

Centre for Health Economics  
Seminar Series  
21 September 2005

**The Assessment of Quality of Life  
(AQoL) Instrument and its extension  
to include the severity of an initial  
health state**

Professor Jeff Richardson

Dr Stuart Peacock

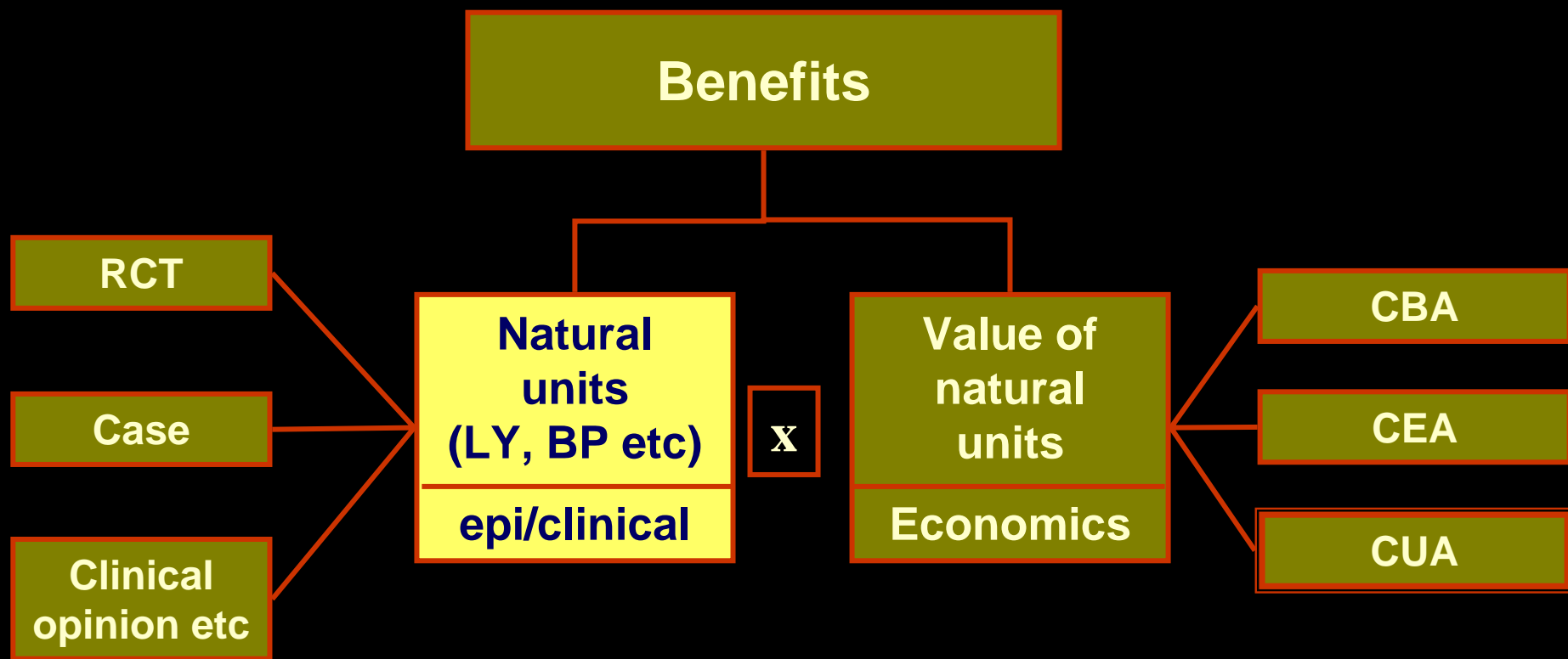
Dr John McKie

Centre for Health Economics

Monash University

# Contents

- Background
  - Measuring Benefits
- CHE Program
- Severity
- AQoL
- AQoL + Severity



# Units of outcome

CBA	--	Dollars
↓		
CEA	--	Natural units (life years)
↓		
CUA	--	Quality Adjusted Life Years (QALYs)

# Values embodied in CUA

‘Social Value’ ← consequences  
 ← change in health state  
 ← utility – strength of preference

Hence

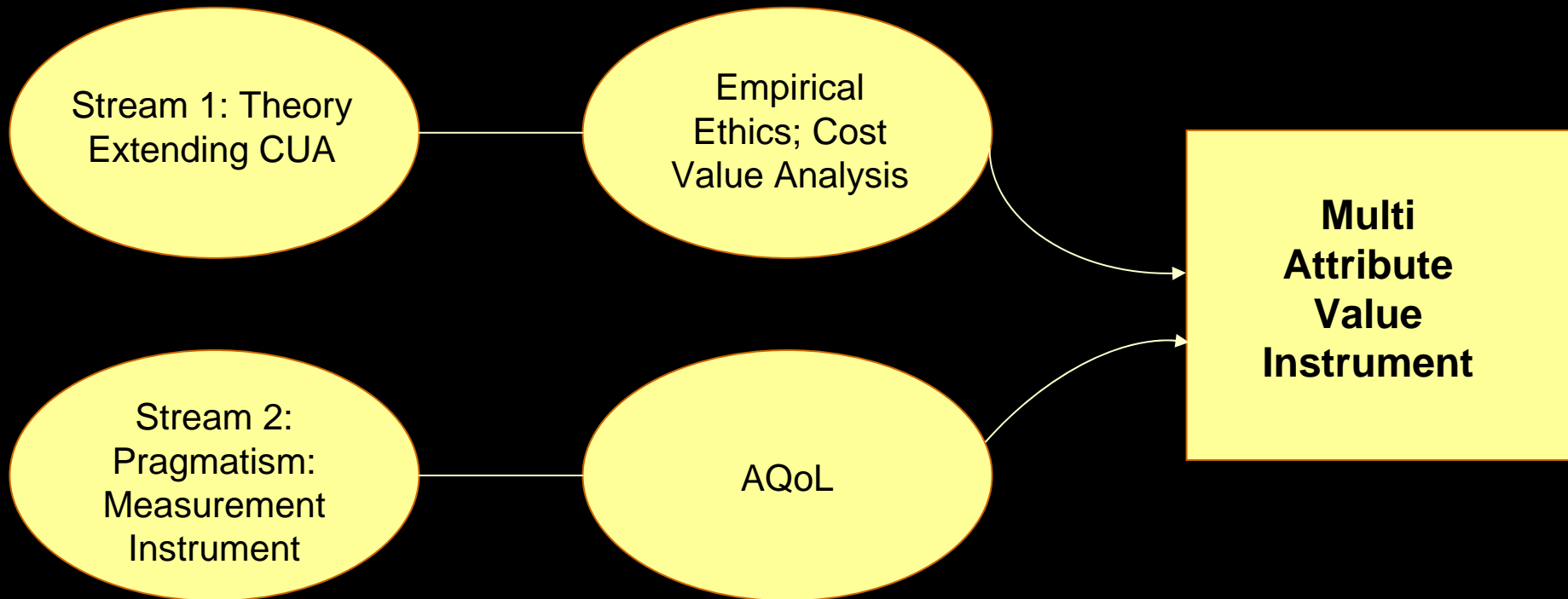
Social value ← ‘deserts’ (value ethics)  
 ← personal characteristics  
 ← ‘fair innings’  
 ← ‘fair share’  
 ← procedural justice

← severity

# Units of outcome

CBA	--	Dollars
↓		
CEA	--	Natural units (life years)
↓		
CUA	--	Quality Adjusted Life Years (QALYs)
↓		
CVA	--	Cost Value Analysis

# CHE Program



# “Empirical Ethics”

## Definition:

- Empirically determining population values
- Subjecting results to ethical criticism and if necessary, re-estimating social values using censored options

# Empirical Ethics Project - Overview

Issue	Quality of Present Evidence	Method	Status	Level of Relevance
<b>1. Health-Related</b>				
(a) Severity	* * *	Interview	1 <sup>st</sup> results	AQoL <sup>4</sup>
(b) Prognosis	?	Postal	Method <sup>2</sup>	AQoL
(c) Adaptation	?	Focus Group	Finished	CBA
<b>2. Personal Characteristics</b>				
(a) Age	* * *	Interview	1 <sup>st</sup> results	AQoL
(b) Health Potential	* *	Postal	Incomplete	CBA
<b>3. Time-Related</b>				
(a) Rate of Time Preference	* * * * *	Postal	NA	CBA
(b) <i>Ex Ante/Ex Post</i> Distinction	?	Postal	Finished	CBA
<b>4. Cost</b>				
(a) Direct Costs	* * * * *	Focus Group	Finished	CBA
(b) Indirect Benefits	* *	Postal	Finished	CBA
<b>5. Ethical Rules</b>				
(a) Rule of Rescue	*	Postal	Finished	CBA
(b) Choice vs Outcome	* *	Focus Group	Incomplete	System <sup>5</sup>
(c) Willingness to Pay	* *	Postal	1 <sup>st</sup> results	System

1. Precise quantitative output; 2. Relevant to economic methodology; 3. Design of system; 4. To be used with AQoL;  
5. Health delivery or financing system

# Empirical Ethics Project

## Adaptation to Illness and Injury (Focus Group)

### *The Question*

“Whose judgements of QoL should be used to determine which treatments should be publicly funded, patients or the public?”

### *Main Outcomes*

- Strong support for a compromise solution: adapted patient’s assessments should be used to determine QoL, but the public should have a say in how much significance is attached to adaptation
- Demonstrated willingness and ability on the part of participants to tackle a conceptually and ethically difficult subject

*Status:* Finished

# Empirical Ethics Project

## The *Ex Ante/Ex Post* Distinction (Postal Survey)

### *The Problem*

“Should the *ex ante* or the *ex post* perspective be used in economic evaluation studies?”

### *Method*

Social willingness to pay for the inclusion/exclusion of pre-outcome emotions: reassurance, regret and uncertainty.

### *Main Outcomes*

- The Australian community does not believe that the purpose of its publicly-financed health system should be to increase utility as defined by private willingness to pay
- The gold standard for health-state measurement should elicit *ex post* evaluations from patients, not *ex ante* evaluations from the public
- It is not a defect of the standard gamble that it does not capture pre-outcome sources of utility, since the inclusion of pre-outcome emotions lacks community support

# Empirical Ethics Project

## Direct Costs (Focus Group)

### *The Question*

“Among patients who are equally ill, should those who can be helped at low cost have priority over those who can be helped at high cost, because this will allow more people to be helped when money is limited?”

### *Main Outcomes*

- Very little support for the giving lexical priority to low cost illnesses
- Community support for a fairness/cost trade-off
- A willingness on the part of participants to treat patients with high cost illnesses, even when the implication of this in terms of reduced health production are made starkly clear
- A desire to preserve the hope of treatment for patients with illnesses that are expensive to treat

*Status:* Data collected

# Empirical Ethics Project

## Indirect Benefits (Postal Survey)

### *The Question*

“Should those who pay higher taxes or care for others have priority access to health services if this allows them to return to work or resume their caring role?”

### *Main Outcomes*

- Some support for giving priority to those who care for young children or elderly relatives
- Little support for giving priority to those who pay higher taxes (specifically in the case of access to life-saving organ transplants and to very costly drugs)
- Strong support for allocating resources according to need, rather than social worth, in a public health system
- Some indirect benefits – i.e. sources of utility - are socially irrelevant when determining priorities in a public system

*Status:* Complete

# Empirical Ethics Project

## Personal Willingness to Pay (Postal Survey)

### *The Question*

“Should priorities in the government health scheme be determined by how much people would be willing to pay for them?”

### *Main Outcomes*

- Little support for WTP as the appropriate method for setting priorities in a public health scheme
- By implication, the criterion for prioritising health care is not the satisfaction of preferences (welfarism)
- Strong support for the criterion of health maximisation (extra-welfarism)

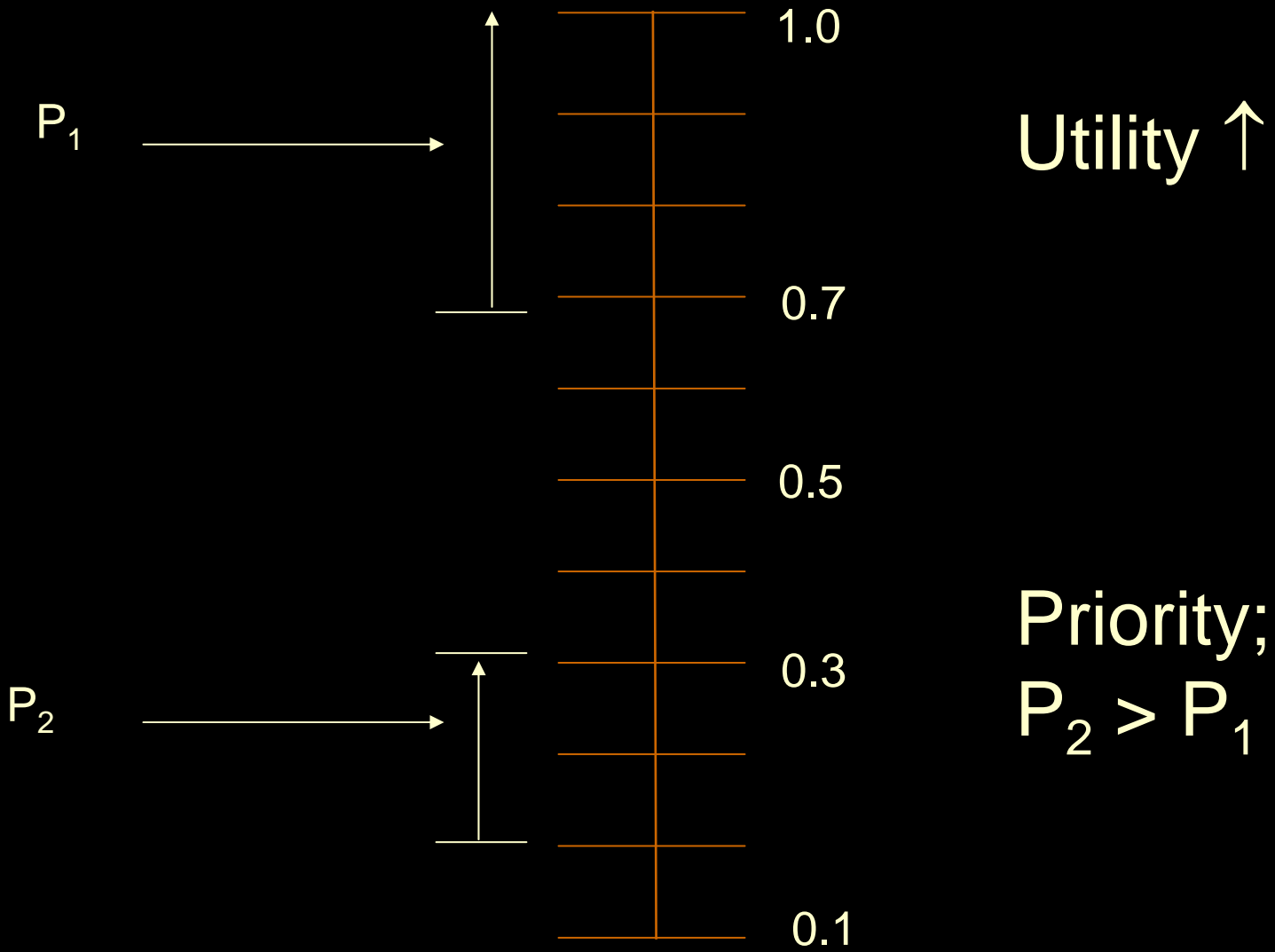
*Status:* Finished

# Empirical Ethics Project

## Emerging Themes

- While people may prefer complete discretion over their own care, they subscribe to paternalism for others, and are willing to cross-subsidise only specific types of commodities and sources of satisfaction
- Those members of the Australian community consulted believe that the purpose of the public health system is to improve the health of the community, subject to distributional constraints (extra-welfarism) not to maximise utility (welfarism)

# Social value and severity



# Evidence of Severity

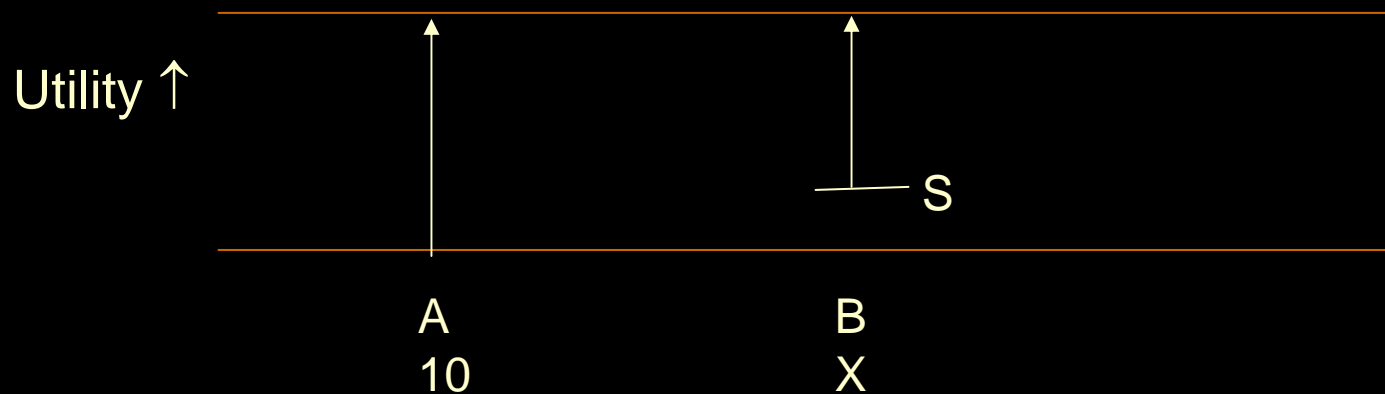
Study	Country	Number of Subjects	Type of Subjects	Elicitation Method
(Nord 1991)	Norway	1,141	Doctors/Bio <sup>a</sup> /GenPop <sup>b</sup>	PTO <sup>d</sup>
(Nord 1993b)	Norway	150	Politicians	DCM <sup>e</sup>
(Nord, Richardson et al. 1993)	Norway/Australia	486	GenPop/Students/Nurses	PTO
(Nord 1993a)	Norway	10	NIPH <sup>c</sup>	PTO
(Abelson, Lomas et al. 1995)	Canada	280	GenPop/Health Officials	DelPol <sup>f</sup>
(Ubel, Loewenstein et al. 1996)	USA	42	Economics Students	PTO
Richardson 1997	Australia	78	Economics Students	RS
(Prades 1997)	Spain	30	Economics Students	PTO
(Ubel, Spranca et al. 1998)	USA	289	Prospective Jurors	DCM
(Ubel 1999b)	USA	479	Prospective Jurors	DCM

Source: McKie & Richardson (forthcoming)

# Nord & Richardson (1993)

Unit A ... save life of 10

Unit B ... cure chronic illness



PTO: How many (x) cured in B equivalent to 10 in A

Results: Norway 110 implies  $U_s = 0.91$

Australia 85 implies  $U_s = 0.88$

Utility Gain significantly greater than 0.09, 0.12

# Richardson 1997

## Need vs Improvement (Cont'd)

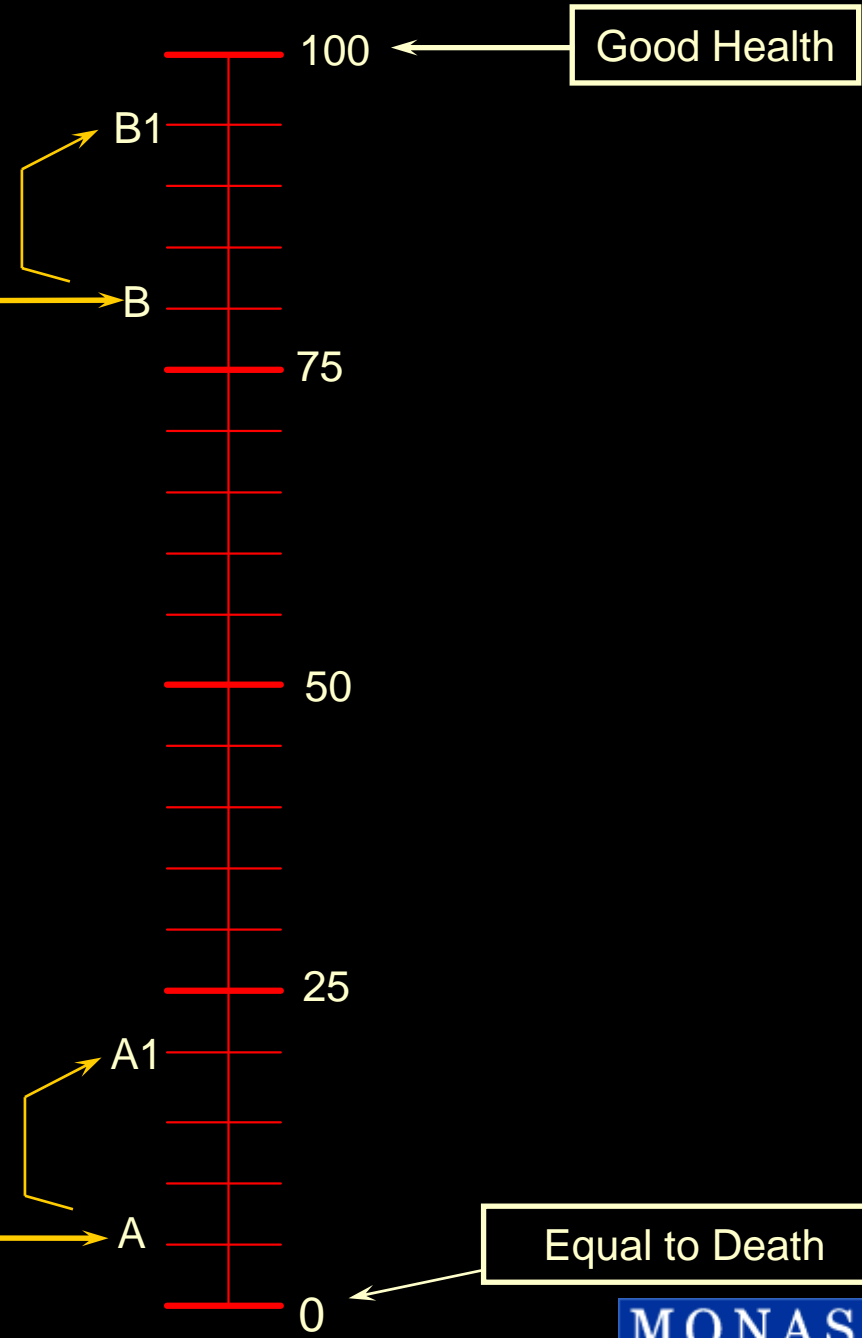
### Pilot Study - $n = 78$ (Richardson, 1997)

	Benefits (Patient Perspective)	
	Project A	Project B
• Cost	Same as B no differences	Same as A no differences
• Program improves	QoL	QoL
• People are willing to personally pay	\$30,000	\$30,000
• It is rated as equally valuable as gaining	1 year of life	1 year of life

# Quality of Life Scale

Illness B before treatment	I have moderate pain or discomfort
----------------------------------	---

Illness A before treatment	I am confined to bed, I have extreme discomfort
----------------------------------	---



# Results

Prefer:	Project 1 (severe illness)	57%
	Project 2	16%
	Equal priority	28%

Number needed in  $P_2$  to equalise value of 100  
in  $P_1$ ,

mean	318
median	200

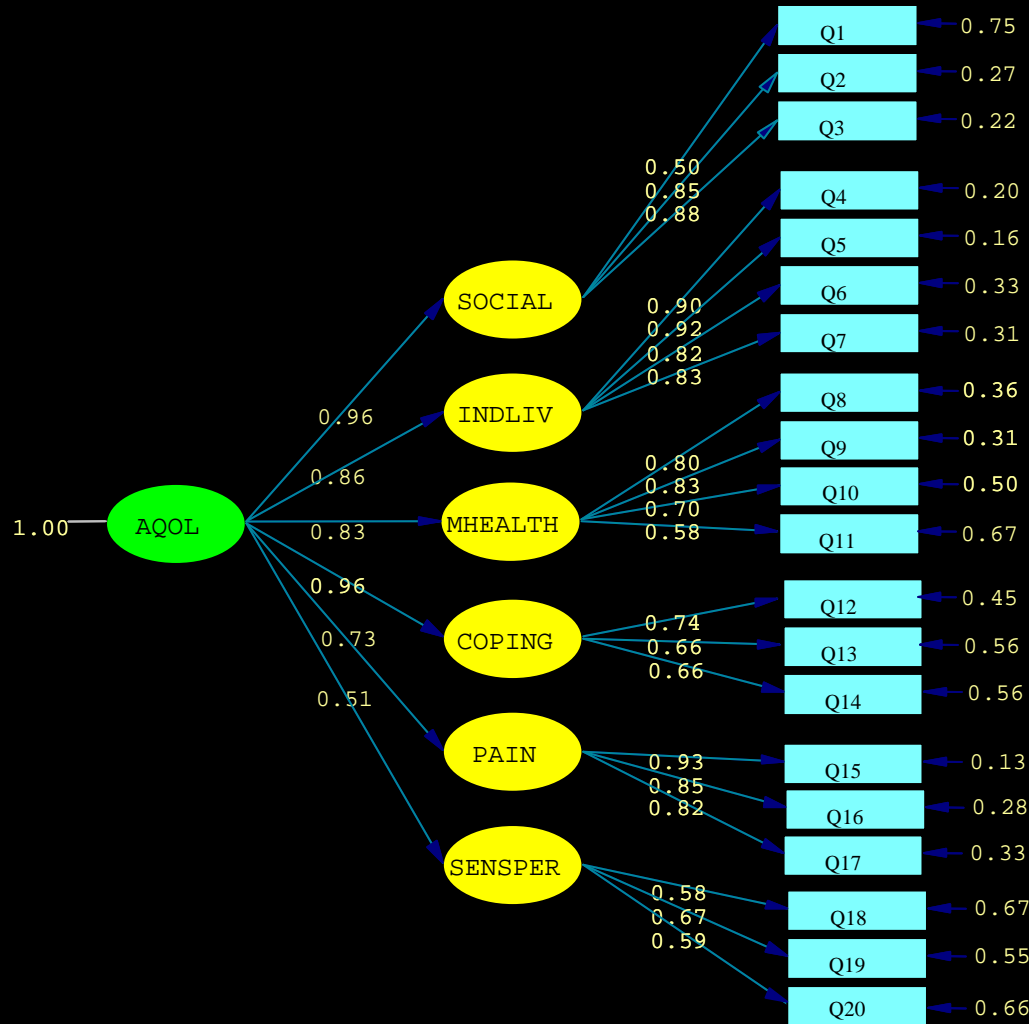
# Ethical justification

- Rawls 1971:
  - Benefits for the most disadvantaged
- Utilitarianism
  - Wolf: reducing misery > increasing wellbeing
  - Kymlicka: people with natural handicap have a claim for compensation

# Severity and Policy

- US organ transplantation criteria
- 150 Norwegian politicians
  - Severity vs health gain
  - Results
    - Severity 38%
    - Equal weight 45%
    - Health gain 11%

# Assessment of Quality of Life Instrument



Chi Square = 460.73, df = 164, P – value = 0.00000, RMSEA = 0.054, CFI = 0.99

# AQoL continued

- Stage 1      Multiplicative Model

$$DU = \frac{1}{k} \left[ \prod_{i=1}^n [1 + kw_i DU_i(x_{ij})] - 1 \right]$$

- Stage 2      Econometric adjustment for redundancy, interactive dimensions

$$TTO(MA \text{ states}) = AQoL^{\alpha + \beta_i Dimensions_i + \delta_{ij} \Pi Dim_{ij}}$$

# AQoL continued

- Stage 1      Multiplicative Model

$$DU = \frac{1}{k} \left[ \prod_{i=1}^n [1 + kw_i DU_i(x_{ij})] - 1 \right]$$

- Stage 2      Econometric adjustment for redundancy, interactive dimensions

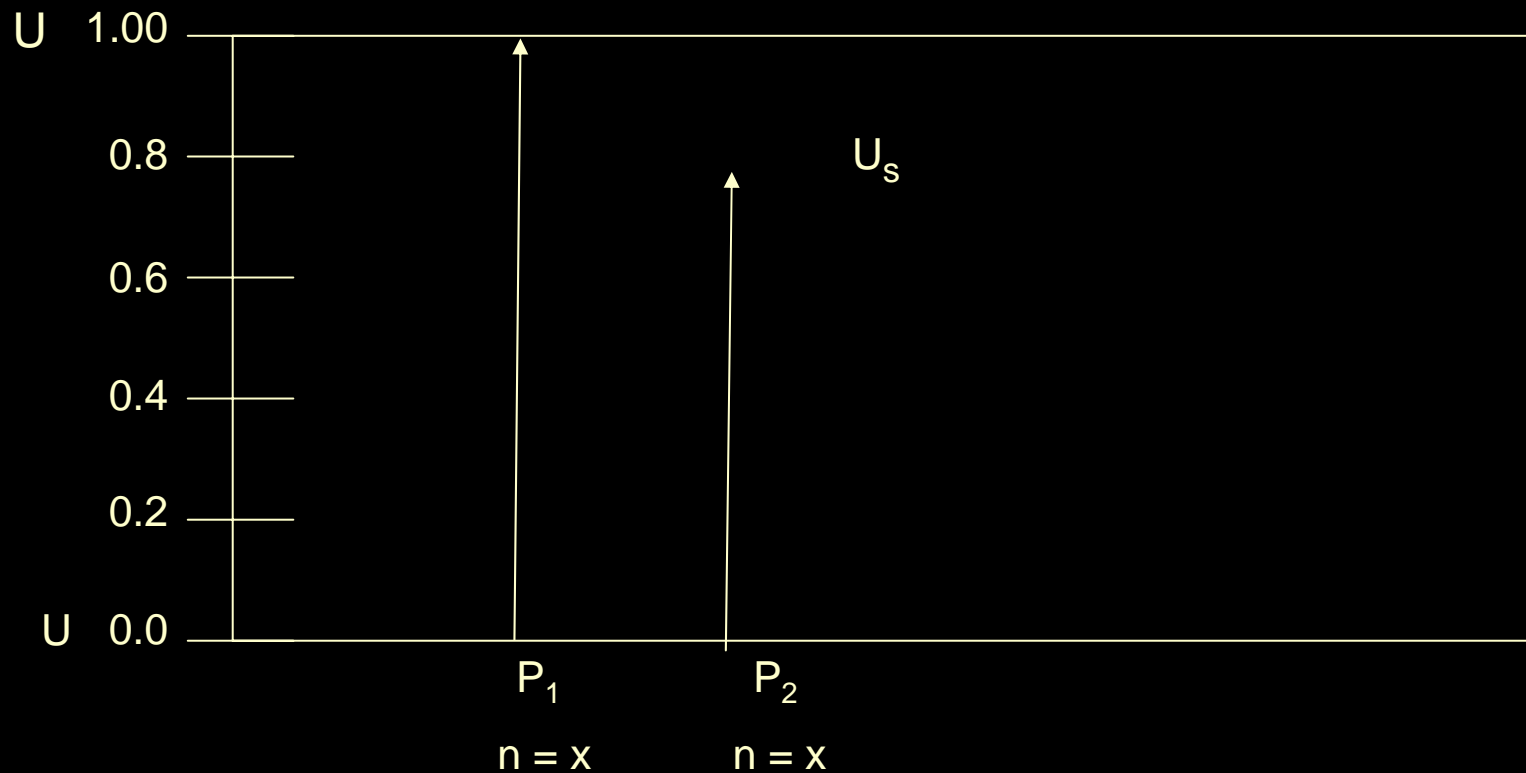
$$TTO(MA \text{ states}) = AQoL^{\alpha + \beta_i Dimensions_i + \delta_{ij} \Pi Dim_{ij}}$$

- Extension to AQoL
  - VisQoL      new dimension, modified item levels
  - PsyQoL      as above
  - Obesity      adaptation

# Value Equations: Perspective

- Social vs Individual Perspective
  - AQoL ← individual TTO  
= stationary state
  - Value ← citizens perspective  
(aims to inform an NHS)  
← Value of a changed health state  
(quality/quantity)
- Social Value of Change  
 $f(U_1 - U_0, \text{severity}_0, \text{age, other})$
- Value : PTO or Social WTP

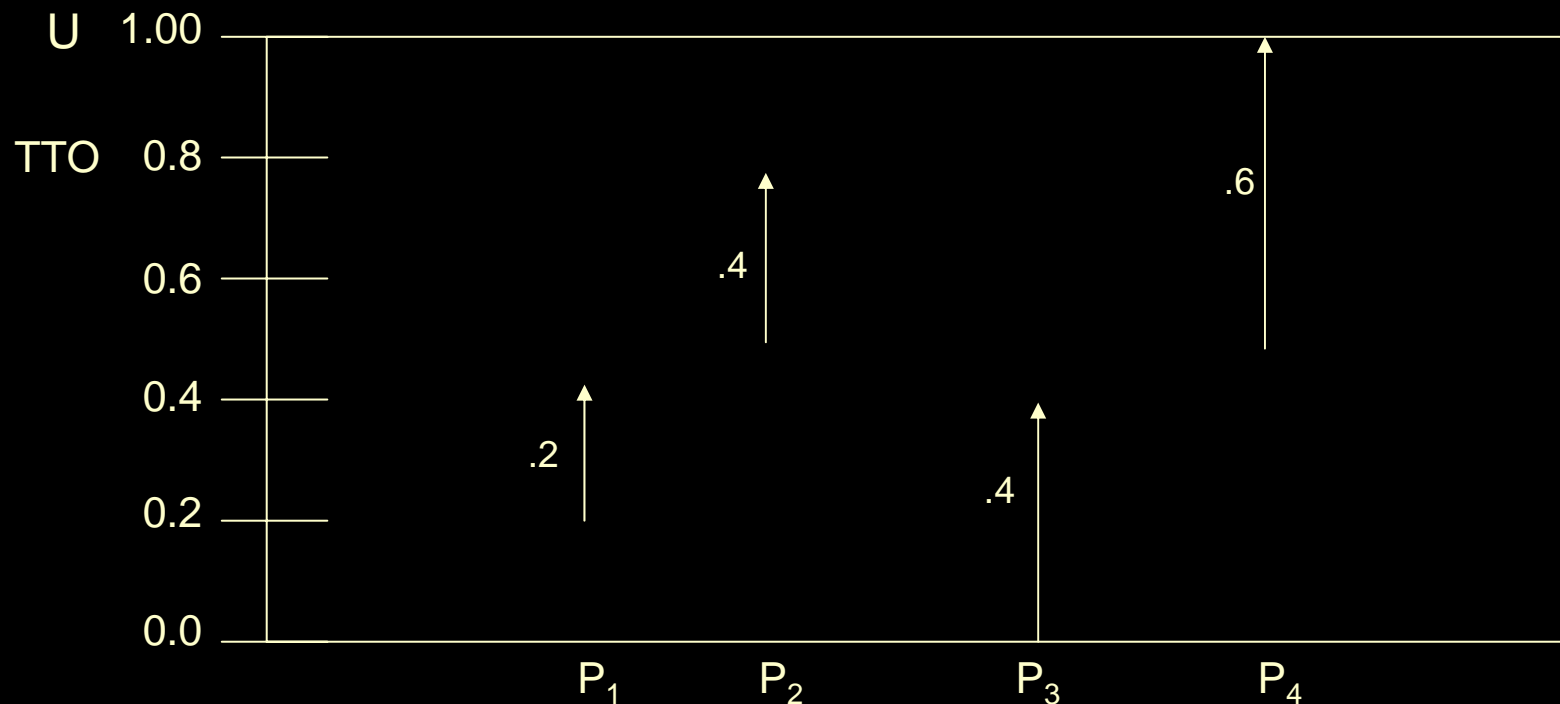
# Adjustment 1: Severity Weights; Value of Changed Health State



$$X (1.00) = 100 (U_s)$$

$$U_s = \frac{x}{100}$$

# Methodology: compare social value (PTO) with change in utility (TTO)

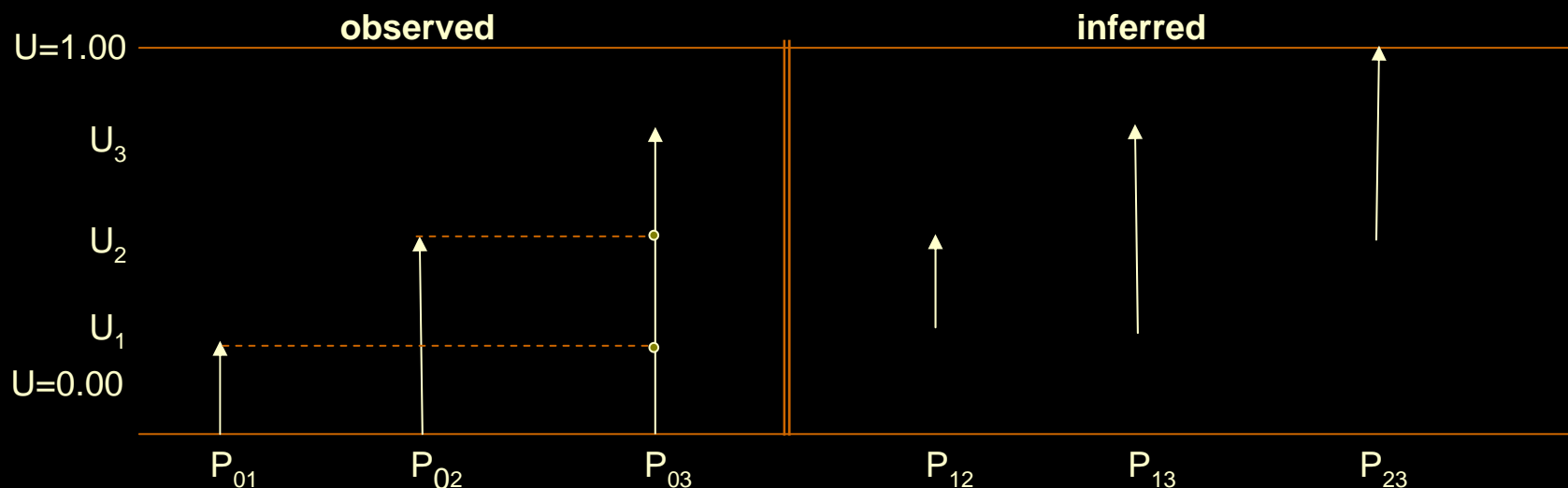


Examples

$$P_1 (0.2 \rightarrow 0.4) > P_2 (0.5 - 0.8)$$

$$P_3 (0.0 \rightarrow 0.4) > P_4 (0.4 - 1.0)$$

# Use of PTO Data Set 1



**Problem:** No variation in severity (death)

**Solution**  $P_{1,2} = P_{02} - P_{01}$

$$P_{13} = P_{03} - P_{01}$$

$$P_{23} = P_{02} - P_{01}$$

**Data** Outliers trimmed

$n = 237$

$U_s = 36$  PTOs

# Value Equations

## Basic Severity Equation

$$\text{Value} = (\text{AQoL}_1 - \text{AQoL}_0)^\alpha (\text{DU}(\text{AQoL}_0))^\beta$$

# Value Equations

## Basic Severity Equation

$$\text{Value} = (\text{AQoL}_1 - \text{AQoL}_0)^\alpha (\text{DU}(\text{AQoL}_0))^\beta$$

**Adjustment** Dimensions may be valued differently by individual (for self) and by the citizen (for others)  
 eg mobility in others ... valued more  
 social interaction ... valued less

## Full Severity Equation

$$\text{Value} (\text{AQoL}_1 - \text{AQoL}_0)^A (\text{DU}(\text{AQoL}))^B$$

$$A = \alpha + a_1 \text{Dim}_1 + \dots + a_6 \text{Dim}_6$$

$$B = \beta + b_1 \text{Dim}_1 + \dots + b_6 \text{Dim}_6$$

$$\text{Model: PTO} = (U_1 - U_2)^\alpha \cdot U_2^\beta$$

No	Eq Type	Statistic	$\alpha$	$\beta$	$t_\alpha$ $t_\beta$ ( $Z_\alpha$ $Z_\beta$ )	n	$R^2$
1	OLS	individual	0.87	<b>0.334</b>		237	0.83
2	RE	individual	0.76	<b>0.20</b>		237	
3	OLS	individual <sup>(2)</sup>	0.71	0.23	10.97, 2.64	237	0.82
4	RE*	individual	0.47	0.46	585, 4.06	237	
5	OLS	median	0.73	1.23	2.82, 2.53	36	0.94

Key (1) Random effects model  
(2) Censored data

# Social value by utility gain and severity

$$\text{Social value: PTO} = (U_1 - U_0)^{0.47} (\text{DU})^{0.46}$$

		Health Gain				
(U <sub>1</sub> -U <sub>0</sub> ) DU Severity						
		.2	.4	.6	.8	1.0
.2		0.22				
.4		0.31	0.42			
.6		0.37	0.51	0.62		
.8		0.42	0.59	0.73	0.82	
1.0		0.47	0.65	0.79	0.9	1.0

# Ratio change in social value to utility gain

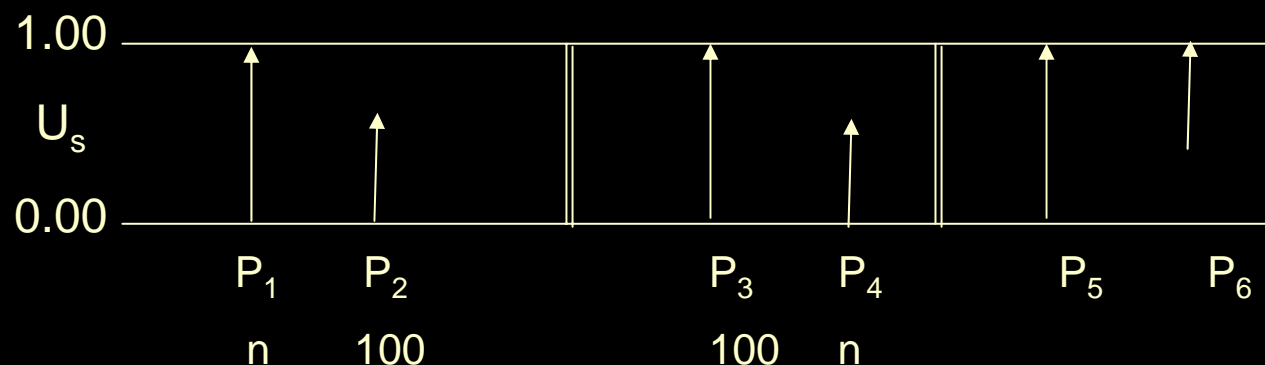
Value ( $D_{ij}$ ) / Utility Gain ( $U_1 - U_0$ )

$(U_1 - U_0)$ \ DU Severity	.2	.4	.6	.8	1.0
.2	1.1				
.4	1.6	1.1			
.6	1.9	1.3	1.0		
.8	2.1	1.5	1.2	1.0	
1.0	2.4	1.6	1.3	1.0	1.0

# Problem: PTO vs TTO

MAU	PTO	TTO	MAU	PTO	TTO
1	0.67	0.82	10	0.56	0.54
2	0.83	0.88	11	0.91	0.83
3	0.71	0.86	12	0.83	0.70
4	0.65	0.66	13	0.67	0.76
5	0.71	0.72	14	0.57	0.61
6	0.57	0.50	15	0.83	0.81
7	0.67	0.79	16	0.50	0.47
8	0.67	0.74	17	0.56	0.57
9	0.80	0.82	18	0.50	0.60

# Types of PTO [Version 3]



If  $n$  exaggerated (cognitive dissonance)

PTO 1 :  $n(1.0) = 100 \cdot U_s \rightarrow U_s = n/100$  Upper end compression

PTO 2 :  $100(1.0) = n U_s \rightarrow U_s = 100/n$  Lower end extension

PTO 3:  $100(1) = n(1 - U_s) \rightarrow U_s = 1 - 100/n$

PTO 4 - 6 = above with direction reversed (ie prevention)

# Next Stage of Measurement

## Sort out:

PTO 1; PTO<sub>2</sub>; PTO<sub>3</sub>

Social WTP

Include age in scenario

Include prognosis

## Extension:

- Age, SES Patient in value equation
- Age, SES of respondent in value equation

## Rules of Thumb Concerning Severity (after Nord 1999)

Health state	Description	Value range
Death		0.0
Severe	For instance, a person who has to sit in a wheelchair, has pain most of the time, and is unable to work	0.65-0.85
Considerable	For instance, a person who must use crutches to walk, has light pain intermittently, and is unable to work	0.90-0.94
Moderate	For instance, a person who has difficulty moving about outdoors and slight discomfort, but is able to do some work and has only minor difficulties at home	0.98-0.995
Full health		1.0

Source: McKie, Richardson (forthcoming)