Efficient Conjoint Choice Designs in the Presence of Respondent Heterogeneity
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Choice Experiment
Choice of a certain type of car

<table>
<thead>
<tr>
<th>Size</th>
<th>Color</th>
<th>Fuel</th>
<th>Brand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>Grey</td>
<td>LPG</td>
<td>Mercedes</td>
</tr>
<tr>
<td>Medium</td>
<td>Red</td>
<td>Gasoline</td>
<td>Toyota</td>
</tr>
<tr>
<td>Small</td>
<td>Blue</td>
<td>Diesel</td>
<td>Renault</td>
</tr>
</tbody>
</table>

81 possible profiles, 85320 possible choice sets of size three.

Mixed Logit Model
The standard multinomial logit model:

$$ p_{ks}(\beta) = \frac{\exp(x'_{ks} \beta)}{\sum_{i=1}^{K} \exp(x'_{is} \beta)} $$

Capturing consumer heterogeneity:

$$ \beta \sim N(\mu_\beta, \Sigma_\beta) $$

Challenge and Questions
- Incorporating consumer heterogeneity increases the complexity dramatically.
- Is there any computational shortcut to construct the mixed logit design?
- Is it possible to include the prior uncertainty into the design?