

# Advanced Topics in CBC *Part 2*



# Agenda

- ▶ Partial Profile
- ▶ Shelf-Sets
- ▶ Free Format CBC

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# PARTIAL PROFILE

# Partial Profile Designs

- ▶ Rather than showing all attributes at the same time, we show a random subset of the attributes in each task
- ▶ Attributes are rotated so that each task contains different subset of attributes
- ▶ Over the course of an interview, all attributes typically seen at least once, usually many times

# Too many attributes is difficult...

For your practice, which of the MRI systems below would you be most likely to purchase? If information about a particular product feature is not shown, assume that all of the machines are equal in that regard.

Choose by clicking one of the buttons below:

Brand	Philips	Hitachi	Picker
Patient Position	Multi-position	Upright	Recumbent
Field Strength	1.0 Tesla	1.5 Tesla	0.6 Tesla
Clinical Space Requirement	300 sq. feet	500 sq. feet	400 sq. feet
Patient Weight Limit	400 pounds (180 Kg)	600 pounds (270 kg)	500 pounds (225 kg)
Brain Array	No	Yes	No
Neurovascular array	Yes	No	Yes
Cardiac Array	Yes	No	No
Spine Array	Yes	No	Yes
Lower Leg Array	No	Yes	Yes
Gap Between Patient and Magnetic Array	21 inches	17 inches	19 inches
System Cost (excluding installation and service)	\$1.5 million	\$2 million	\$3 million

# So let's only show a partial list

For your practice, which of the MRI systems below would you be most likely to purchase? If information about a particular product feature is not shown, assume that all of the machines are equal in that regard.

Choose by clicking one of the buttons below:

- Brand
- Patient Position
- Clinical Indication
- Required Room
- Brain Array
- Cardiac Array
- Lower Extremity Array
- System Cost (excluding installation and service)

For your practice, which of the MRI systems below would you be most likely to purchase? If information about a particular product feature is not shown, assume that all of the machines are equal in that regard.

Choose by clicking one of the buttons below:

Brand	GE	Fonar	Philips
Patient Position	Upright	Multi-position	Recumbent
Field Strength	1.5 Tesla	3.0 Tesla	1.0 Tesla
Neurovascular array	No	Yes	No
Cardiac Array	Yes	Yes	No
Spine Array	No	Yes	No
System Cost (excluding installation and service)	\$3 million	\$2 million	\$2.5 million

# Benefits of Partial Profile CBC

- ▶ Seemingly no limit to the number of attributes
  - More complete model???
- ▶ Reduces the respondent burden
- ▶ Forces respondents to consider all attributes
  - Can't simplify and focus only on 2-3 attributes

# Potential Pitfalls

- ▶ Usually requires larger sample size and/or tasks per respondent
- ▶ Data are often quite “noisy” at the individual level for very large designs
- ▶ “Flattening” of attribute importances
- ▶ Probable understatement of importance of price
- ▶ Can respondents maintain an “all else being equal” mindset when viewing a subset of attributes?



# All Else Equal?

For your practice, which of the MRI systems below would you be most likely to purchase? If information about a particular product feature is not shown, assume that all of the machines are equal in that regard.

Choose by clicking one of the buttons below:

<b>Brand</b>	<b>Picker</b>	<b>Siemens</b>	<b>Hitachi</b>
<b>Patient Position</b>	<b>Multi-position</b>	<b>Upright</b>	<b>Recumbent</b>
<b>Clinical Space Requirement</b>	<b>300 sq. feet</b>	<b>500 sq. feet</b>	<b>400 sq. feet</b>

**Brain Array**  
**Cardiac Array**  
**Lower Leg Array**  
**System Cost (excluding installation and service)**

For your practice, which of the MRI systems below would you be most likely to purchase? If information about a particular product feature is not shown, assume that all of the machines are equal in that regard.

Choose by clicking one of the buttons below:

<b>Brand</b>	<b>GE</b>	<b>Fonar</b>	<b>Philips</b>
<b>Patient Position</b>	<b>Upright</b>	<b>Multi-position</b>	<b>Recumbent</b>
<b>Field Strength</b>	<b>1.5 Tesla</b>	<b>3.0 Tesla</b>	<b>1.0 Tesla</b>
<b>Neurovascular array</b>	<b>No</b>	<b>Yes</b>	<b>No</b>
<b>Cardiac Array</b>	<b>Yes</b>	<b>Yes</b>	<b>No</b>
<b>Spine Array</b>	<b>No</b>	<b>Yes</b>	<b>No</b>
<b>System Cost (excluding installation and service)</b>	<b>\$3 million</b>	<b>\$2 million</b>	<b>\$2.5 million</b>

# Lighthouse Studio Settings

CBC Exercise Settings - CBCgolffexercise

Question Text | Attributes | Response Type | Design | Format | Task Labels | Skip Logic

**Design Settings**

Random Tasks

Fixed Tasks  Fixed Task Designs...

Concepts per Task  (excluding None option)

None Option  Settings...

Hide Advanced Settings

**Design Settings Help**

Press "F1" to see detailed help for the Advanced Design Module.

**Advanced Settings**

Random Task Generation Method

Questionnaire Versions

Design Seed

Attribute Randomization  Settings...

Concept Sorting  Settings...

Show Levels of First Attribute no More than Once per Task  
(Affects Complete Enumeration and Shortcut methods when prohibitions are in use.)

**Advanced Design Module Settings**

Traditional Full-Profile CBC Design

Alternative-Specific CBC Design

Align Common Attributes on Same Row

Partial-Profile CBC Design

Attributes to Show

Rotate Attribute  through

Note: Attributes outside of the above range are shown in all tasks.

Generate Design | Test Design... | Import / Export Design...

Rename | Advanced... | Note: All CBC Random and Fixed Tasks use this format. | Preview | OK | Cancel

# “Fixed” Attributes

- ▶ In PP designs, some attributes (such as “price”) can be constrained to always be present in the task
  - May make tasks more realistic
  - Preliminary research suggests this doesn’t bias the parameters for the “forced inclusion”
  - We’ll need more research to confirm this

# Design Considerations

- ▶ **Sample size – rotating attributes reduces effective sample size**
  - With 10 attributes showing 5 at a time, we are collecting only 50% as much information as we would using full profile
  - BUT...respondents answer with less error when there are fewer attributes to consider, so measurement error increase is offset by respondent error decrease.
  
- ▶ **Which attributes should be rotated**
  - Help respondents keep “all else equal” mindset?
  - Realistic to market?
  - Non-rotated attributes will have proportionally more information than rotated attributes

# Analysis

- ▶ Partial profile designs are analyzed the same way you'd analyze standard CBC
  - Omitted attributes are coded as “0” in the CHO file
  - No difference in simulations – you can simulate scenarios with as many attributes varying as you wish

# How Well Does it Work?

- ▶ Keith Chrzan has conducted many tests comparing partial-profile (PP) and full-profile (FP) CBC. He concludes:
  - PP is overall more efficient (lower statistical efficiency, but less respondent fatigue and simplification heuristics)
  - Parameters are quite similar (after adjusting for scale), with only a few isolated differences. PP has larger “scale” than FP

# PP and “Flattening” of Importances

- ▶ Although Chrzan has shown that PP and FP parameters are usually equivalent (after adjusting for scale), Sawtooth Software recently (2004) conducted a split-sample study (n=1000) that suggested that PP parameters may reflect a “flattening” of importances relative to FP
  - “Critical” attributes become less important
  - “Unimportant” attributes become more important
  
- ▶ Need additional research to confirm this

# Other Observations about PP

- ▶ Our most recent split-study comparison (2004) shows significantly fewer “reversals” at the individual-level for partial profile than for full profile (9 total attributes, 31 total levels).
  - FP = 5.8 reversals, PP = 3.7 reversals (significant difference  $p < 0.01$ )
- ▶ Sawtooth Software’s most recent study also suggested a “price” bias for PP similar to ACA.
  - Price received 18% importance in PP, but 29% in FP (significant difference  $p < 0.01$ )
- ▶ Paper by Frazier and Jones (2004) also showed a price bias with PP. Across three studies, PP had an average Price importance of 26%, whereas comparable FP showed importance of 32%. FP had consistently higher price importance in all three studies.



# PP and HB

- ▶ Research by Pinnell and Fridley (Sawtooth Software Conference 2001) suggested problems with HB and PP CBC.
  - Subsequent developments in CBC/HB (version 3.2) suggest that their result was due to overfitting and use of improper “priors” (the defaults in older CBC/HB versions)
  - Reducing the prior variance and increasing the weight of the priors seems to result in better estimation
- ▶ Even so, you can expect more “noise” at the individual level with PP CBC and HB than with ACA.
  - Suggests needing larger sample sizes

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# **SHELF-FACING DISPLAY**

# Example

If these were your only options, which would you choose?

Product	Price
Ariel (4 bottles)	\$ 3.99
Persil (2 bottles)	\$ 7.59
Sunil (1 bottle)	\$ 7.59
Sunil (2 bottles)	\$ 5.59
Sunil (1 bottle)	\$ 3.89
Dash (3 bottles)	\$ 3.39
Speed (1 bottle)	\$ 3.39
Wisk (1 bottle)	\$ 5.19
Mr. Proper (3 bottles)	\$ 2.59
Ariel (4 boxes)	\$ 5.69
Persil (3 boxes)	\$ 5.09
Sunil (2 boxes)	\$ 4.49
Dash (2 boxes)	\$ 6.49
Speed (2 boxes)	\$ 4.09
Mr. Proper (3 boxes)	\$ 3.29
Ariel (3 boxes)	\$ 11.39
Persil (3 boxes)	\$ 6.59
Sunil (2 boxes)	\$ 4.09
Dash (2 boxes)	\$ 5.99
Speed (2 boxes)	\$ 2.49
Wisk (1 box)	\$ 3.69
Mr. Proper (3 boxes)	\$ 4.09
Ariel (2 boxes)	\$ 15.49
Persil (2 boxes)	\$ 11.59
Sunil (1 box)	\$ 11.89
Dash (1 box)	\$ 9.39
Speed (1 box)	\$ 7.39
Wisk (1 box)	\$ 9.39
Mr. Proper (2 boxes)	\$ 9.29
None of these	

# Lighthouse Studio Settings

CBC Exercise Settings - CBCgolffexercise

Question Text Attributes Response Type Design Format Task Labels Skip Logic

**Format Options**

Question Width (pixels)

Task Width (pixels)

Number of Columns

Cell Padding (pixels)

Level Border (pixels)

Concept Border (pixels)

Add separation between concepts

Space Between Concepts (pixels)

Add separation between concept rows

Space Between Rows (pixels)

Shelf Facing Display

**Shelf Facing Settings**

Number of Rows in Each Task

	Number of Concepts on Row
▶ 1	

**"Traditional None Option" Position in Shelf Facing Tasks**

Position for the "Traditional None Option"

NOTE: If you select "Task's Header or Footer," enter the Sawtooth Script [%CBCNone( )%] in one of the Question Header or Question Footer Text Fields.

**Shelf Facing Format Settings**

Top Attribute Background Color

Other Attributes Background Color

Shelf Top Border Width (pixels)

Shelf Bottom Border Width (pixels)

**Display Type**

Note: All CBC Random and Fixed Tasks use this format.

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# **FREE FORMAT CBC QUESTIONS**

# Standard CBC layout is great...

## Hotel Example


If these were your only choices, which would you choose?

1/10

Hotel:	Marriott's MoutainSide	Marriott's Summit Watch	Park City Marriot
Number of Nights:	5 nights	3 nights	7 nights
Customer Review:	Very good! 4.2/5	Excellent! 4.3/5	Very good! 4.1/5
Free Cancellation:	✓	✓	
Regular Price:	\$215/night	\$200/night	\$199/night
Your Price:	\$139/night	\$139/night	\$159/night
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		← →	

# But it has limitations...

- ▶ Vertical conjoint, designed to look like the website



**Marriott's MountainSide at Park City** ★★★

North Park City [Map](#)

1-855-305-5076 • Travelocity Rate ✓ Free Cancellation

**Most Popular!** 5 people booked this hotel in the last 48 hours

Booked in the last 5 minutes


**Very good! 4.2/5**  
(128 reviews)

**We have 1 left at**

~~\$215~~ **\$139**  
avg/night

✓ Book Now, Pay Later  
[Compare Prices](#)

Orbitz **\$139**
Expedia **\$139**
Hotwire **\$139**
Cheaptickets **\$139**



**Marriott's Summit Watch** ★★★

Downtown Park City [Map](#)

1-855-828-1972 • Travelocity Rate ✓ Free Cancellation

Booked in the last 60 minutes


**Excellent! 4.3/5**  
(198 reviews)

**We have 4 left at**

~~\$200~~ **\$139**  
avg/night

✓ Book Now, Pay Later  
[Compare Prices](#)

Orbitz **\$139**
Hotwire **\$139**
Cheaptickets **\$139**
Hotels.com **\$139**



**Park City Marriott** ★★★★★

North Park City [Map](#)

1-855-304-7816 • Travelocity Rate

**Very good! 4.1/5**  
(353 reviews)

**We have 5 left at**

~~\$199~~ **\$159**  
avg/night

[Compare Prices](#)

Orbitz **\$159**
Hoteling **\$133**
Hotwire **\$159**
Hotels.com **\$159**

# But it has limitations...

- ▶ Collect both first choice AND other types of data (consideration set, chip allocation, alternative input methods)
- ▶ Multiple scenarios (“What would you prescribe if diabetic? What about non-diabetic?”)

## 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 <input type="text"/>	Mountain Dew 12 pack \$3.79 <input type="text"/>	Store Brand Orange 12 pack \$3.19 <input type="text"/>
A&W Root Beer 6 pack \$1.49 <input type="text"/>	Store Brand Lemon Lime 6 pack \$2.09 <input type="text"/>	Pepsi 12 pack \$2.59 <input type="text"/>





# More Limitations...

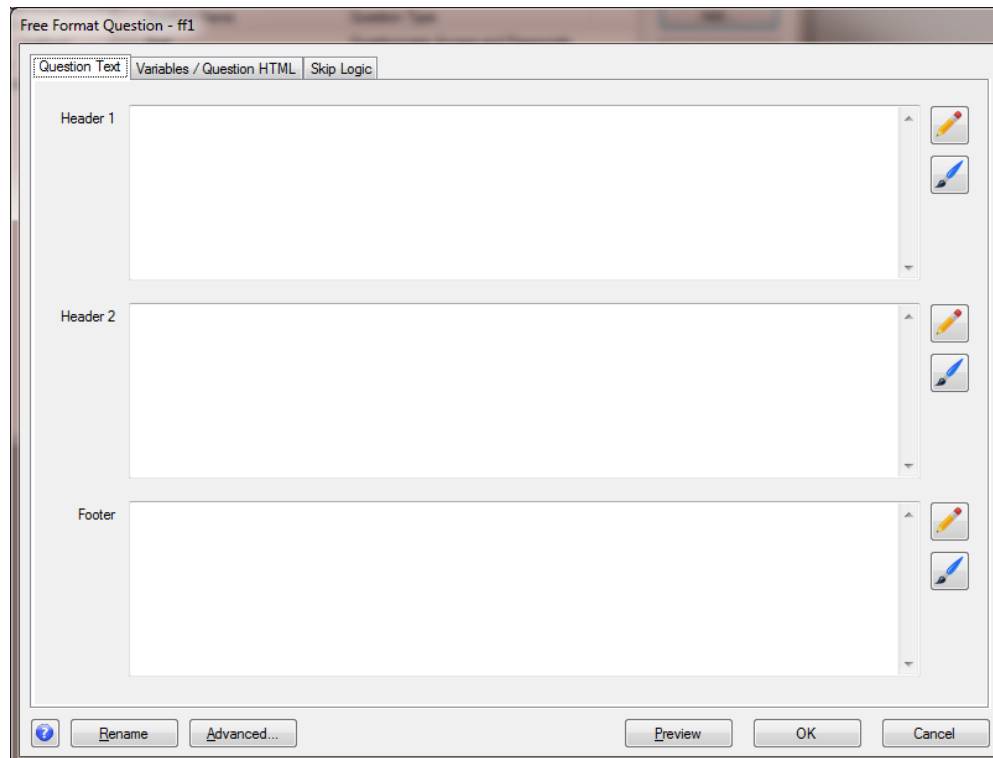
- ▶ Labels for alternative-specific designs
- ▶ Multiple fixed products where you want to show levels of fixed attributes
- ▶ Menu-based conjoint
- ▶ Any time you don't like the way we make things look!

# Solution: Custom CBC

- ▶ Lighthouse and older versions of SSI Web allow you to generate the design and collect data while using your own custom layout for your CBC tasks
- ▶ Requires use of Free Format questions (may necessitate license upgrade to larger size!)
- ▶ Also requires some knowledge of HTML
  - How many of you are HTML literate?

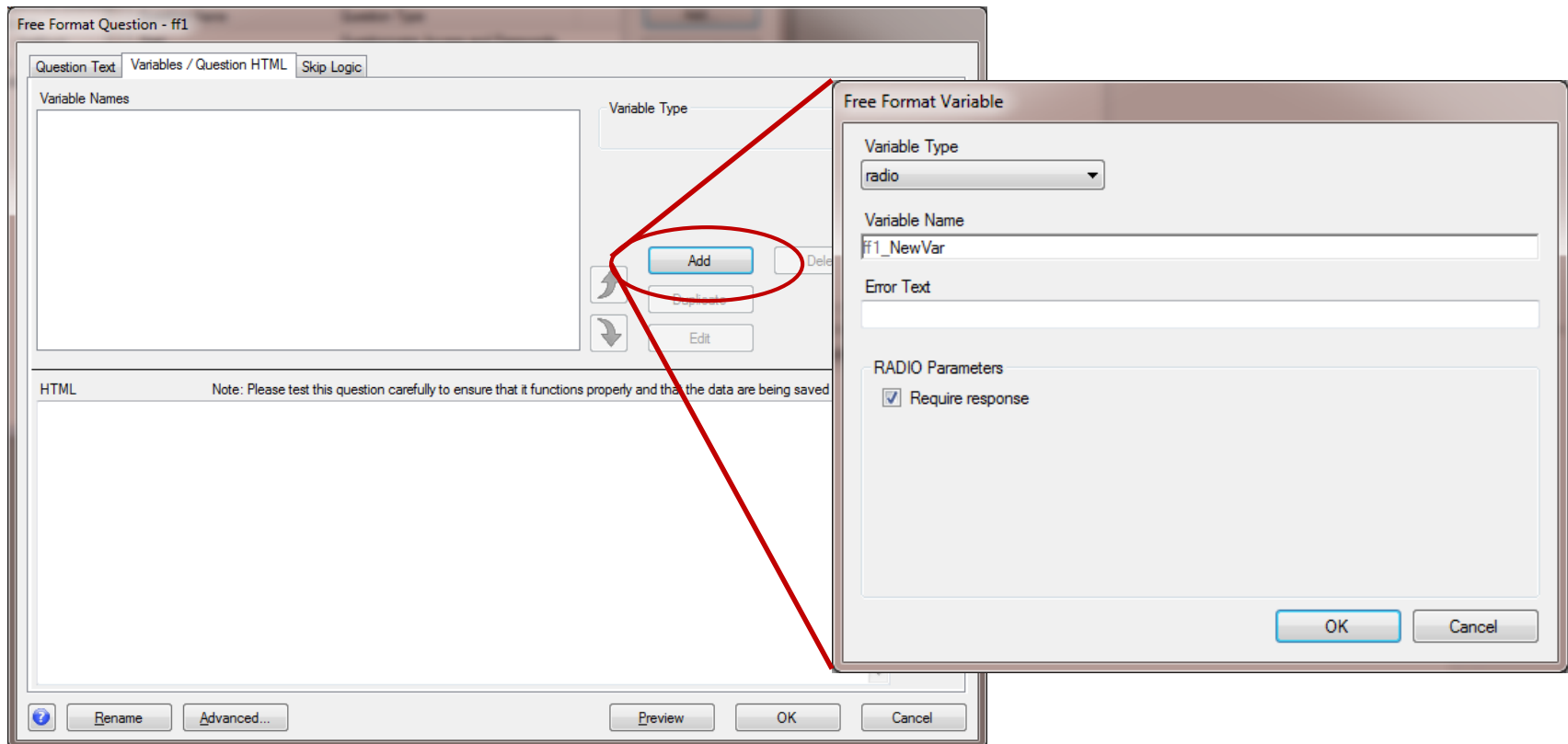
# Free Format - Parameters

- ▶ Header 1, Header 2, Footer similar to all other question types



# Free Format – Adding Variables

- ▶ Power of free format is ability to customize questions, data collection



# Supported variable types

- ▶ Radio
- ▶ Checkbox
- ▶ Select (Combo Box)
- ▶ Text (Numeric)
- ▶ Text (One-line Text Box)
- ▶ Textarea (Multi-line Text Box)
- ▶ Hidden

# SSI Script in CBC

- ▶ **CBC/Web includes specialized scripts**
  - Display Attribute & Level Text for CBC design, even if randomized
  - Store CBC answers back into the right spots in the data file – less coding work on the back end!

# Setting Up a CBC Free Format

- ▶ **Create a Free Format question**
  - Name should start with prefix such as FFTASK indexed by the "RAN#" portion of the reserved CBC question names (such as FFTASKRAN1, FFTASKRAN2, etc.)
  - Place each Free Format question on same page as its corresponding CBC question (preferably above it)
  - Generate HTML for question layout
    - I recommend stealing layout from existing CBC questions by previewing and then viewing the source code
  - Insert SSI Scripting that taps into design
  - Insert script to record answers
  - Test ONE question before adding others!

# Deconstructing a CBC Task

- ▶ Table, Row and Data Cell HTML tags define the shape and layout of the contents of the task
  - `<table>` indicates a new table, `</table>` indicates that you've finished a table
  - `<tr>` - begin new row within the table, `</tr>` closes the current row.
  - `<td>` - new data cell in the table, `</td>` - end of contents of current data cell

Which would you rather be in 30 years?				
Income Status	Rich	Poor	Middle Class	NONE: I would rather die than end up like any of these people.
Hair Status	Bald	Full head of hair	Receding hairline	
Family	No family	Large family (10+ children)	One ex-spouse but two great kids	
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



# Deconstructing a CBC Task

Which would you rather be in 30 years?

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

- ▶ Within each cell, we need to show data
  - Fixed labels are hard-coded into the HTML
    - `<td>Income Status</td>`
  - CBC Design information must be dynamically inserted
    - `[%CBCDesignLevelText (CBCQuestionName, ConceptPosition#, LevelTextPosition#) %]`
    - `<td>[%CBCDesignLevelText(CBCRAN1,1,3)%]</td>`

# Deconstructing a CBC Task

Which would you rather be in 30 years?

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

## ► Response to Stimuli need to be stored

- Using SSI Script allows us to automatically unscramble concept randomization/sorting.

```
<td class="input_cell clickable">
```

```
[%RadioSelect(FFTaskRandom1_response,  
CBCDesignConceptValue(cbc_Random1, 1))%]
```

```
</td>
```



# WARNING!!!

- ▶ You must carefully check your HTML syntax for each custom CBC question to ensure that you have referred to the variable names correctly for each choice task. *A mistake can invalidate a task, or potentially your entire CBC study.*
  - Visually inspect each custom CBC task, running under Local Web Server, comparing each standard CBC task with each custom built task. The attribute levels presented in each task should match.
  - Compare answers you THOUGHT you gave with answers recorded in the data file

# CSS Hooks

## ▶ Select Question

- Question type: `<div class="select">`
- See Following Slide for details

## ▶ Numeric Question

- Question type: `<div class="numeric">`

## ▶ CBC Template

- Question type: `<div class="cbc">`
- Attribute Labels: `<div class="label_text">`
- Level Text: `<div class="level_text">`
- Alternating Color #1: `<div class="alt_color1">`
- Alternating Color #2: `<div class="alt_color2">`

# JavaScript Functions

- ▶ Many JavaScript functions exist to help you set up Free Format questions correctly. Consult program help for more details
  - [General Web Interviewing \(CiW\) Help | Composing Web Surveys | Composing Questions | JavaScript in SSI Web](#)

# HTML & CSS Help

- ▶ Lots of online resources
  - [www.w3school.org](http://www.w3school.org)
  - [www.htmlgoodies.com](http://www.htmlgoodies.com)
- ▶ Preview CBC question, then right-click and “View Source”.
- ▶ Program Help file (“F1” Key) has lots of specific information on CSS in Lighthouse Studio
- ▶ Text editor can help you add HTML tags correctly
- ▶ Books are abundant, cheap
- ▶ Hire a high school / local college student!

# QUESTIONS?

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