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Modeling Co-occurring Health Conditions to Predict Health Utility from Generic Health-Related Quality of Life Indexes

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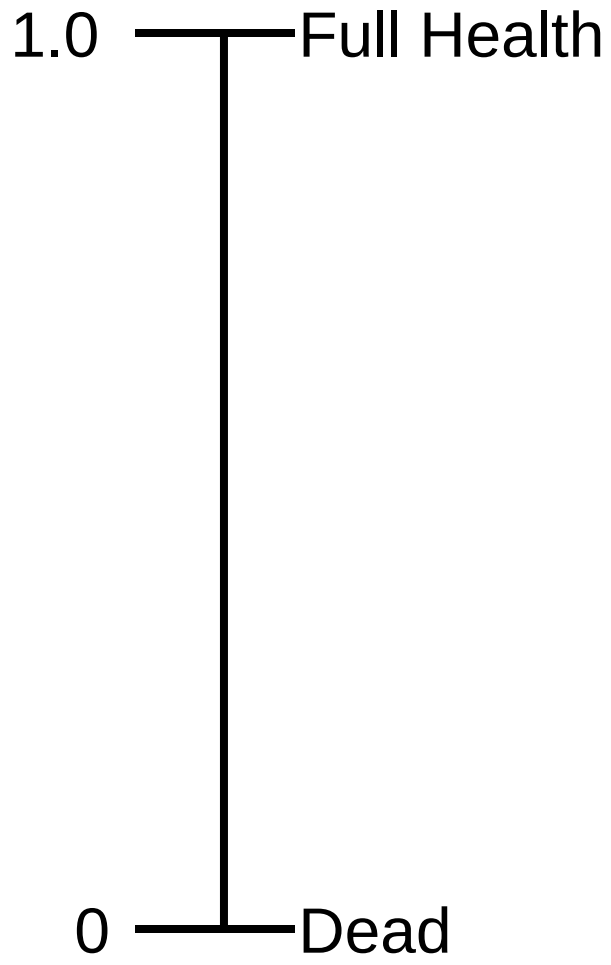
Health Utility

- Preference-based summary score of health
- Scores from generic health-related quality of life (HRQoL) measures are appropriate for cost-effectiveness analyses



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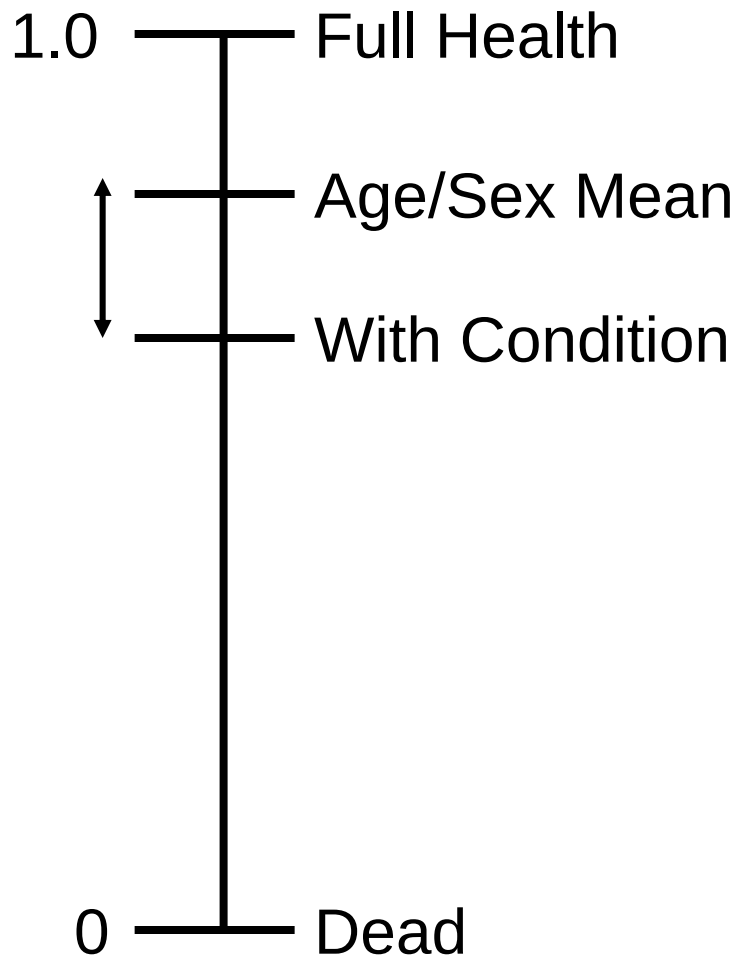
Health Utility Impact of a Single Condition

- Cost-effectiveness analyses often require an estimate of the health utility change of a single health condition

- When longitudinal change data are not available, estimate differences in cross-sectional scores
  - Current recommendations suggest comparing scores from a sample with a health condition to age- and sex-adjusted normative values



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Estimating the Impact of a Single Condition When Other Conditions are Present

- We should be able to estimate the impact of a single health condition on health utility independent of the other health conditions in large datasets
- It is not known how the impacts of multiple health conditions combine:
  - Additive
  - Multiplicative
  - Minimum
- A rule for modeling the impact of multiple health conditions is particularly useful for estimating condition impact catalogs

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Data

- 1998-2004 Medicare Health Outcomes Survey
- SF-6D health utility score from the SF-36 version 1
- Exclude proxy respondents and surveys with less than 80% completed

- 103,484 observations used for model estimation
- 102,945 observations used for model testing
- Split data into two groups:
  - aged 65 and older
  - under age 65

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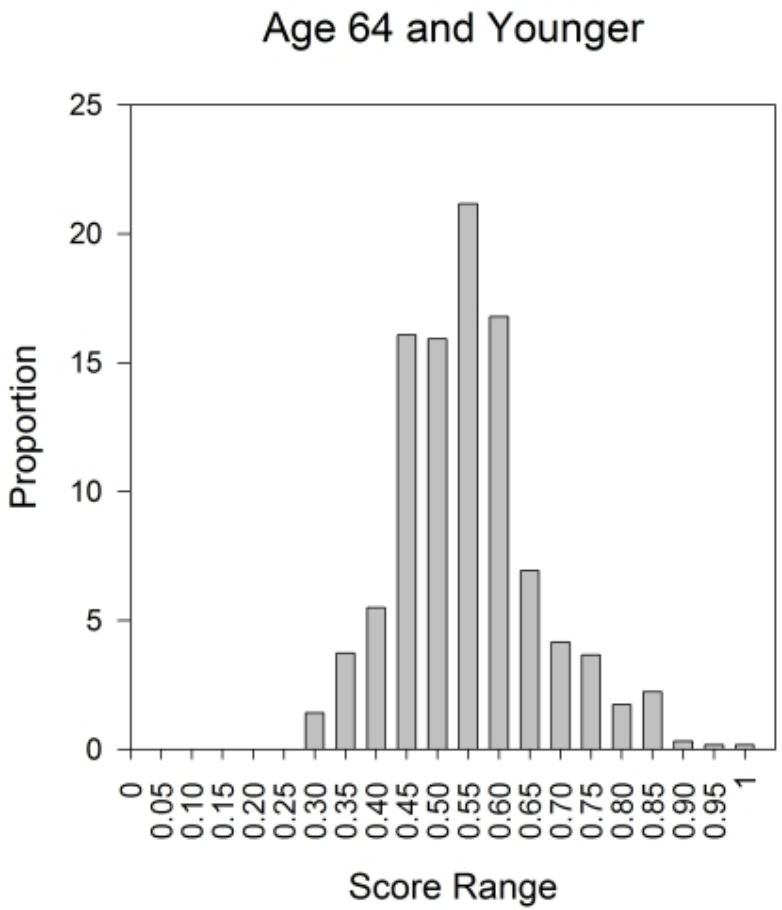
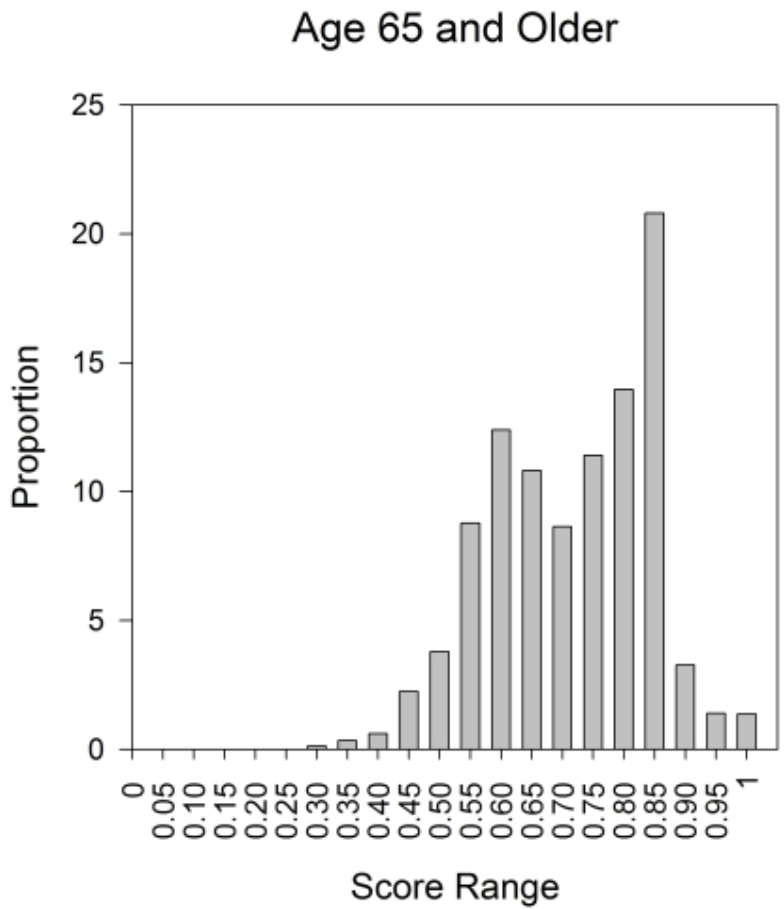
Distribution of SF-6D Scores





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Models

- All models fit in WinBUGS 1.4.1
- Censored at 1.0 and 0.3

- SF-6D summary score modeled with:
  - 15 health conditions

  - Age in years
  - Sex
  - Education
  - Income

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4 Combination Rules

- Additive
- Minimum
- Multiplicative
- Count

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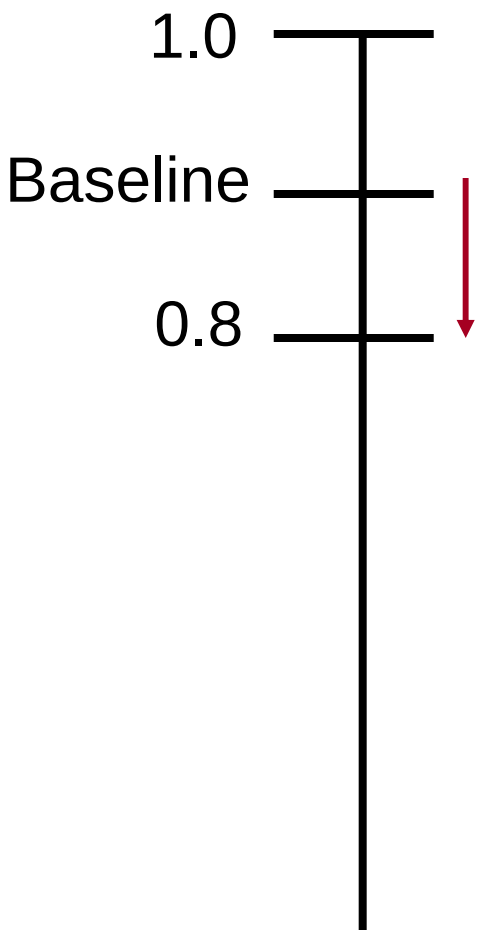
Additive Model

Condition A: -0.1



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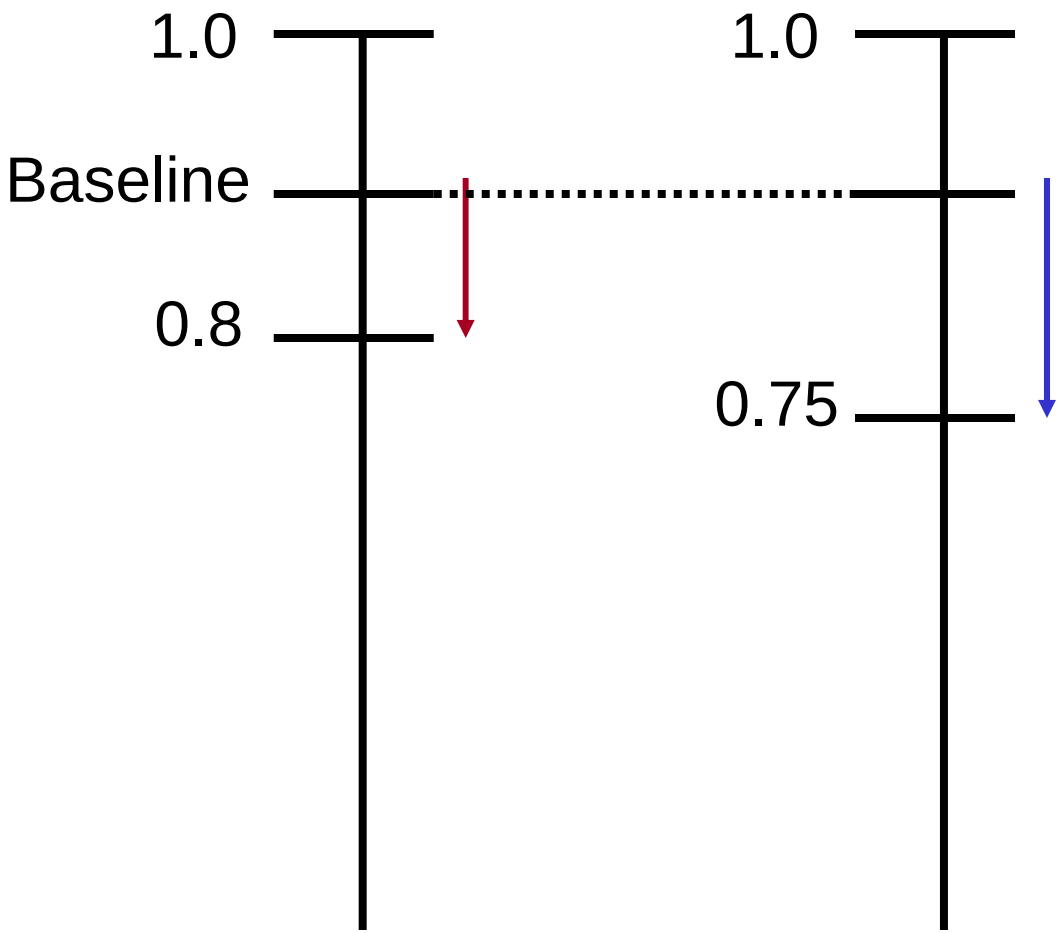
Additive Model

Condition A: -0.1 **Condition B: -0.15**



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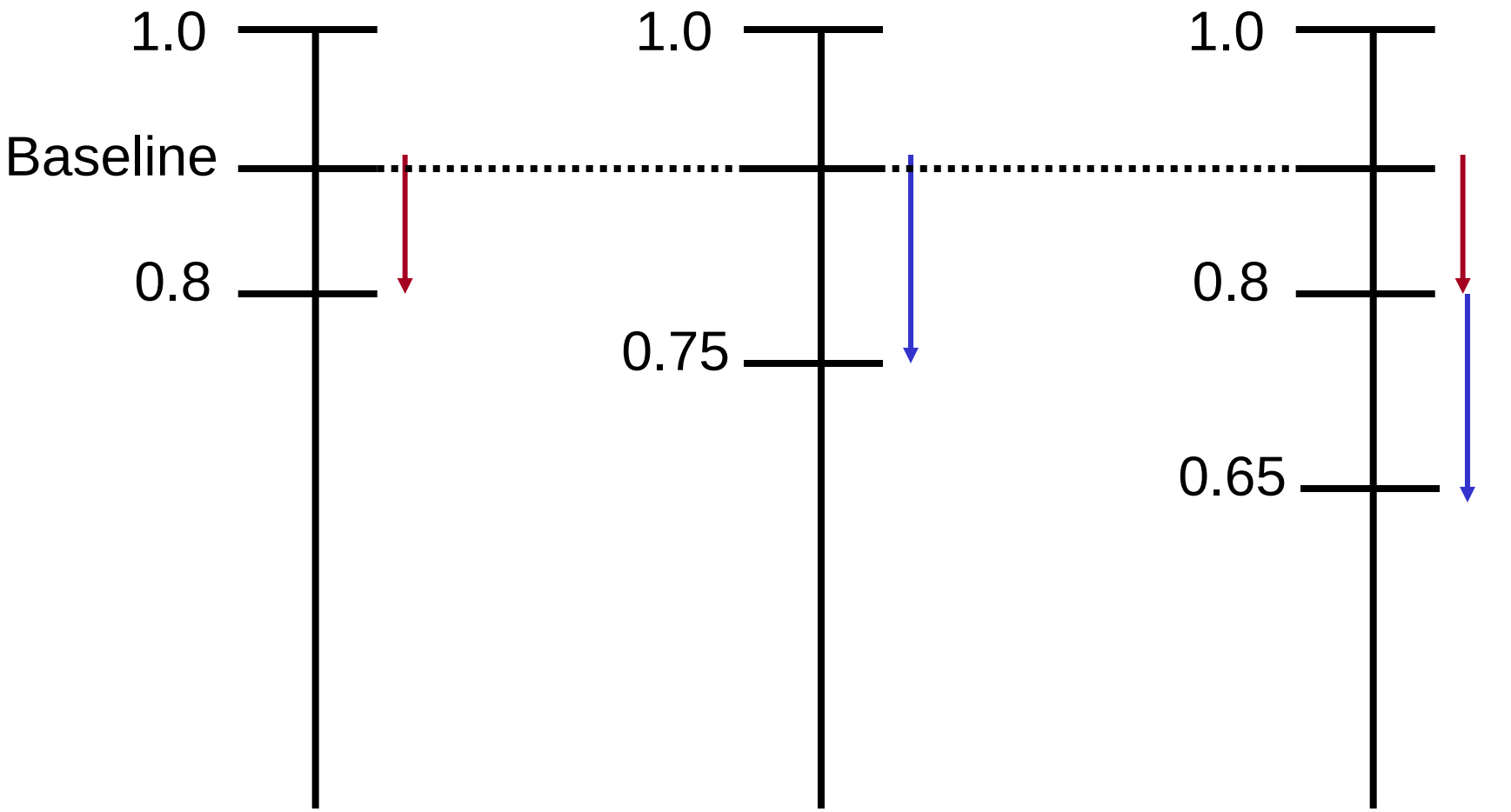
Additive Model

Condition A: -0.1 **Condition B: -0.15** **A & B: -0.25**



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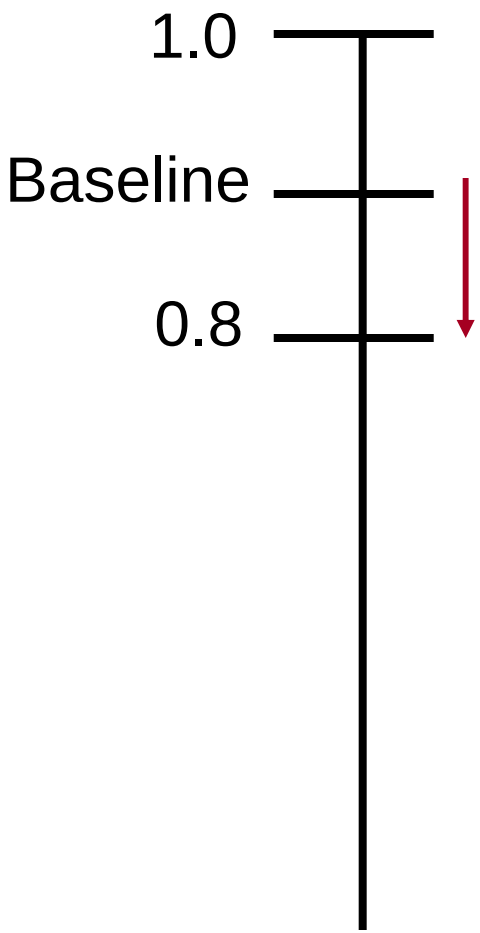
Minimum Model

Condition A: -0.1



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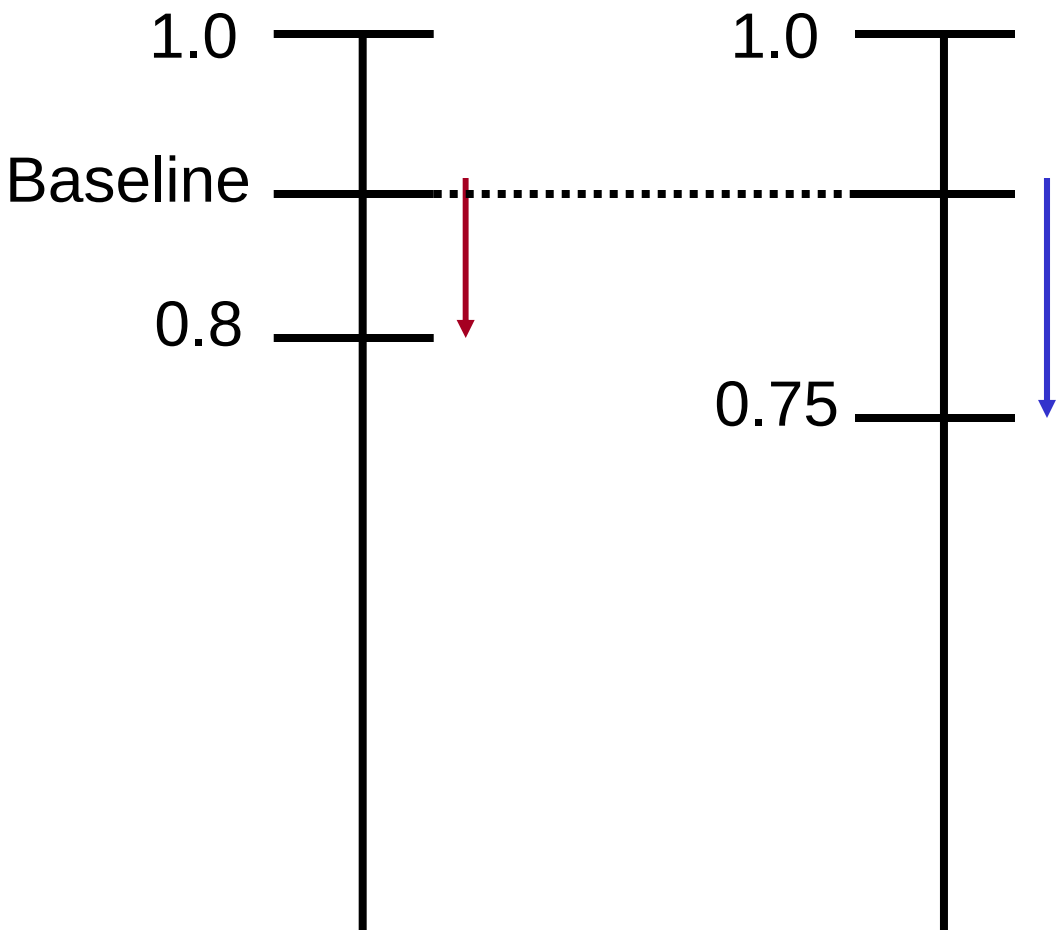
Minimum Model

Condition A: -0.1 **Condition B: -0.15**



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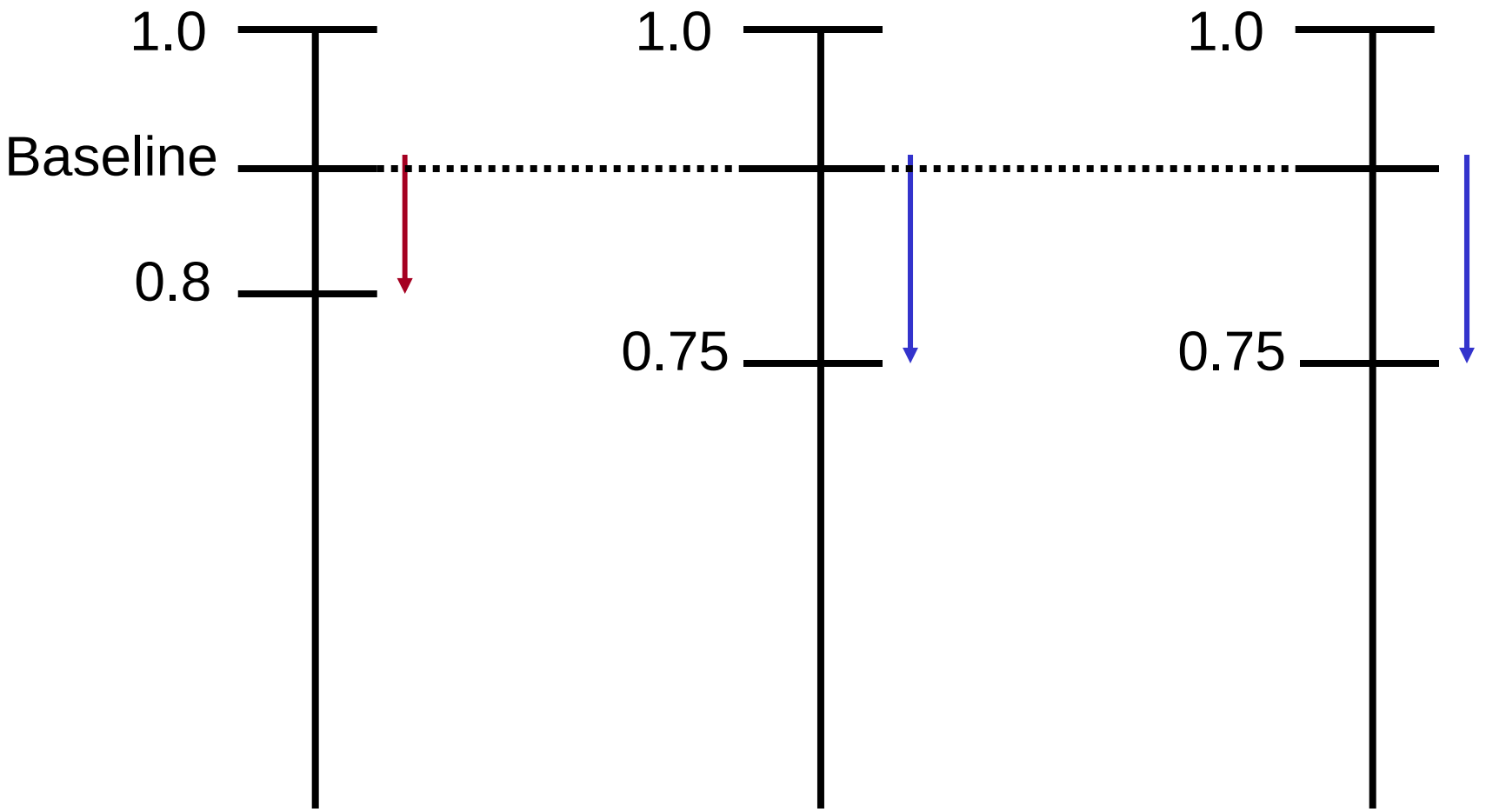
Minimum Model

Condition A: -0.1 **Condition B: -0.15** **A & B: -0.15**



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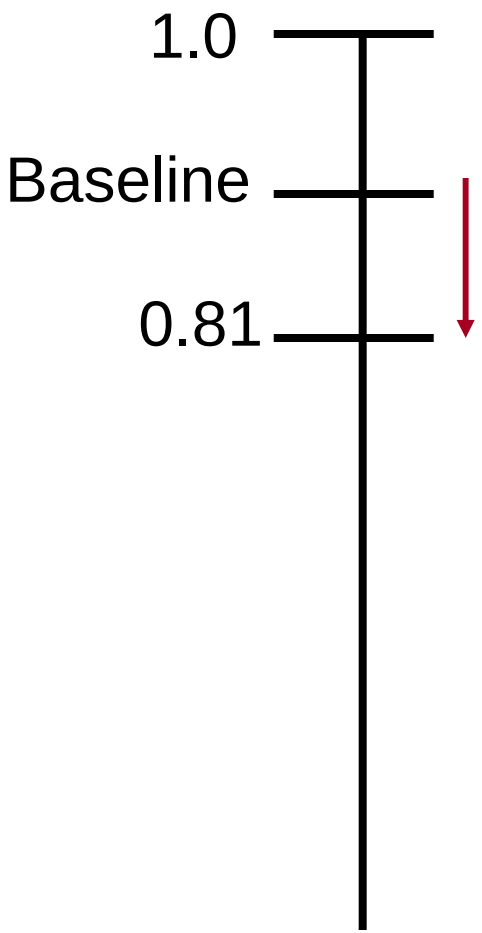
Multiplicative Model

Condition A: -0.1



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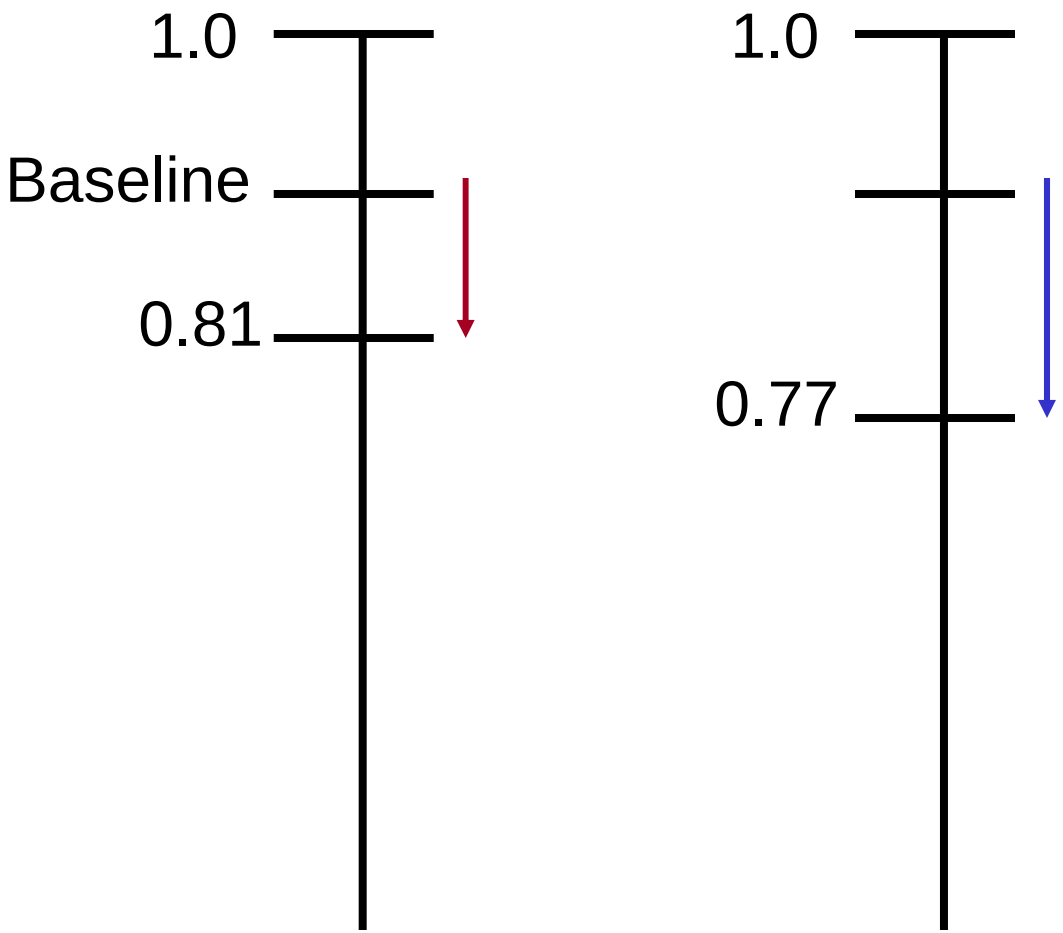
Multiplicative Model

Condition A: -0.1 **Condition B: -0.15**



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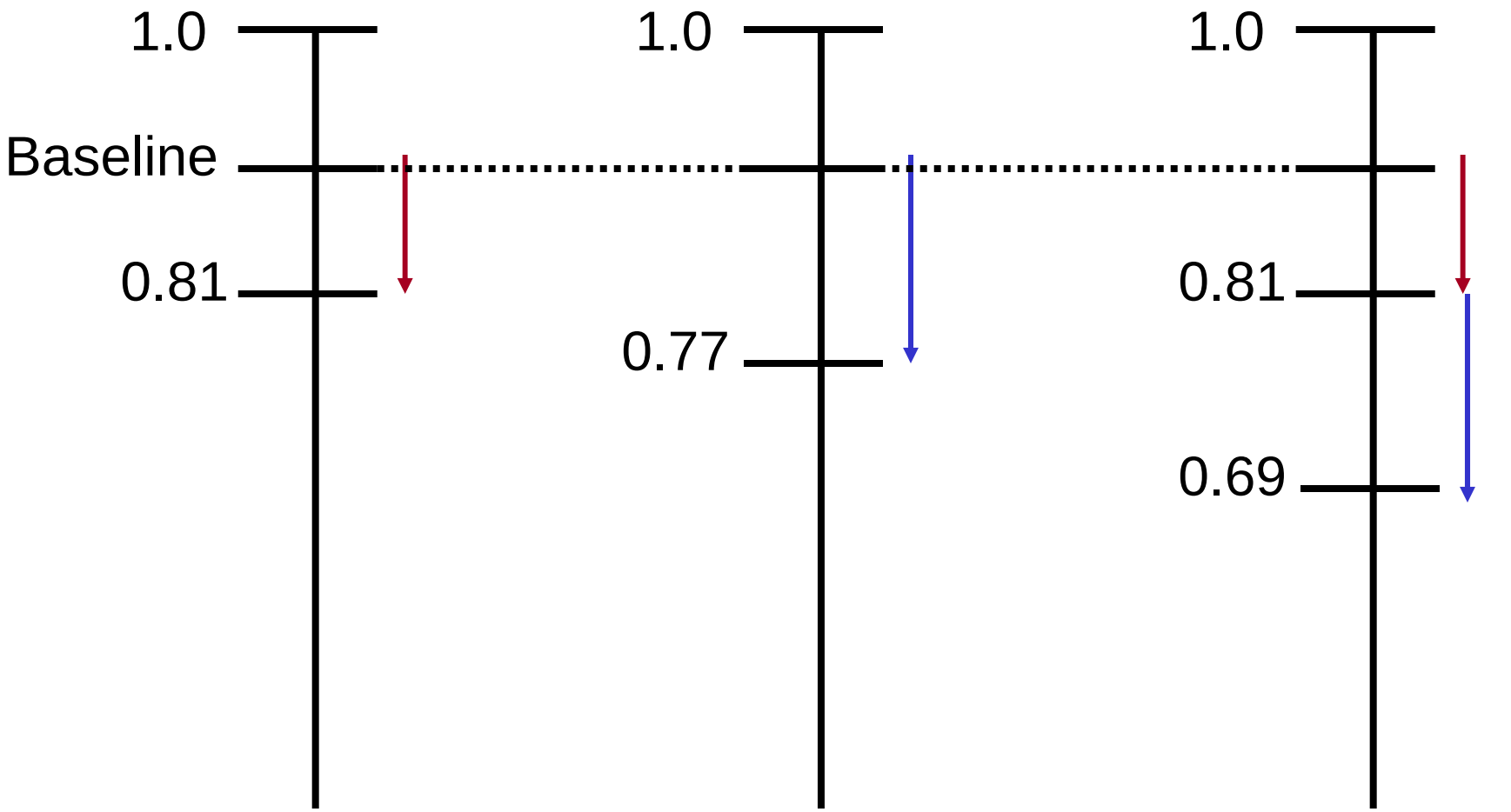
Multiplicative Model

Condition A: -0.1 **Condition B: -0.15** **A & B: -0.21**



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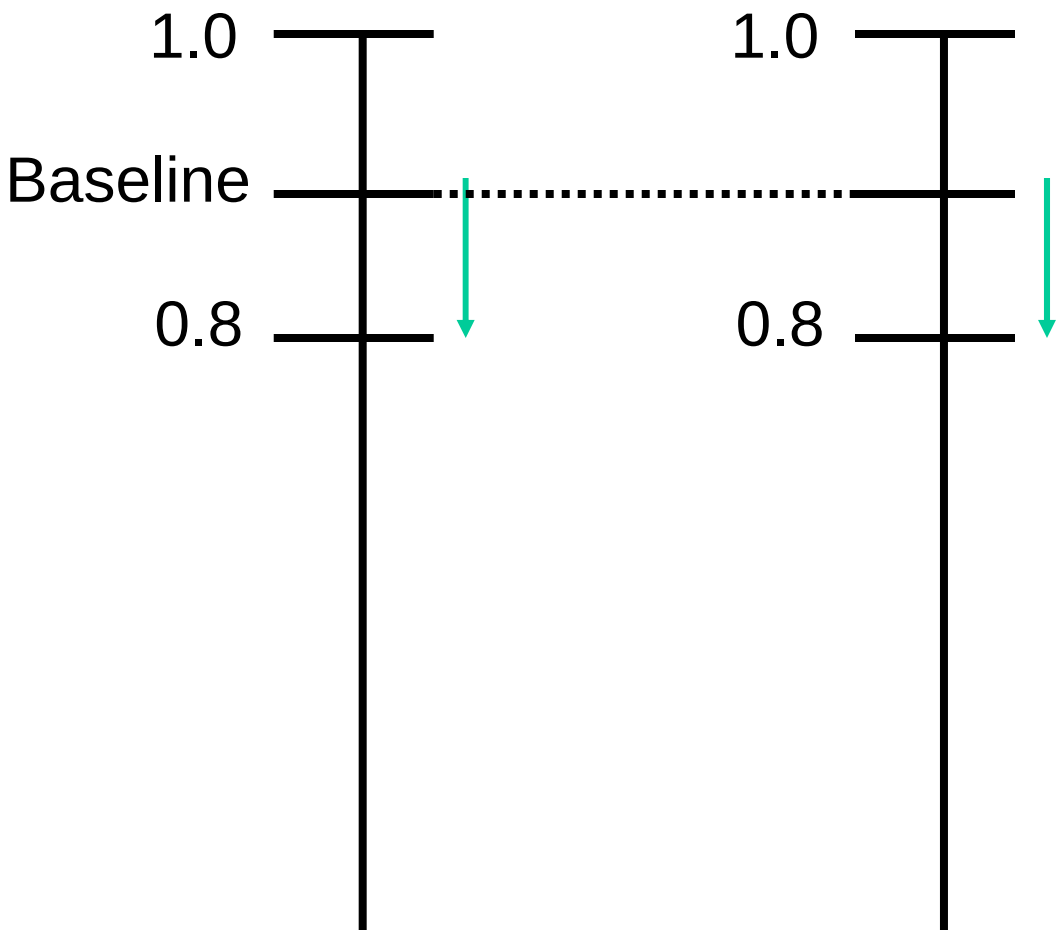
Count Model

Condition A: -0.1 **Condition B: -0.1**



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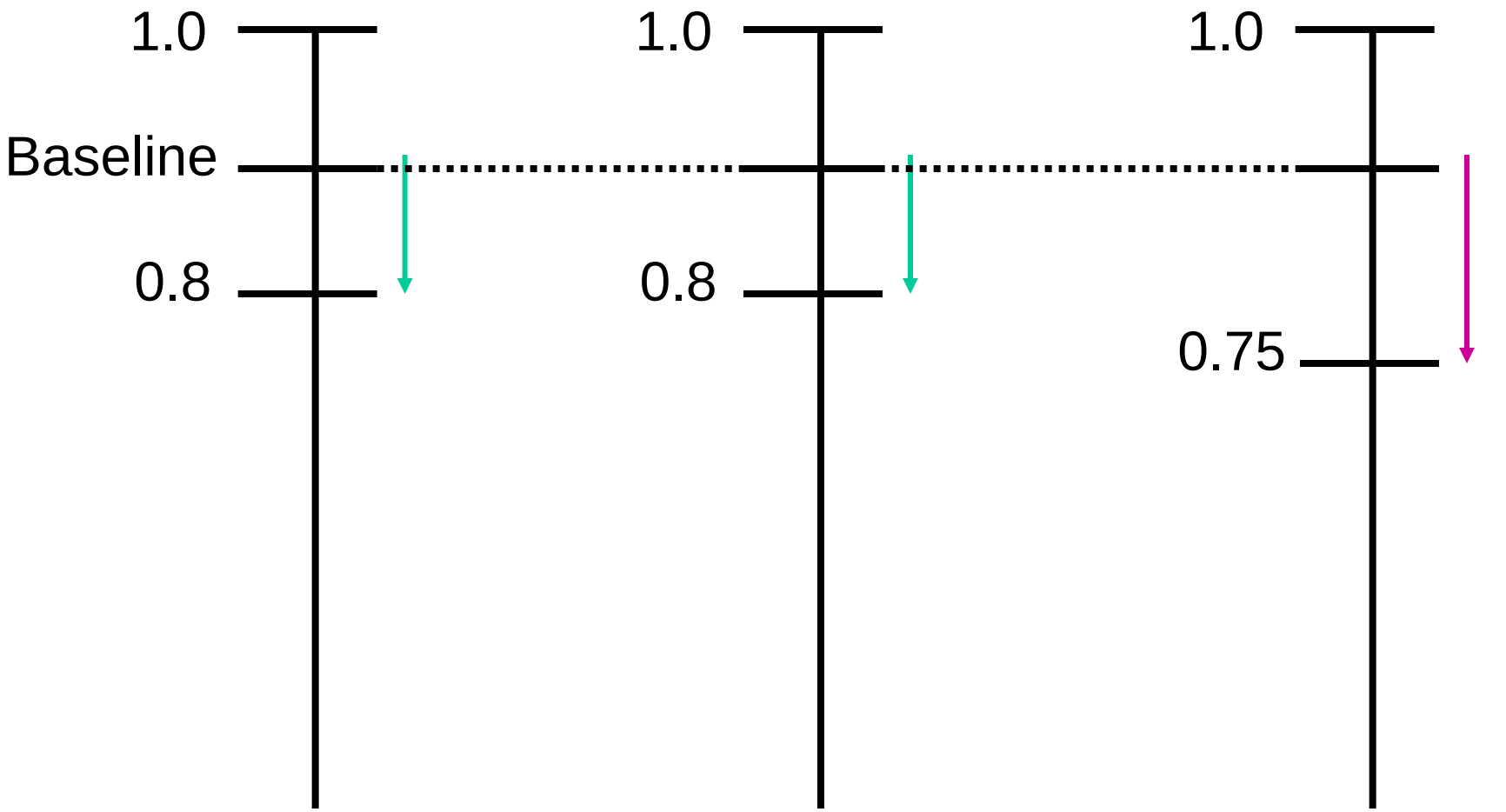
Count Model

Condition A: -0.1 **Condition B: -0.1** **A & B: -0.15**



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Deviance Information Criteria

- Measure of overall model fit
- The multiplicative model has substantially improved model fit compared to all other models
  - In both age groups
  - In models both adjusted and unadjusted for age, sex, education, and income
- Adjusted models have better fit than unadjusted models

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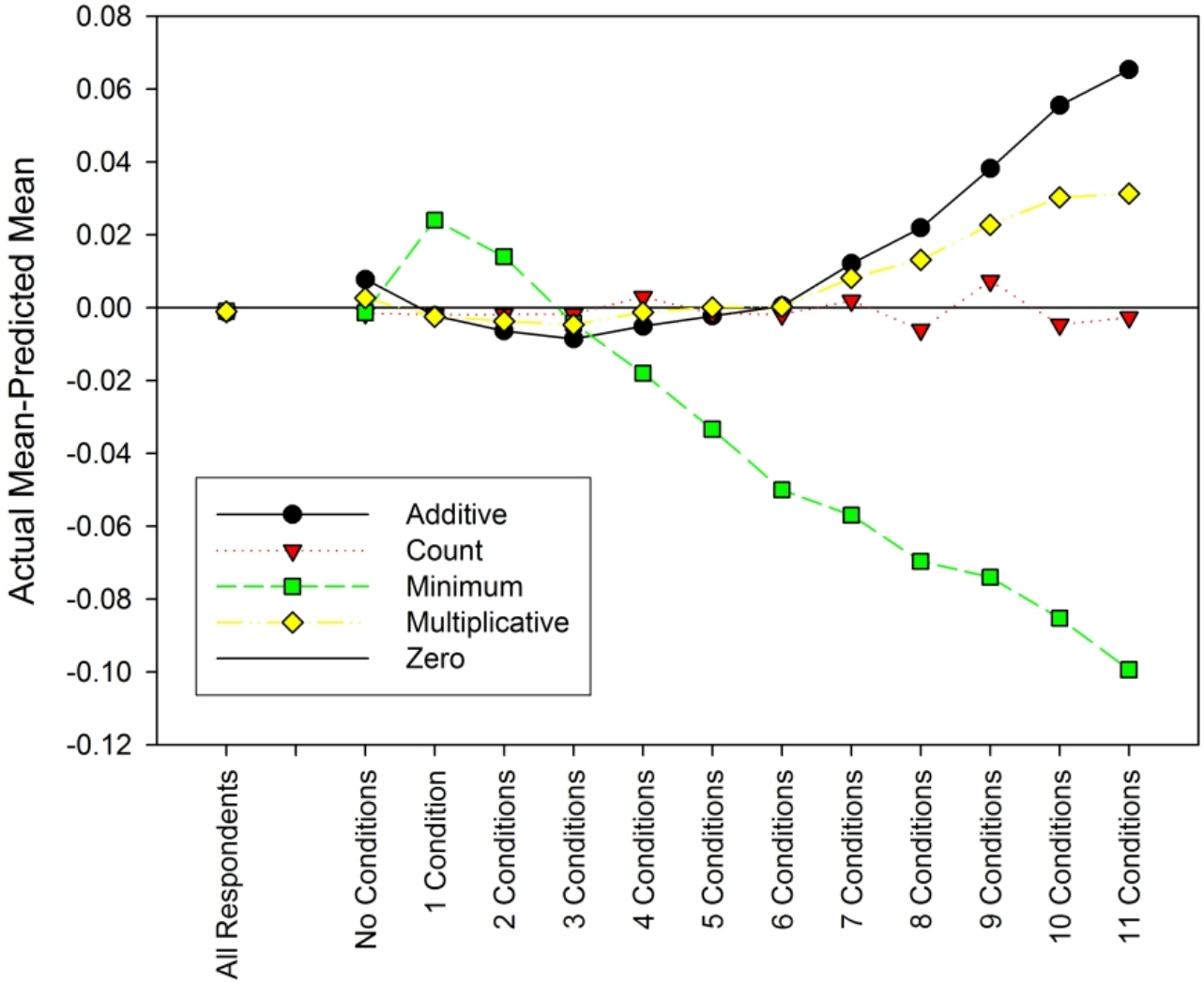
Predictive Error by Number of Conditions



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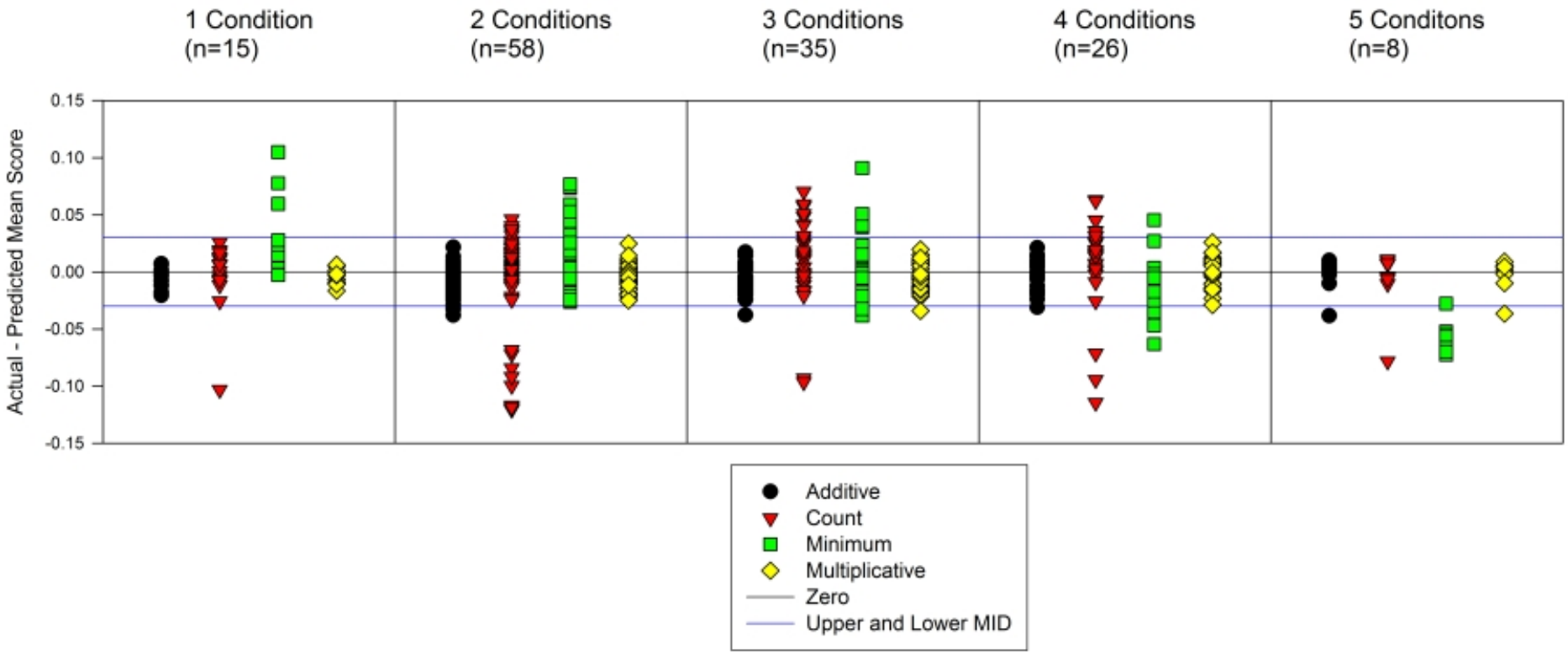
Predictive Error for Named Conditions



Each point represents a group of individuals (n>50) with a particular combination of health conditions (i.e., stroke and a respiratory condition)

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Results from the Multiplicative Model

Health Condition	Rank	Impact on SF-6D Score (SD)
Depression	1	-0.167 (0.002)
Respiratory Condition	2	-0.058 (0.001)
Arthritis of the Hip/Knee	3	-0.057 (0.001)
. . .		
Diabetes	13	-0.027 (0.001)
Coronary Artery Disease	14	-0.025 (0.001)
Myocardial Infarction	15	-0.009 (0.002)

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Generalizability

- Similar analyses using two other datasets
- Medical Expenditure Panel Survey (MEPS)
  - 2000-2002
  - EQ-5D (with US Scoring), n= 50,565
  - SF-6D from the SF-12 version 1, n= 49,474
  - 15 of 128 chronic health conditions
- Canadian Community Health Survey 1.1 (CCHS)
  - 2000-2001
  - Health Utilities Index Mark 3 (HUI3), n= 116,908
  - 15 of 25 chronic health conditions

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Results

Dataset	HRQoL Measure	Fit Criterion	
		DIC	Predictive Validity
Medicare	**SF-6D**	Multiplicative	Multiplicative
MEPS	**SF-6D**	Ambiguous	Multiplicative?
	EQ-5D	Ambiguous	Multiplicative?
CCHS	**HUI3**	Additive	Additive

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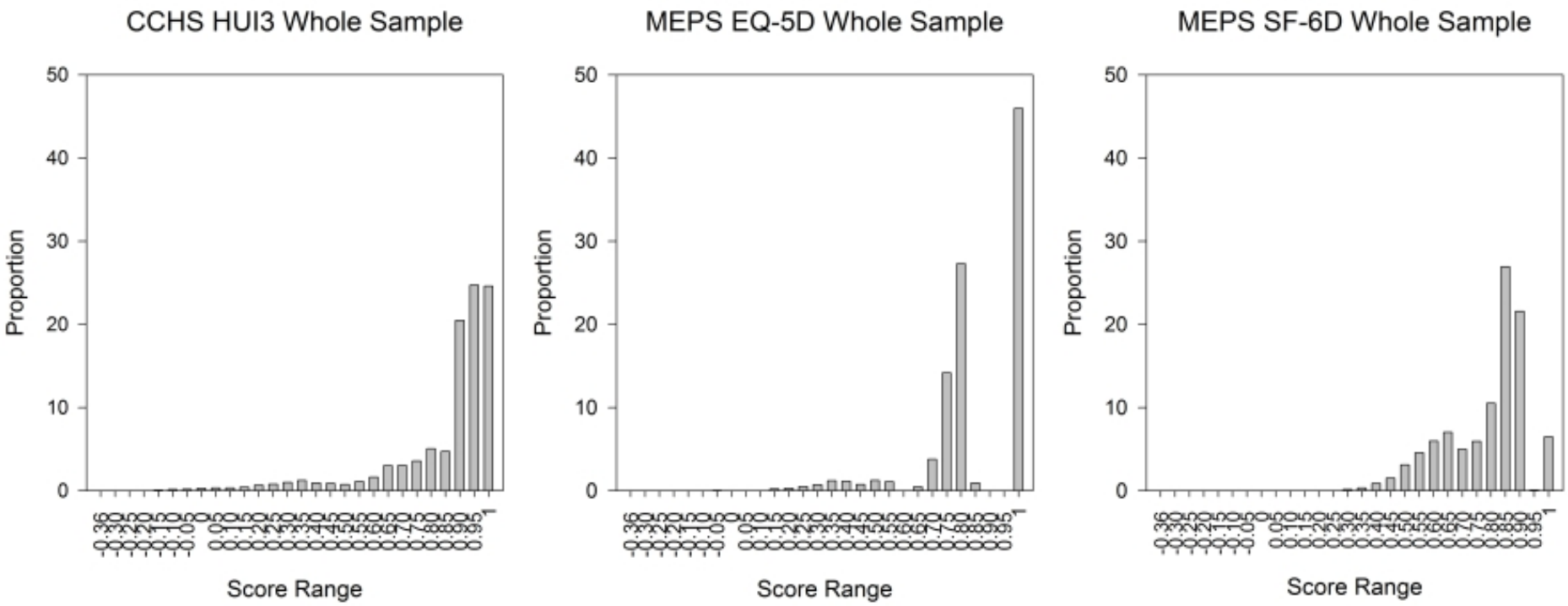
General Population Surveys

- Analyses are complicated by high health utility scores, low condition prevalence, and weights



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Strengths and Limitations

- Strengths
  - Large datasets with diverse populations
  - Prevalent health conditions which impact HRQoL

- Limitations
  - Did not test entire space of possible combination rules
  - Have not fully tested models in CCHS and MEPS
  - Generalizability may be limited by HRQoL measure or dataset

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Conclusions

- When modeling the SF-6D health utility score in the Medicare Health Outcomes Survey, a multiplicative model had substantially improved fit compared to the other tested models
- All combination rules are imperfect

- Future work may find generalizable rules for a HRQoL score
  - Overall measures of model fit may not be appropriate for datasets with very healthy respondents

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Thank you!

We look forward to your comments and questions

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