as price is conditional on just ONE other attribute (such as brand), you can always model the data correctly using first-order interactions, no matter what the pattern of prices within the table

- But beware making price conditional on two or more attributes (e.g. brand and package size) and not using proportional tables!

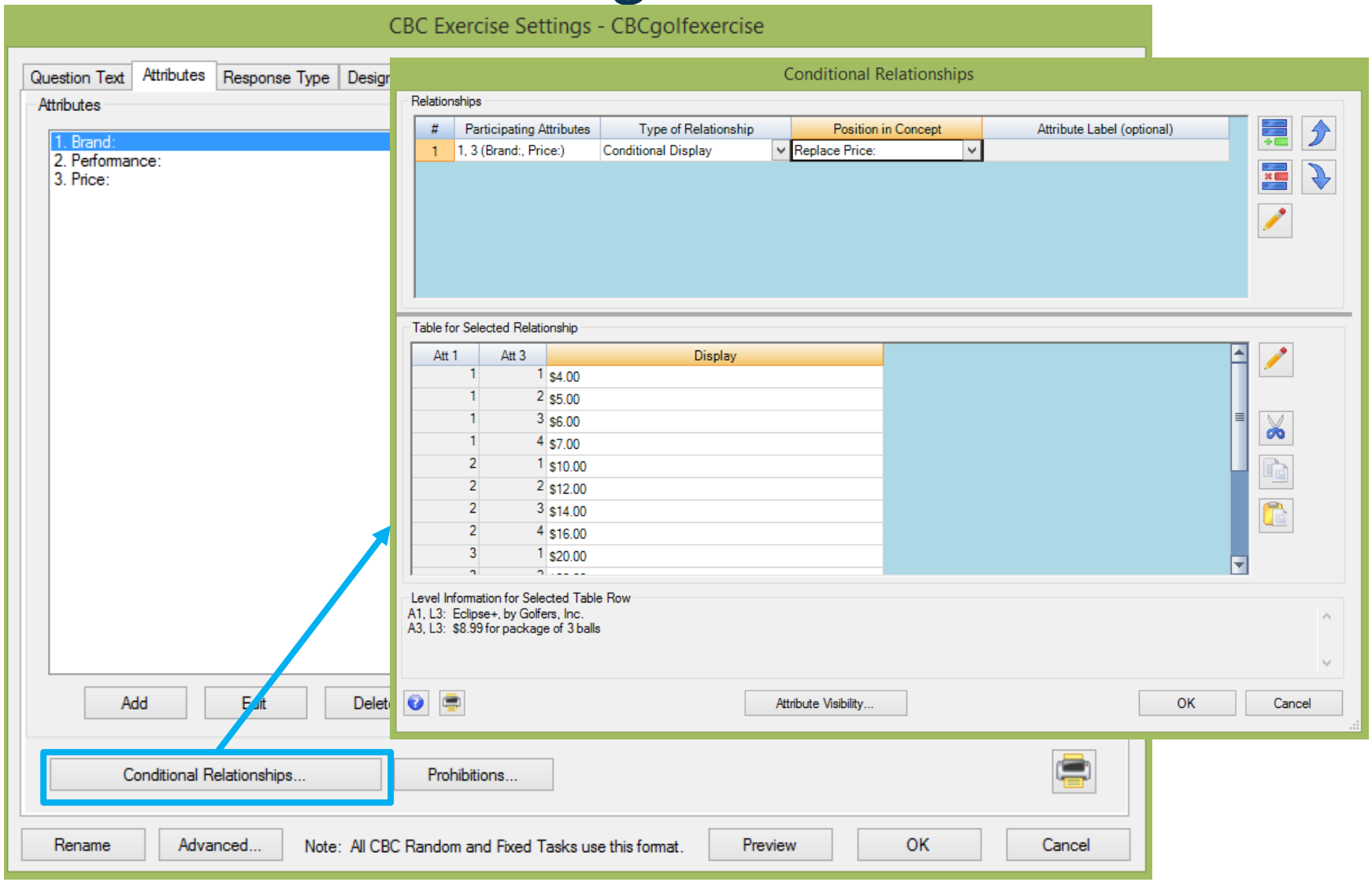
- If price is conditional on two or more attributes, and the pricing table is not proportional, then you may not be able to model effects correctly with CBC software

Conditional Pricing--Brand Intercept

- If using conditional pricing, remember that the utility of brand is no longer interpreted as “the preference for this brand, everything else held constant.”

- It is “the preference for this brand, given its average price.”

Lighthouse Studio Settings



Conditional Display

- As with price, sometimes we want to show combinations of attributes (dependencies) in a single representation.

Brand: Coke
Type: Light
Pack: 6 pack 12 oz. cans

Floorplan Name: Burlwood
Stories: 2 stories
Bedrooms: 4
Lot Size: ½ acre

The “Burlwood” floorplan is a classy two-story house with four bedrooms, situated on a ½ acre lot.”

Design Considerations

- You can include up to 250 attributes in each conditional table (previous versions supported only 4 attributes)
  - Remember, though, that you can only estimate interaction effects for 2-attribute combinations
  - If you suspect strong interactions between more than 2 attributes simultaneously, then maybe you need to combine attributes.
- CBC Software allows you to include more than 1 conditional display table, but only one conditional price table
- Proportionality needs are similar to conditional price for continuous attributes

ALTERNATIVE-SPECIFIC DESIGNS

Alternative-Specific Designs

- A much more flexible way to think about CBC designs.
- To this point, our thinking has revolved around the idea of building a single list of attributes that applies to all product concepts we show.
- This is traditional-style conjoint thinking!

Alternative Specific Example

If these were your only options, how would you choose to get to work?

1/10

Bus	Car	Train	Walk
Leaves every 25 minutes $3.00 round-trip fare Wi-Fi available	Daily Parking Fee: $10.00	Leaves every 35 minutes $5.00 round-trip fare	

Alternative-Specific Designs

- Since the 1970s, advanced choice researchers have been thinking about “alternatives” and the attributes that modify them:

Bus	Car	Train	Walk
Leaves every 25 minutes $3.00 round-trip fare Wi-Fi available	Daily Parking Fee: $10.00	Leaves every 35 minutes $5.00 round-trip fare	

Alternative-Specific Constants

Modifying Attributes

- One estimates utilities for the ASCs (alternative-specific constants), plus the utility of the modifying attributes.

Alternative-Specific Designs

- Allow for amazingly customizable designs
- Available only with the CBC Advanced Design Module license
  - Also available with standard ACBC license
- A possible solution when you are struggling with too many prohibitions

Alternative-Specific Example

- Mode of Transportation
  - (Alternative specific constant)
  - Bus
  - Car
  - Train
  - Walk
- Att. A: Pick Up Frequency
  - Leaves every 15 minutes
  - Leaves every 25 minutes
  - Leaves every 35 minutes
  - Leaves every 45 minutes
- Att. B: Round-trip Fare
  - $2.00
  - $3.00
  - $4.00
  - $5.00
- Att. C: Wi-Fi Availability
  - Wi-Fi available
  - Wi-Fi not available
- Att. D: Daily Parking Fee
  - Free Parking
  - $5.00 per day
  - $10.00 per day
  - $15.00 per day

Simple Solution

- Prohibit “Round Trip Fare” from appearing with Car or Walk, “Daily Parking Fee” from appearing with Bus, Train, or Walk, etc.

- But, the standard designer won’t handle this!
  - Too many prohibitions
  - We use an alternative design algorithm that allows for these types of prohibitions

Alternative-Specific Designer

- "Alternative-Specific Designer" activates when
  - The setting is chosen on the "Advanced Design" tab
  - All levels of one attribute are prohibited with one level of another attribute

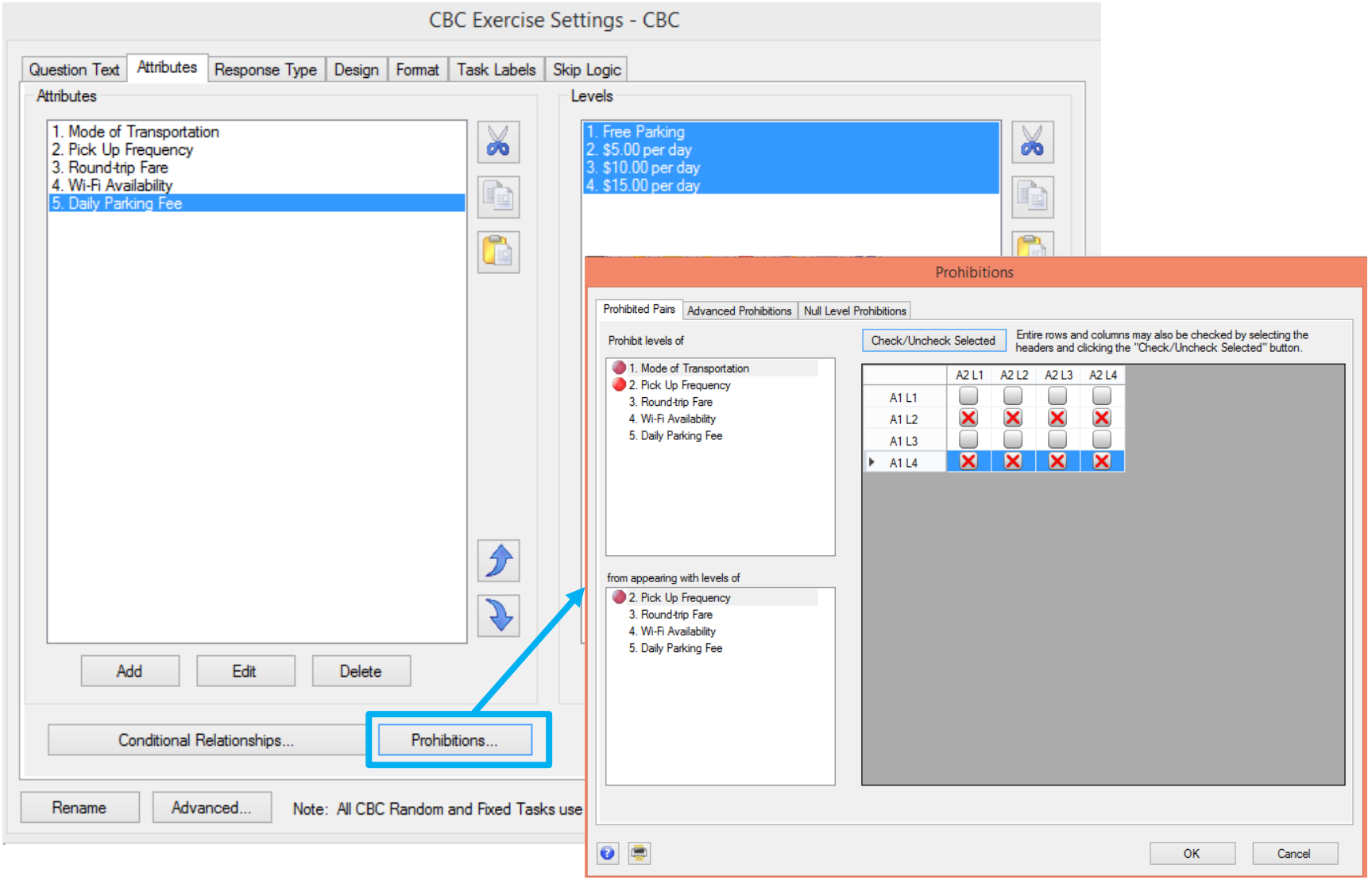
	Acer	Asus	Sony	Samsung	Apple
iOS	X	X	X	X	
Windows					X
Android					X

	Acer	Asus	Sony	Samsung	Apple
Windows					X
Android					X

Special Notes

- Alternative-Specific Designs can have regular prohibitions (but these often are very damaging, so try to avoid these at all costs!)
- Some attributes can apply to all products while others are alternative-specific
- You should test alternative-specific design using the Advanced Test, NOT the Quick Test

Lighthouse Studio Settings



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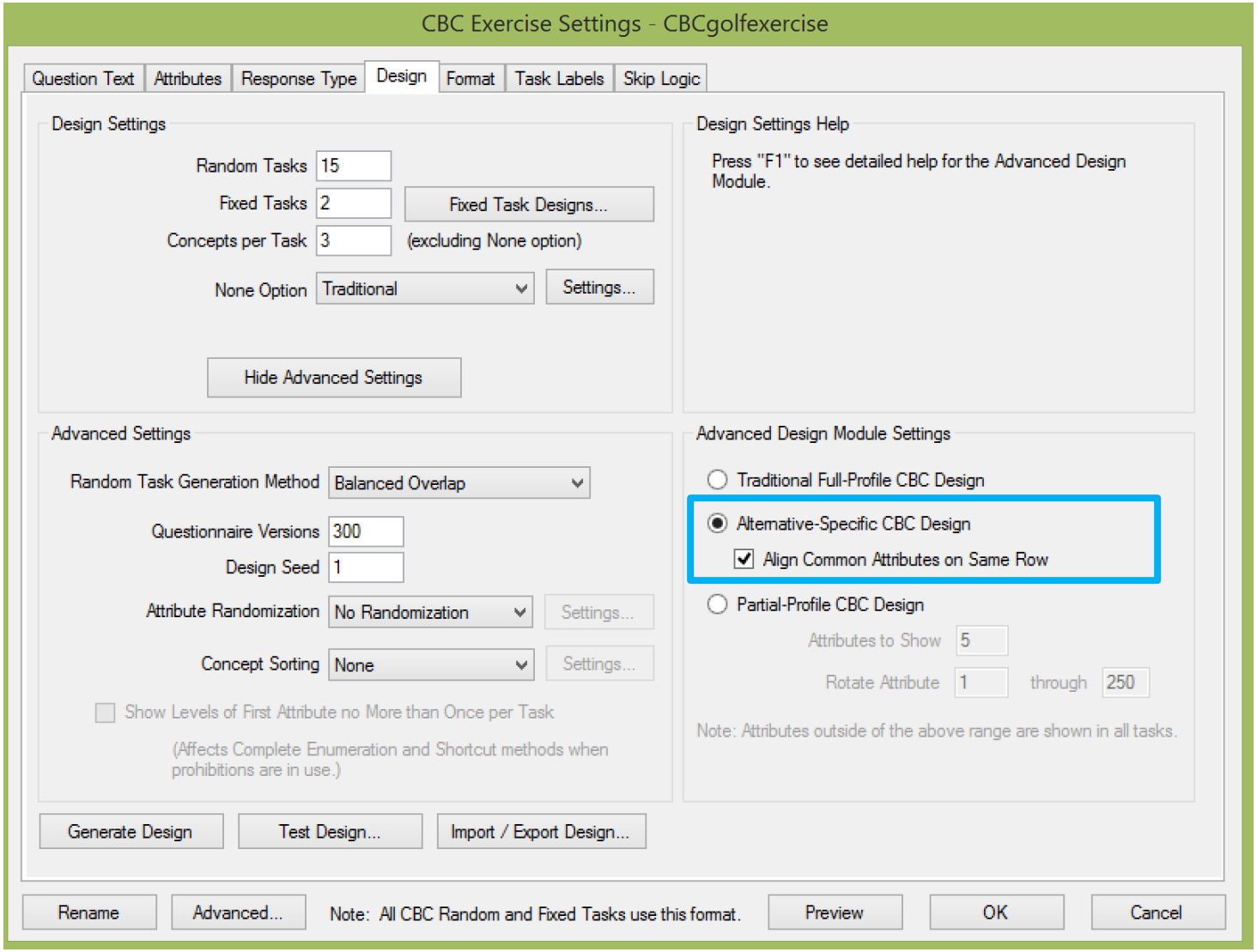

Align Common Attributes

If these were your only options, which would you choose?
Choose by clicking one of the buttons below:

1/10

Computer Type	Notebook	Notebook	Notebook	Desktop	Desktop
Brand	Sony	HP	Acer	Lenovo	Toshiba
Laptop Display	13”	17”	14”		
Desktop Display				19” Flat Panel	15” CRT
Processor	2.0 Ghz Core 2 Duo	2.33 Ghz Core 2 Duo	3.0 Ghz Core 2 Duo Extreme	2.33 Ghz Core 2 Duo	1.83 Ghz Core 2 Duo
RAM	512 MB	512 MB	4 GB	1 GB	2 GB
Graphics Card	128 MB Video Card	64 MB Integrated Video Card	128 MB Video Card	64 MB Integrated Video Card	256 MB Video Card
Laptop Price	$2,100	$1,200	$1,500		
Desktop Price				$1,700	$500
	○	○	○	○	○

Given what you know about the market, would you really buy the computer you chose above?

- ○ Yes
- ○ No

Don't Align Common Attributes

If these were your only options, which would you choose? Choose by clicking one of the buttons below:

1/10

Notebook	Notebook	Notebook	Desktop	Desktop
Sony	HP	Acer	Lenovo	Toshiba
13"	17"	14"	19" Flat Panel	15" CRT
2.0 Ghz Core 2 Duo	2.33 Ghz Core 2 Duo	3.0 Ghz Core 2 Duo Extreme	2.33 Ghz Core 2 Duo	1.83 Ghz Core 2 Duo
512 MB	512 MB	4 GB	1 GB	2 GB
128 MB Video Card	64 MB Integrated Video Card	128 MB Video Card	64 MB Integrated Video Card	256 MB Video Card
$2,100	$1,200	$1,500	$1,700	$500
○	○	○	○	○

Given what you know about the market, would you really buy the computer you chose above?

- ○ Yes
- ○ No

(Note that attribute labels cannot be shown when "Align Common Attributes on the Same Row" is unchecked.)

The Design Matrix

Alternative1	Alternative2	Alternative3	Alternative4
(1-1) Bus	(1-2) Car	(1-3) Train	(1-4) Walk
(2-2) Leaves every 25 minutes	(5-3) Daily Parking Fee: $10.00	(2-3) Leaves every 35 minutes	
(3-2) $3.00 round-trip fare		(3-4) $5.00 round-trip fare	
(4-1) WiFi Available			

	A1: Mode	A2: Frequency	A3: Fare	A4: WiFi	A5: Parking Fee
Alternative 1	1 0 0	0 1 0	0 1 0	1	0 0 0
Alternative 2	0 1 0	0 0 0	0 0 0	0	0 1 0
Alternative 3	0 0 1	0 0 1	-1 -1 -1	0	0 0 0
Alternative 4	-1 -1 -1	0 0 0	0 0 0	0	0 0 0

Estimation for Alternative-Specific Plans

- In terms of software usage, part worth estimation feels no different than for regular CBC, latent class, or HB
  - The alternative-specific (conditional) effects are not generic "main effects," but are conditional upon the levels of the primary attribute they were displayed with
  - Standard errors of conditional effects much larger than those for "common" attributes

End of Part 1 -
Don't forget to join us next week for Part 2!

Webinar

Sawtooth Software

Go Beyond the Basics –
Advanced Concepts in Choice-Based Conjoint

Aaron Hill
VP of Client Services

Part 2

- Partial Profile
- Shelf-Sets
- Free-Format

Wednesday August 3rd, 2016
8:00 am - 9:00 am PT/
11:00 am – 12:00 pm ET

QUESTIONS?

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