What's New in Lighthouse Studio v9.6

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Agenda

- Word Import
- Bandit MaxDiff
- Genetic Algorithms in the Choice Simulator

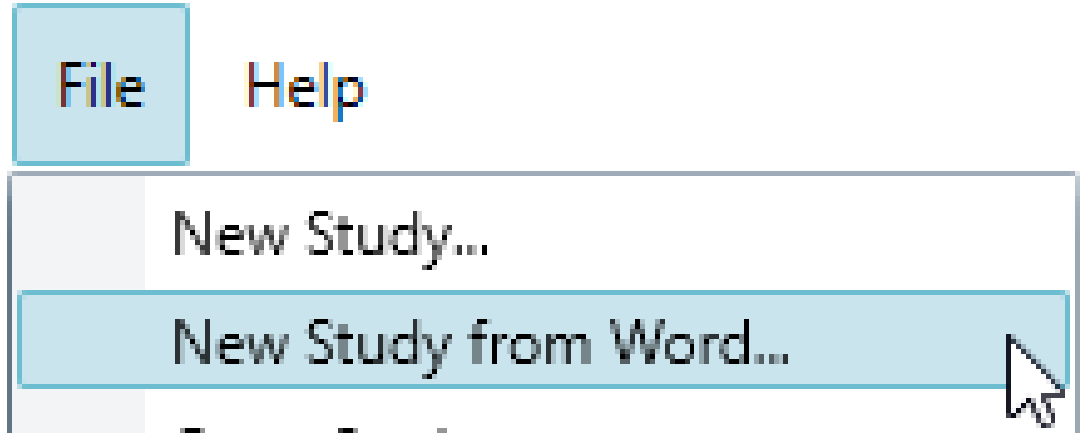
Word Import

What is Word Import?

- Allows users to import questions from a Word document into Lighthouse Studio.
- Your colleagues and you can…
  - Rearrange the survey,
  - Define question text,
  - Add response options
- …all within the Word environment, then import it into Lighthouse Studio with the click of a button.

How It Works

- Start by creating your Word document.
- Click “New Study from Word…” in Lighthouse Studio and select your Word document.



Tags

- Tags are how question settings are defined in the Word document.
- They’re written as text between bracket characters:

[PAGE BREAK]
[MAXIMUM: 100]

- Tags are case- and formatting-insensitive.

Example Question

[QUESTION: Brands]

All questions start with a “question” tag and the question’s name.

Example Question

[QUESTION: Brands]
[TYPE: SELECT]

The question's type is declared with a "type" tag. The following types are supported:

- Select
- Numeric
- Open-End
- Constant Sum
- Ranking
- Semantic Diff
- Grid
- Text
- Terminate

Example Question

[QUESTION: Brands]
[TYPE: SELECT] [CHECKBOX]

This is an optional tag. It makes the select question use checkboxes.

Example Question

[QUESTION: Brands]
[TYPE: SELECT] [CHECKBOX]
Which brands do you use?

Question text is defined as plain text in the document.

Example Question

[QUESTION: Brands]
[TYPE: SELECT] [CHECKBOX]
Which brands do you use?

- Brand A
- Brand B
- Brand C

And response options are added as list items in the Word document.

Example Question:
Other Specify and Exclusive

[QUESTION: Brands]
[TYPE: SELECT] [CHECKBOX]
Which brands do you use?

- Brand A
- Brand B
- Brand C
- Other brand [OTHER]
- None of the above [EXCLUSIVE]

Response options can be set to other specify or exclusive with these tags.

Example Question: Require Response

[QUESTION: Brands]
[TYPE: SELECT] [CHECKBOX]
[NOT REQUIRED]
Which brands do you use?

- Brand A
- Brand B
- Brand C
- Other brand [OTHER]
- None of the above [EXCLUSIVE]

"Required" or "not required" tags determine if respondents must answer this question.

Example Question: Randomize

[QUESTION: Brands]
[TYPE: SELECT] [CHECKBOX]
[NOT REQUIRED] [RANDOMIZE]
Which brands do you use?

- Brand A
- Brand B
- Brand C
- Other brand [OTHER]
- None of the above [EXCLUSIVE]

Response options will be randomized.

Example Question: Formatting

[QUESTION: Brands]
[TYPE: SELECT] [CHECKBOX]
[NOT REQUIRED] [RANDOMIZE]
Which brands do you use?

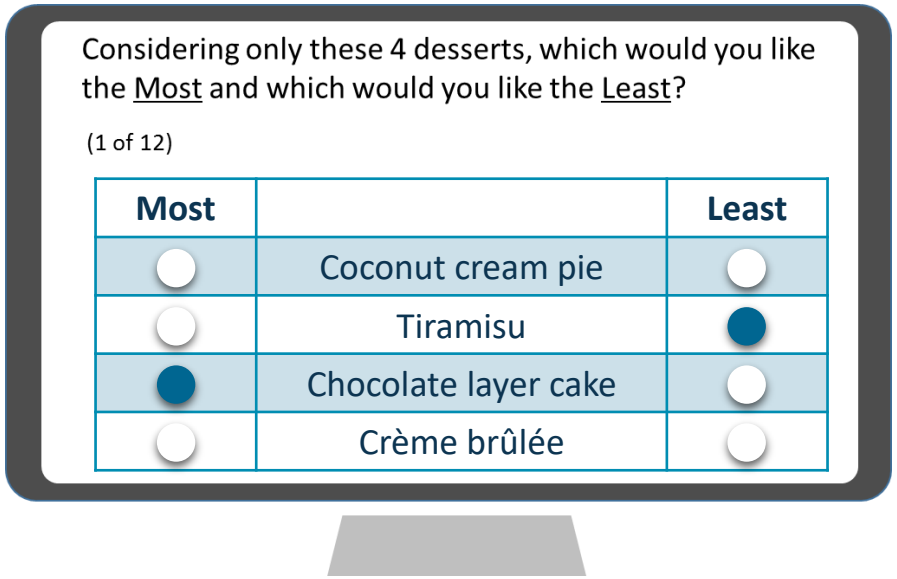
- Brand A
- Brand B
- Brand C
- *Other brand* [OTHER]
- **None of the above** [EXCLUSIVE]

Text that is bold, italicized, or underlined in question text or response options keep that formatting in Lighthouse Studio.

Bandit MaxDiff

MaxDiff is…

…an approach for measuring consumer preference for a list of items. Items could include messages, benefits, images, product names, claims, brands, features, packaging options, and more!



Rank	Item	Score
1	Hot brownie sundae	7.10
2	Chocolate molten cake	6.82
3	Chocolate layer cake	6.22
4	Italian gelato	6.13
5	New York cheesecake	5.90
…	…	…
20	Tiramisu	1.10

But what if we have a large list of items and we're really only interested in which are BEST

- Scenario : My client has a large list of 100+ items and wants me to find out which are the best ones for the sample.
  - Advertising claims
  - Clinical trials
  - Product launches
  - Website modifications
  - Packaging
  - Etc.

- MaxDiff is going to struggle with this requirement unless we have very large sample size. Otherwise, our data will be way too sparse.

Challenges with Traditional MaxDiff

- MaxDiff doesn’t scale to large numbers of items at the individual level
- Example: 20 questions, 5 items per question
  - With 20 items, we can show each item 5 times each
  - 25 items, 4 times each
  - 50 items, 2 times each
  - 100 items, 1 time each (Sparse MaxDiff)
  - 100+ items, each item is seen fewer than 1 time on average
- When interviewing humans there’s a limit to how many items you can reasonably study (if you need stable individual level estimates for all items).

Challenges with Traditional MaxDiff

- MaxDiff assumes we care about each item equally
  - The designer equalizes the number of times each item is shown
  - Often we really only care about identifying the best items (stars), especially when we have a lot of them
  - If so, we spend a lot of time asking about items we care less about (dogs)
- MaxDiff doesn't learn from past respondents
  - In hindsight, we have spent a lot of time asking people about items that were dogs.
  - Wouldn't it have been better to learn as we went along so that we wasted less time asking about the dogs?

How can we do better?

- Don’t waste so much respondent time on the dogs
- Focus more respondent time on the stars
- As we get more information, we’re in a better position to tell the dogs and the stars apart

What is Bandit MaxDiff?

- Bandit MaxDiff uses preferences from previous respondents so subsequent respondents see MaxDiff questions that oversample the topmost items – the ones that are most likely to turn out to be the overall winners.

- Methodology in three steps:
  - Counting Analysis
  - Thompson Sampling
  - MaxDiff Questionnaire

Better yet…

- …if the goal is to identify the topmost items for the sample, researchers can save up to 75% on data collection costs by using Bandit MaxDiff because you only need to interview as few as 25% of respondents as you did in the past!

- Lighthouse Studio MaxDiff-500 subscribers can now test up to 2,000 items at a time with Bandit MaxDiff. The limit for suite holders has also been automatically increased to 2,000 items.

How to use it

- If you are studying a large number of items (say, 60 or more), Bandit MaxDiff typically will not carry all items into each respondent's MaxDiff questionnaire. A subset of, say, 30 items could be chosen for each respondent. Due to how sparse the data could become for any one respondent, pooled analysis such as aggregate logit would be effective.

- If you are studying relatively few items (say 30 or fewer), Bandit MaxDiff can show every item at least once for every respondent and the most preferred items could be shown four or more times (Boosted Bandit). In such cases, HB, latent class, or aggregate logit will all work quite well.

Create your list of items

- Then add a constructed list and specify the following:

  BanditMaxDiff (MaxDiffExerciseName, Items)

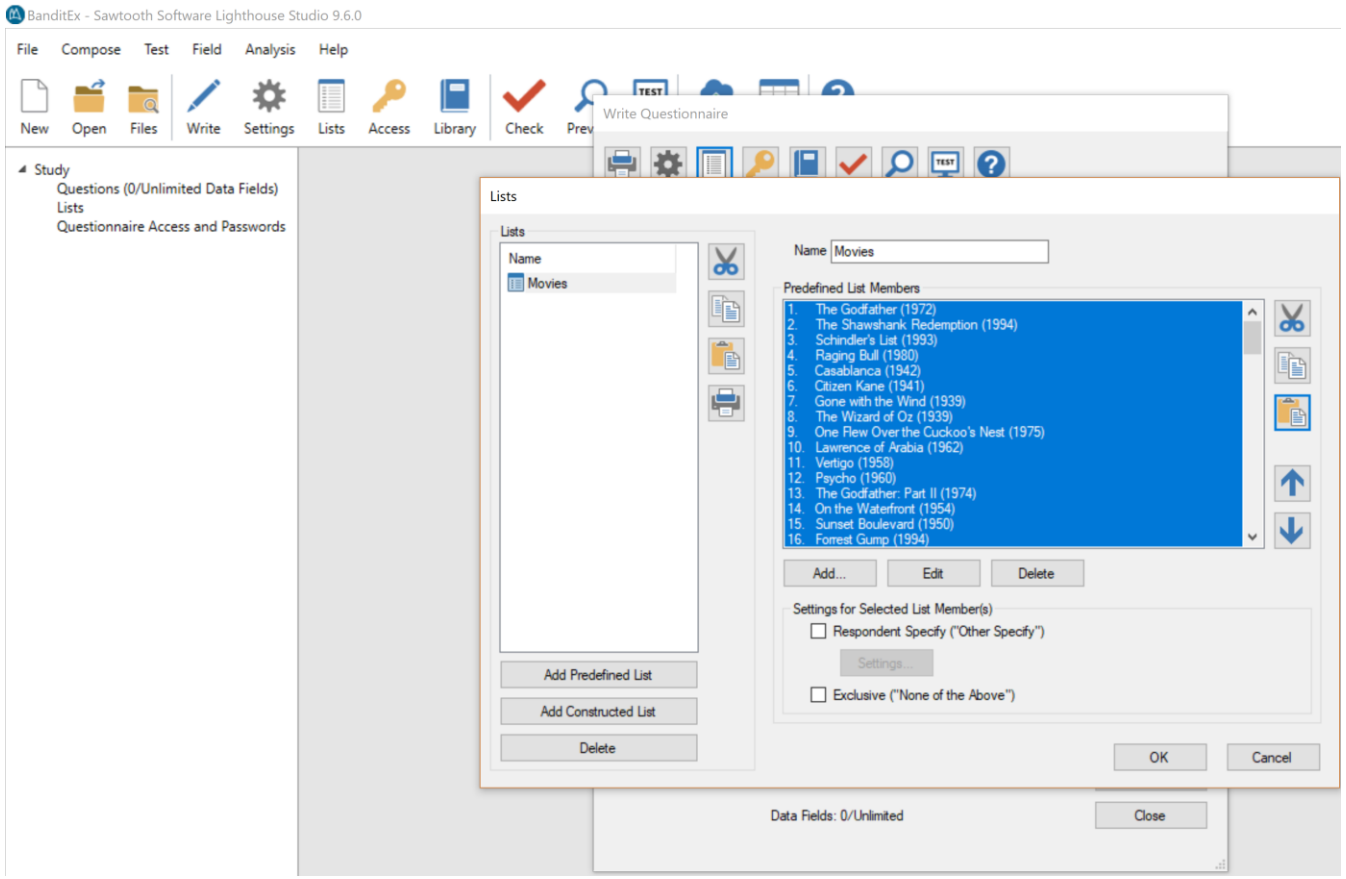
  SETLISTLENGTH (Items)

  – where instead of *MaxDiffExerciseName*, you specify the name of a MaxDiff Exercise that you will be creating

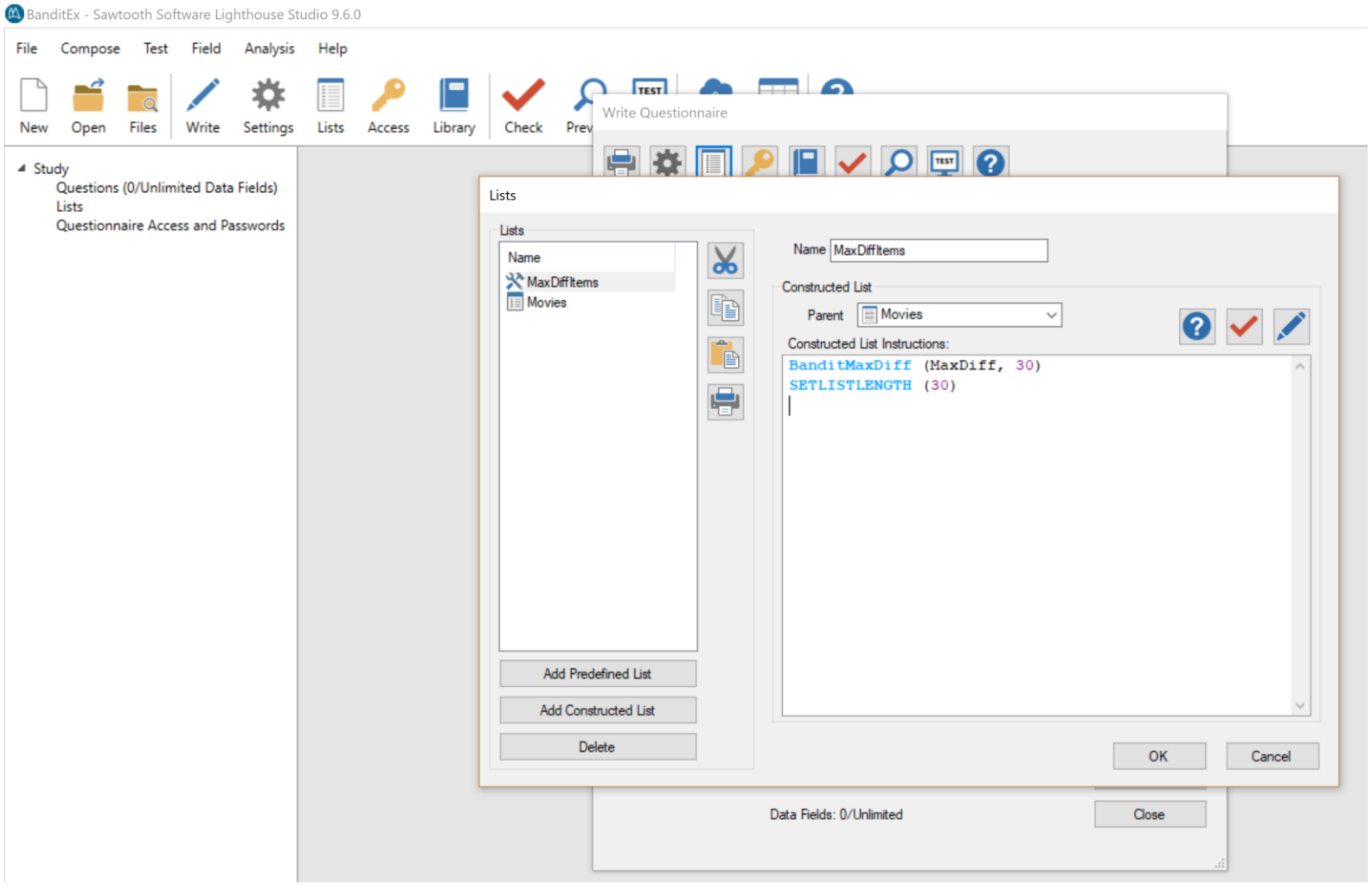
  – Instead of *Items*, you specify the number of items to show each respondent

    - Assuming 30 or more items in your Bandit MaxDiff study, *Items* should typically be 30

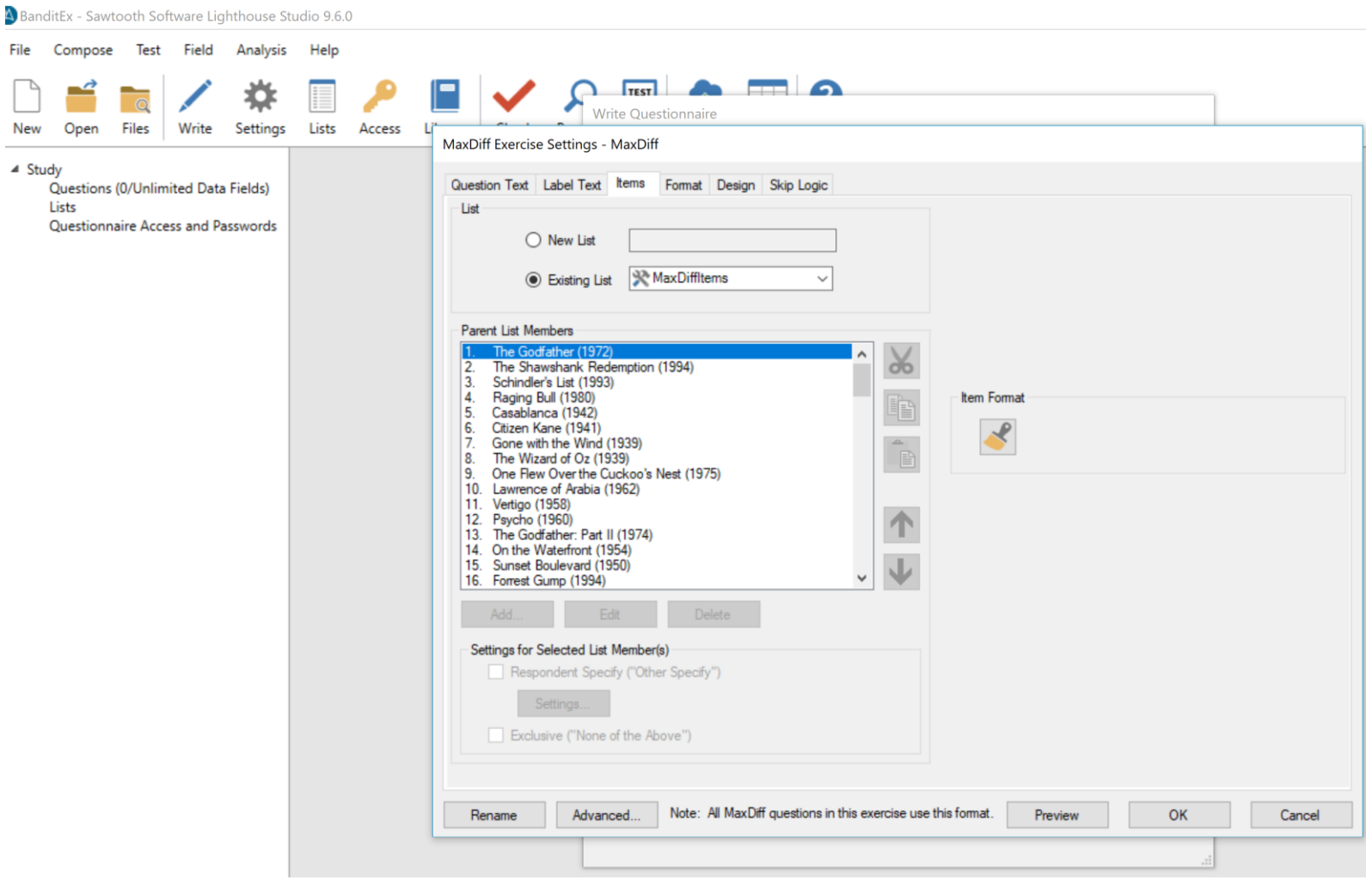
Create your list of items



Create your Bandit constructed list



Create your MaxDiff exercise



Choosing your Adaptivity

- By default, a moderately aggressive level of adaptivity is employed when selecting which items to show each new respondent completing the questionnaire.
- You can change how aggressively to favor previously preferred items for Bandit MaxDiff by using the optional *NumThompsonItems* argument.

BanditMaxDiff (MaxDiffExerciseName, Items, NumThompsonItems)

Why pick a different level of adaptivity than the default?

- If you want a less aggressive approach that strikes a closer compromise between standard level-balanced MaxDiff (where each item is sampled equally) and bandit MaxDiff (which oversamples most preferred items), you should employ a low level of adaptivity.

- If your only goal is to identify the top few items for the sample and your sampling scheme ensures that the first respondents should be not systematically different from the last respondents, you should employ the highest level of adaptivity.

Remember!

- Bandit MaxDiff uses any completed practice records on the server to influence the items drawn for later respondents.

- ***Make sure to RESET your survey on the data collection server prior to launching your study so that it deletes any practice data on the server***

- ***To delete practice data and the associated table of group preferences, you must RESET your survey on the data collection server by logging into the Admin Module.***
  - Just deleting respondent data without resetting the survey does not clean out the preferences and variances for these practice records in the Bandit MaxDiff table on the server.

Sample Sizes for Bandit MaxDiff

	Sample Size to Achieve Top-3 Hit Rate of 90%	Sample Size to Achieve Top-10 Hit Rate of 90%	Row Average
120 items	250	160	205
300 items	1,000	1,050	1,025

Simulation study conducted by Fairchild, Orme, & Schwartz (2015 Sawtooth Software Conference)

Other things to consider…

- This assumes your trying to identify the most preferred items for the total sample. If you have segments in your data, create as many Bandit MaxDiff exercises as are segments of interest.
  - The data can be combined later using HB with a covariate or run aggregate logit separately on each segment if the data is sparse

- Not for offline interviewing
  - Because Bandit MaxDiff relies on past respondents' preferences to select the items to show next respondents, it should not be used with offline CAPI data collection where only data from respondents completed on the same device would be referenced.

Genetic Search

Three available algorithms for product searches

Exhaustive

Simple; Examines all possible combinations; Guaranteed to find the global optimal solution; Can conduct Multi-Objective Searches

Total search space can be enormous (10 attributes w/ 5 levels each makes for 5^10, or 10 million combinations!)

Grid

Extremely fast if search space is large; Accurate if search space is single-peaked; Used to reduce Exhaustive search domain

Not guaranteed to find the global optimal solution if several peaks

Genetic

Faster than Exhaustive if search space is large (but longer than Grid); Finds a variety of near-optimal solutions, and most times the single best optimal solution; Can conduct Multi-Objective Searches

Still not guaranteed to find the global optimal solution, but Genetic is less vulnerable than Grid search to finding the local optimum

Genetic Algorithm

- Based on concepts of evolutionary biology and Darwinian theory (survival of the fittest)
- Each searched product field is a “chromosome”, and the options (attribute levels) for those fields are the “genes”
- Each solution (a set of chromosomes) is an “organism”

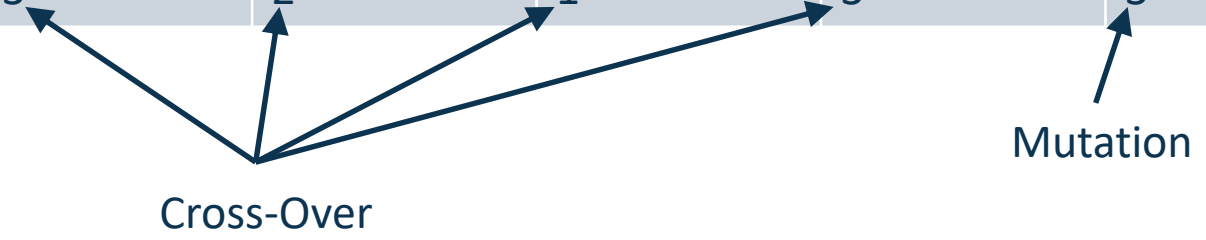
Basics Steps for GA (1)

- Generate pool of organisms (products) using random or targeted values
- Evaluate the organisms in terms of their “fitness” (utility, share, etc.)
- Choose parents based on their fitness and produce “offspring”
  - Offspring are a combination of the parents’ traits
- Evaluate the offspring’s fitness
- “Cull” the population by removing the least fit members of the population
  - The number remaining is the original pool size

Basics Steps to GA (2)

- Offspring are formed through random cross-over and mutation:

	A1	A2	A3	A4	A5
Parent “A”	4	2	1	3	5
Parent “B”	3	1	1	2	5
Offspring “C”	3	2	1	3	3

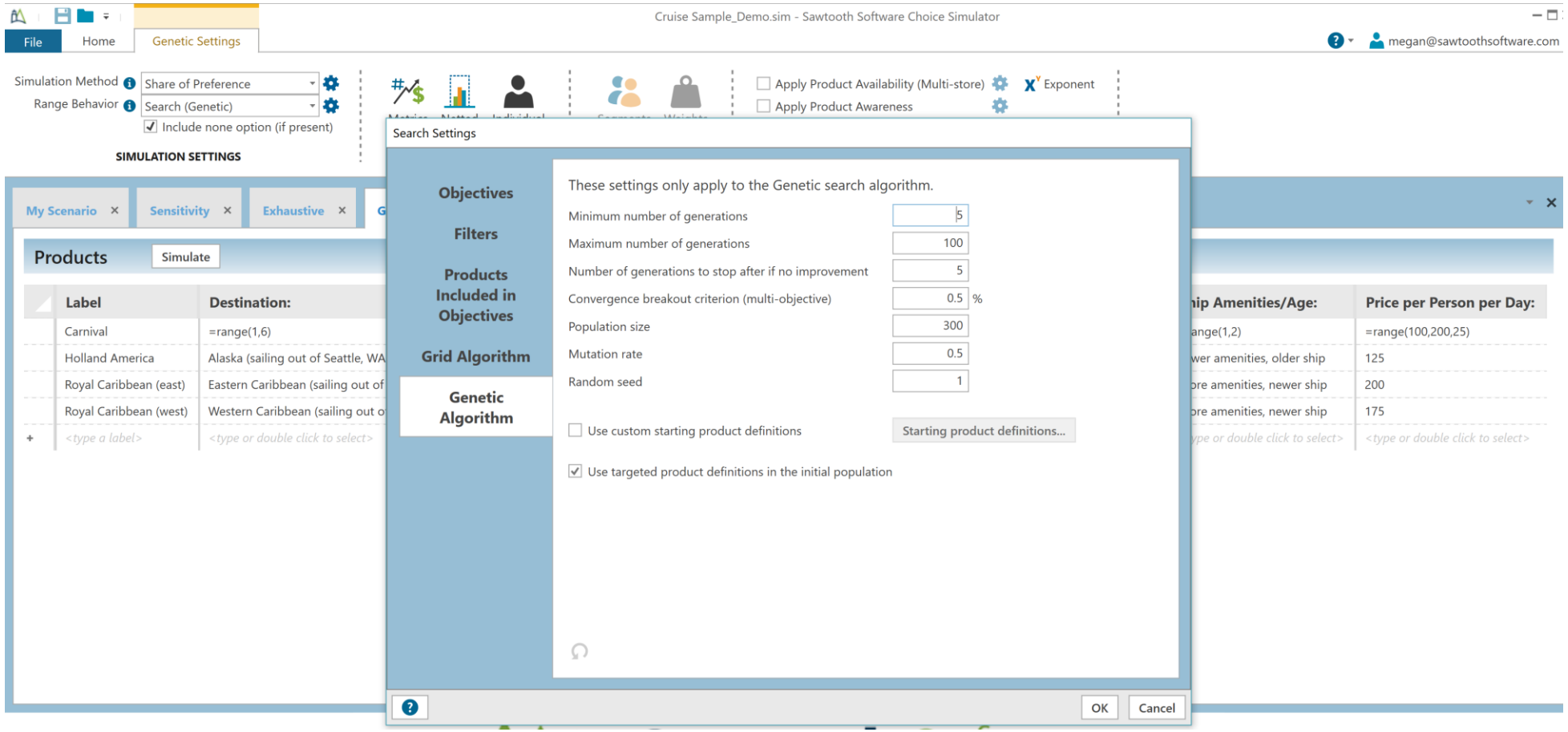


Basic Steps to GA (3)

- Each iteration of evaluation, creating and culling the population is called a “generation”

- Generations continue until the maximum is reached OR the population fails to improve

Demo


Cruise Sample_Demo.sim - Sawtooth Software Choice Simulator
File
Home
Genetic Settings
megan@sawtoothsoftware.com
Simulation Method
Share of Preference
Range Behavior
Search (Genetic)
Include none option (if present)
SIMULATION SETTINGS
Apply Product Availability (Multi-store)
Apply Product Awareness
Exponent
My Scenario
Sensitivity
Exhaustive
Products
Simulate
Label
Destination:
Carnival
=range(1,6)
Holland America
Alaska (sailing out of Seattle, WA
Royal Caribbean (east)
Eastern Caribbean (sailing out of
Royal Caribbean (west)
Western Caribbean (sailing out o
<type a label>
<type or double click to select>
Price per Person per Day:
=range(100,200,25)
125
200
175
Search Settings
Objectives
Filters
Products Included in Objectives
Grid Algorithm
Genetic Algorithm
These settings only apply to the Genetic search algorithm.
Minimum number of generations
5
Maximum number of generations
100
Number of generations to stop after if no improvement
5
Convergence breakout criterion (multi-objective)
0.5
%
Population size
300
Mutation rate
0.5
Random seed
1
Use custom starting product definitions
Starting product definitions...
Use targeted product definitions in the initial population
OK
Cancel

Recommendations

- Run Exhaustive IF number of attribute level combinations to search is feasible (ex. 5 attributes w/ 4 levels each is 4^5, only 1024 scenarios)
- If Exhaustive is not feasible, start with Grid search. Run multiple passes and if the same answer is always obtained, it is likely the optimum. If not, reduce the domain and re-run Exhaustive.
- Use Genetic if the response surface is irregular with many peaks.
- Use Exhaustive or Genetic if the business goal is to consider multiple objectives, such as maximizing profit and share.

Questions?

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Appendix

Importing Text Questions

- Question text defaults to header 1.
- Specific question text can be set with “header 1,” “header 2,” “question text,” or “footer” tags.

[QUESTION: Q1]

[TYPE: TEXT]

Thank you for taking the survey.

[QUESTION: Q2]

[TYPE: TEXT]

[HEADER 1]

Here’s some question text.

[HEADER 2]

More question text.

Importing Select Questions

- Select questions default to radio buttons, but “radio,” “checkbox,” or “dropdown” tags can specify a certain input type.
- For checkbox select questions, you can optionally include “minimum” and “maximum” tags.

[QUESTION: Q1]
[TYPE: SELECT] [CHECKBOX]
[MINIMUM: 1] [MAXIMUM: 3]
Please select up to three items.

- Item 1
- Item 2
- Item 3
- Item 4

Importing Numeric Questions

- Numeric questions also support “minimum” and “maximum” tags.
- “Don’t know” tags are also supported to offer respondents a don’t know / refuse option.
- To permit decimal responses, add a “decimals” tag.

[QUESTION: Hours]
[TYPE: NUMERIC]
[MINIMUM: 0 | MAXIMUM: 168]
[DON’T KNOW: 999]
[DECIMALS]
How many hours do you spend on this activity each week?
Input “999” if you do not know.

Importing Open-End Questions

- Open-end questions default to supporting multiple lines, but this can be set with “single line” or “multiple lines” tags.
- The number of characters required in responses can be set with “minimum” and “maximum” tags.

[QUESTION: Name]
[TYPE: OPEN-END]
[SINGLE LINE]
[MINIMUM: 1 | MAXIMUM: 30]
What is your name?

Importing Constant Sum Questions

- The “total” tag defines the total that respondents must reach with their responses.
- Like before, decimals can be enabled with the “decimal” tag.

[QUESTION: HoursSpent]
[TYPE: CONSTANT SUM]
[TOTAL: 24]
How many hours per day do you spend on each of these activities?

- Activity 1
- Activity 2
- Activity 3

Importing Ranking Questions

- Ranking questions default to drag-to-container, but this can be set with “drag-to-container,” “sort vertically,” or “sort horizontally” tags.
- The number of items to rank can optionally be set with “partial.”

[QUESTION: ColorRanking]
[TYPE: RANKING | SORT VERTICALLY]
[PARTIAL: 3]
Please rank three colors.

- Red
- Blue
- Yellow
- Green

Importing Ranking Questions (cont.)

- Alternatively, ranking questions can be set to “numeric” or “dropdown.”
- When using these, the number of items to rank can optionally be set with “minimum” and “maximum.”

[QUESTION: ColorRanking]
[TYPE: RANKING | NUMERIC]
[MINIMUM: 1 | MAXIMUM: 3]
Please rank up to three colors.

- Red
- Blue
- Yellow
- Green

Importing Semantic Diff Questions

- Semantic diff questions have three different lists, which are set like this:

  [QUESTION: Q1]

  [TYPE: SEMANTIC DIFF]

  [LEFT LIST]

  - Helpful
  - Economic

  [RIGHT LIST]

  - Not helpful
  - Expensive

  [SCALE LIST]

  - Agree
  - No opinion
  - Disagree

Importing Semantic Diff Questions (cont.)

- Semantic diff questions default to sliders, but the “slider” or “radio” tags can be used to specify an input type.

[QUESTION: Q1]
[TYPE: SEMANTIC DIFF]
[RADIO]

Importing Semantic Diff Questions (cont.)

- Semantic diffs have special tags for randomization:
  - Rows are randomized with “randomize rows.”
  - Columns are randomized with “randomize columns.”
  - And individual items are randomized with “randomize items.”

```
[QUESTION: Q1]
[TYPE: SEMANTIC DIFF]
[RANDOMIZE ROWS]
[RANDOMIZE ITEMS]
```

Importing Grid Questions

- Grid questions also have multiple lists. This time, we use “row list” and “column list.”

[QUESTION: Q1]
[TYPE: GRID]
[ROW LIST]
- Row 1
- Row 2

[COLUMN LIST]
- Column 1
- Column 2

Importing Grid Questions (cont.)

- You can change the direction of the grid with a “direction” tag and the value “rows” or “columns.”
- Grid questions default to radio buttons, but “radio,” “checkbox,” “numeric,” or “open-end” tags can change that.

```
[QUESTION: Q1]
[TYPE: GRID]
[DIRECTION: COLUMNS]
[NUMERIC]
```

Importing Grid Questions (cont.)

- Checkbox, numeric, and open-end grid questions support “minimum” and “maximum” tags .
- Numeric grid questions support “don’t know” and “decimals” tags.
- Open-end grid questions support “single line” and “multiple lines” tags.

[QUESTION: Q1]
[TYPE: GRID | NUMERIC]
[DON’T KNOW: 999]
[DECIMALS]

Importing Grid Questions (cont.)

- Rows or columns can be randomized with “randomize rows” or “randomize columns” tags, respectively.

```
[QUESTION: Q1]
[TYPE: GRID]
[RANDOMIZE ROWS]
```

Importing Terminate Questions

- Qualification is set with “qualified” or “disqualified” tags.
- “Link” tags are used to redirect respondents.

```
[QUESTION: Q1]
[TYPE: TERMINATE]
[QUALIFIED]
Thank you for taking the time to answer our questions.

[QUESTION: Q2]
[TYPE: TERMINATE]
[DISQUALIFIED]
[LINK: http://sawtoothsoftware.com]
```

Importing Skips

- Skips are added to questions using the “skip to” tags.
  - Pre-skips can be added to questions using the “pre-skip to” tag.
- Skips are defined with a skip destination and optional skip logic.
- If no skip logic is provided, the skip is set to always skip.

```
[QUESTION: Q1]
[TYPE: SELECT]
[SKIP TO: Q2]                    (after this question is seen, skip to Q2)
[PRE-SKIP TO: Q3]                (before this question is seen, skip to Q3)
[SKIP TO: Q4 IF Q1 = 1]          (if Q1 = 1, skip to Q4)
```

Importing Skips (cont.)

- Special skip destinations are also supported.

[SKIP TO: Next Question]
[SKIP TO: End of Block]
[PRE-SKIP TO: Next Loop Iteration]
[SKIP TO: End of Loop IF Q1 = 1]

Advanced Tips: Comments

- Tags that begin and end with a hyphen are ignored during the import.
- This can be used to add notes to the document:

  [----- start of demographic questions -----]

- Or they can be a handy way to divide parts of the document for easier reading:

  [PAGE BREAK]
  [----------]

Advanced Tips: Literal Brackets

- Double brackets can be used to include actual bracket characters in your question text or list items.

[QUESTION: Q1]
[TYPE: OPEN-END]
How was your last outing [[e.g., hiking, camping, biking]]?

Advanced Tips:
Start and End of Survey

- The beginning and ending of your survey can optionally be marked with “start survey” and “end survey” tags.
- Anything placed outside the start and end tags is ignored by the importer.

John and Jill’s Used Car Survey
[START SURVEY]
…
[END SURVEY]
Email: example@email.com
Phone: 555 – 1234

Advanced Tips: Code

- By default, the importer adds formatting to question texts.
- Question text surrounded by “code” and “end code” tags will ignore all formatting.

```
[QUESTION: Q1]
[TYPE: TEXT]
Welcome to the study.
[CODE]
<script>
…
</script>
[END CODE]
```

Advanced Tips:
Lists in Question Text

- Lists can be included in question text, but you'll have to use a question text tag.

[QUESTION: Q1]

[TYPE: SELECT]

Which brands do you use?

- (Any brand you use 2+ hours / week)
- Brand A
- Brand B
- Brand C

[QUESTION: Q1]

[TYPE: SELECT]

[HEADER 1]

Which brands do you use?

- (Any brand you use 2+ hours / week)

[LIST]

- Brand A
- Brand B
- Brand C

Advanced Tips: Named Lists

- Lists can optionally be given a name.
- Named list can be repeated throughout the survey.

[QUESTION: Q1][TYPE: SELECT]

[LIST: YesNoList]

- Yes
- No

[QUESTION: Q2][TYPE: SELECT]

[LIST: YesNoList]

- Yes
- No

[QUESTION: Q3][TYPE: SELECT]

[LIST: YesNoList]

You can copy-and-paste the entire list to repeat it.

Or leave off the items entirely!