

Inter-generational Discount Rates

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Time Preferences

- Time preferences: extent to which future outcomes are valued relative to immediate ones.
- Discount rate = percent increase in magnitude needed to offset a 1-year delay
- \$1000 now \approx \$1200 in one year implies a 20% annual discount rate.

Inter-generational discount rates

- Most psychological studies use delays within one lifetime (1 week to 10 years)
- Many real decisions affect future generations
 - global warming
 - pollution
 - over-use of antibiotics
 - government pension funds

What's different about inter-generational rates?

- Some economists (Cropper & Portney, 1990; Lipscomb, 1989) argue
 - discounting within own lifetime: personal preference
 - discounting between generations: real rate of interest
- Some have argued for zero discounting of health outcomes that occur to future generations
 - Parsonage & Neuburger (1992)
 - Page (1988)

Comparing inter- & intra-generational rates

	Period 1	Period 2
Generation 1	^{1Y} young	^{1O} old
Generation 2		^{2Y} young

1Y vs. 1O: time and age

1Y vs. 2Y: time and generation

1O vs. 2Y: age and generation

Past Research

- Cropper, Aydede, and Portney (1992; 1994)
 - survey of 3000 members of the general public
 - choose between 2 life-saving programs
 - delays of 5, 10, 25, 50, or 100 years
 - Median discount rates
 - 17% for a 5 year delay
 - 4% for a 100 year delay

Past Research

- Svenson and Karlsson (1989)
 - college students, community adults and nuclear power experts
 - rated seriousness of events (e.g., leakage of nuclear fuel) on 1 to 10 scale
 - delays of 100, 1000, 2000, 10,000, 100,000, 1 million or 2 million years
 - 30% of respondents did not discount
 - for remainder, ratings declined from 10 (100 years) to 4 (2 million years)

Studies of intra- and inter-generational discount rates differ

- Time-age vs. time-generation
- Type of outcome: saving lives, money, health improvement
- Making decision for self or for others
- Outcomes to individual vs. group

Experiment 1

- Purpose: Compare intra- and intergenerational discount rates
- **Two types of comparisons:**
- Type 1: time-generation
 - compare short vs. long delays (e.g., 10 years vs. 300 years)
 - longer delays cross generations
- Type 2: compare time-generation to time-age
 - inter- vs. intra-generational

“Age” Question

- | | | |
|---|---|---|
| 1 | Program A Saves 100
30-year-old people this year. | Program B Saves 1 40-year-old person 10 years from now |
| 2 | Program A Saves 100
30-year-old people this year. | Program B Saves 99
40-year-old people 10 years from now |
| 3 | Program A Saves 100
30-year-old people this year. | Program B Saves 100
40-year-old people 10 years from now |
| 4 | Program A Saves 100
30-year-old people this year. | Program B Saves 101
40-year-old people 10 years from now |
| 5 | Program A Saves 100
30-year-old people this year. | Program B Saves 105
40-year-old people 10 years from now |
| 6 | Program A Saves 100
30-year-old people this year. | Program B Saves 1000
40-year-old people 10 years from now |

“Generation” Question

- | | | |
|---|--|---|
| 1 | Program A Saves 100
30-year-old people this year. | Program B Saves 1 30-year-old person 10 years from now |
| 2 | Program A Saves 100
30-year-old people this year. | Program B Saves 99
30-year-old people 10 years from now |
| 3 | Program A Saves 100
30-year-old people this year. | Program B Saves 100
30-year-old people 10 years from now |
| 4 | Program A Saves 100
30-year-old people this year. | Program B Saves 101
30-year-old people 10 years from now |
| 5 | Program A Saves 100
30-year-old people this year. | Program B Saves 105
30-year-old people 10 years from now |
| 6 | Program A Saves 100
30-year-old people this year. | Program B Saves 1000
30-year-old people 10 years from now |

4 “Age” questions

save 100 30-year-olds now vs.

___ 31-year-olds 1 year from now (A1)

___ 32-year-olds 2 years from now (A2)

___ 40-year-olds 10 years from now (A10)

___ 60-year-olds 30 years from now (A30)

7 “Generation” Questions

save 100 30-year-olds now vs.

___ 30-year-olds

1 year from now (G1)

2 years (G2)

10 years (G10)

30 years (1 generation) (G30)

60 years (2 generations) (G60)

300 years (10 generations) (G300)

900 years (30 generations) (G900)

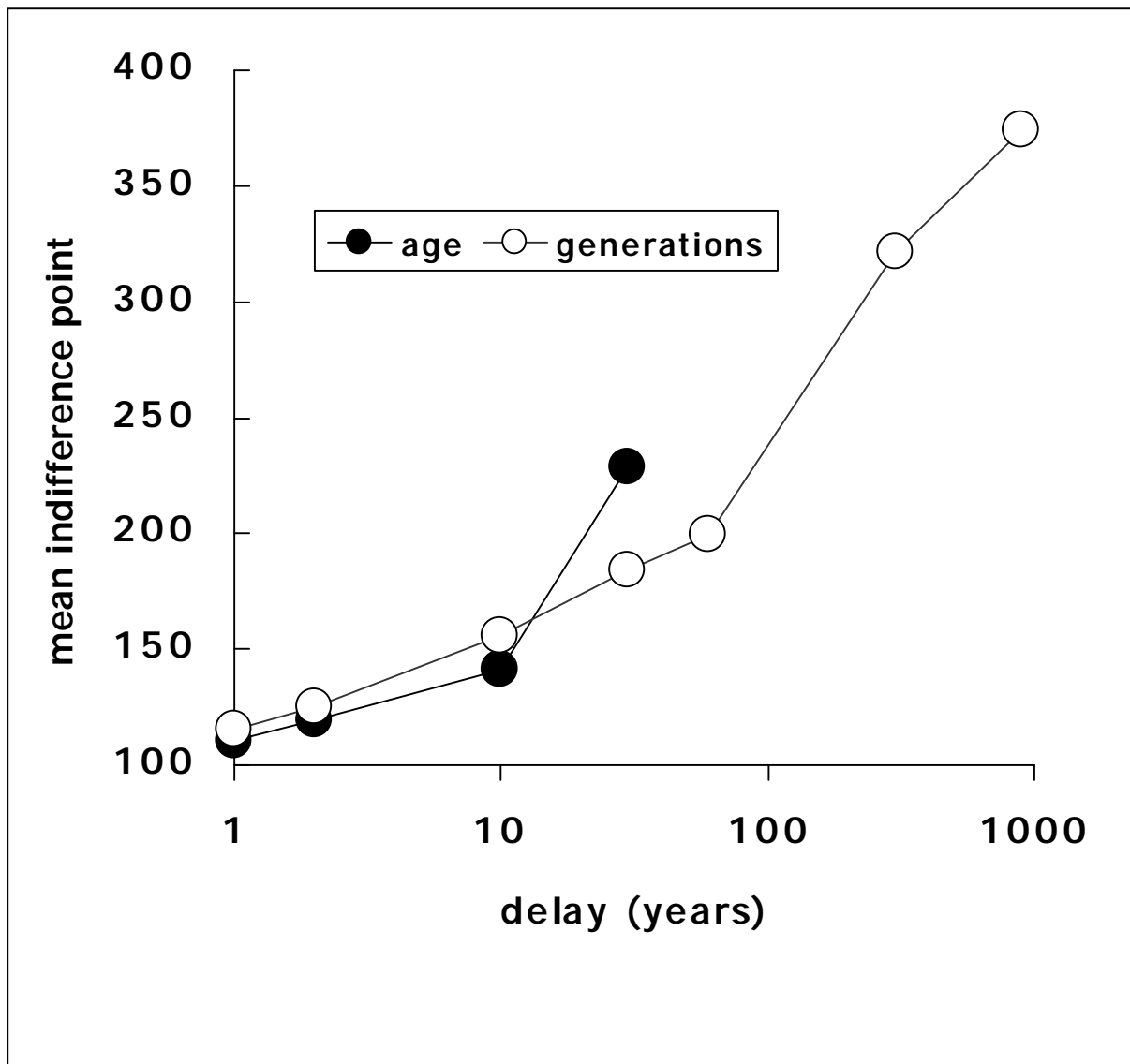
2 Comparisons

- Hold delay constant, vary “age” or “generation” form
 - A1 A2 A10 A30 vs.
 - G1 G2 G10 G30
- Hold “generation” form constant, vary whether delay is in years or generations
 - G1 G2 G10 G30
 - G30 G60 G300 G900

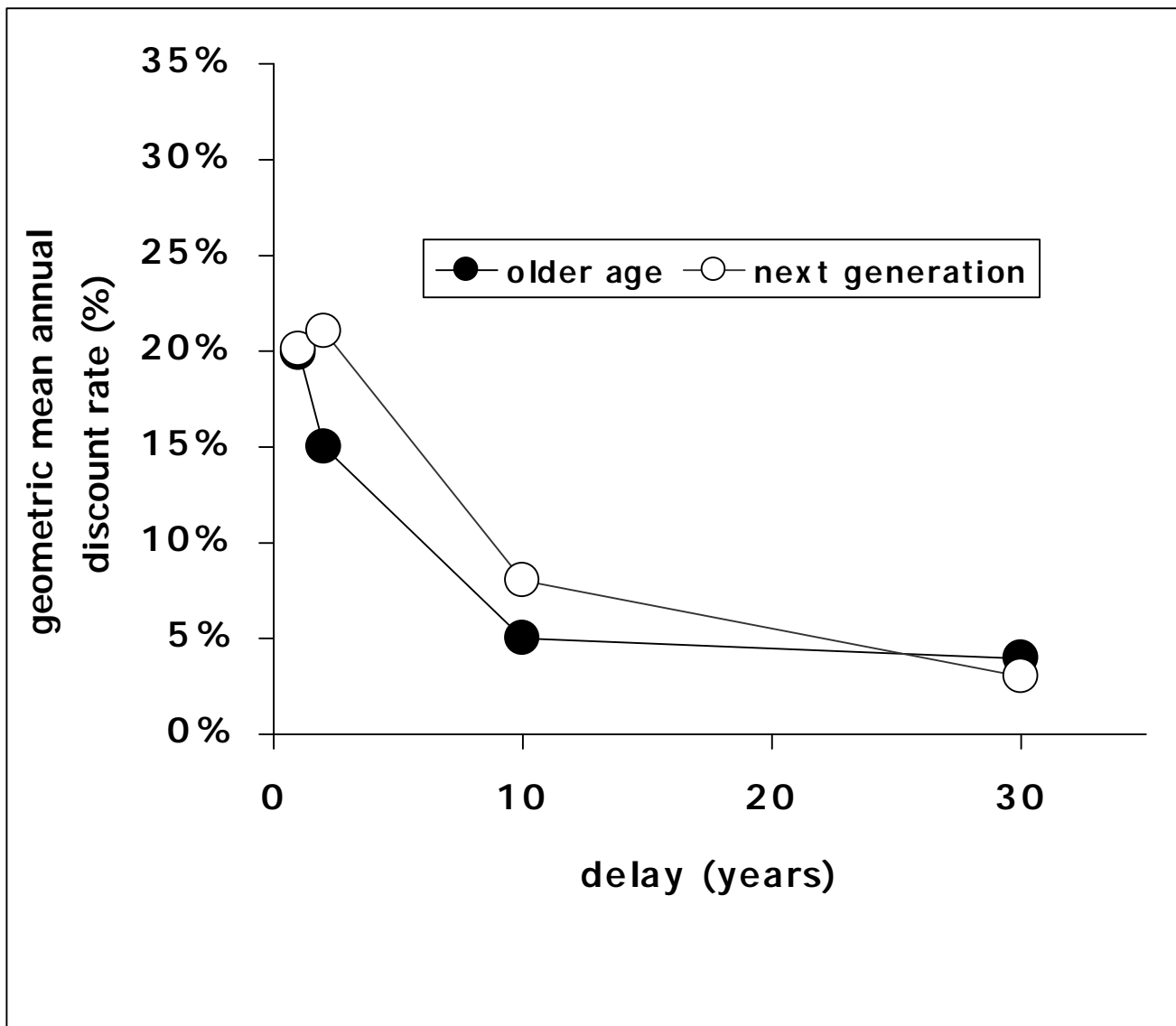
Method

- Participants were 62 college students (5 removed from analysis)
- 11-page questionnaire
- Counterbalanced
 - Order of 11 questions
 - Ascending/descending order of choices within a question

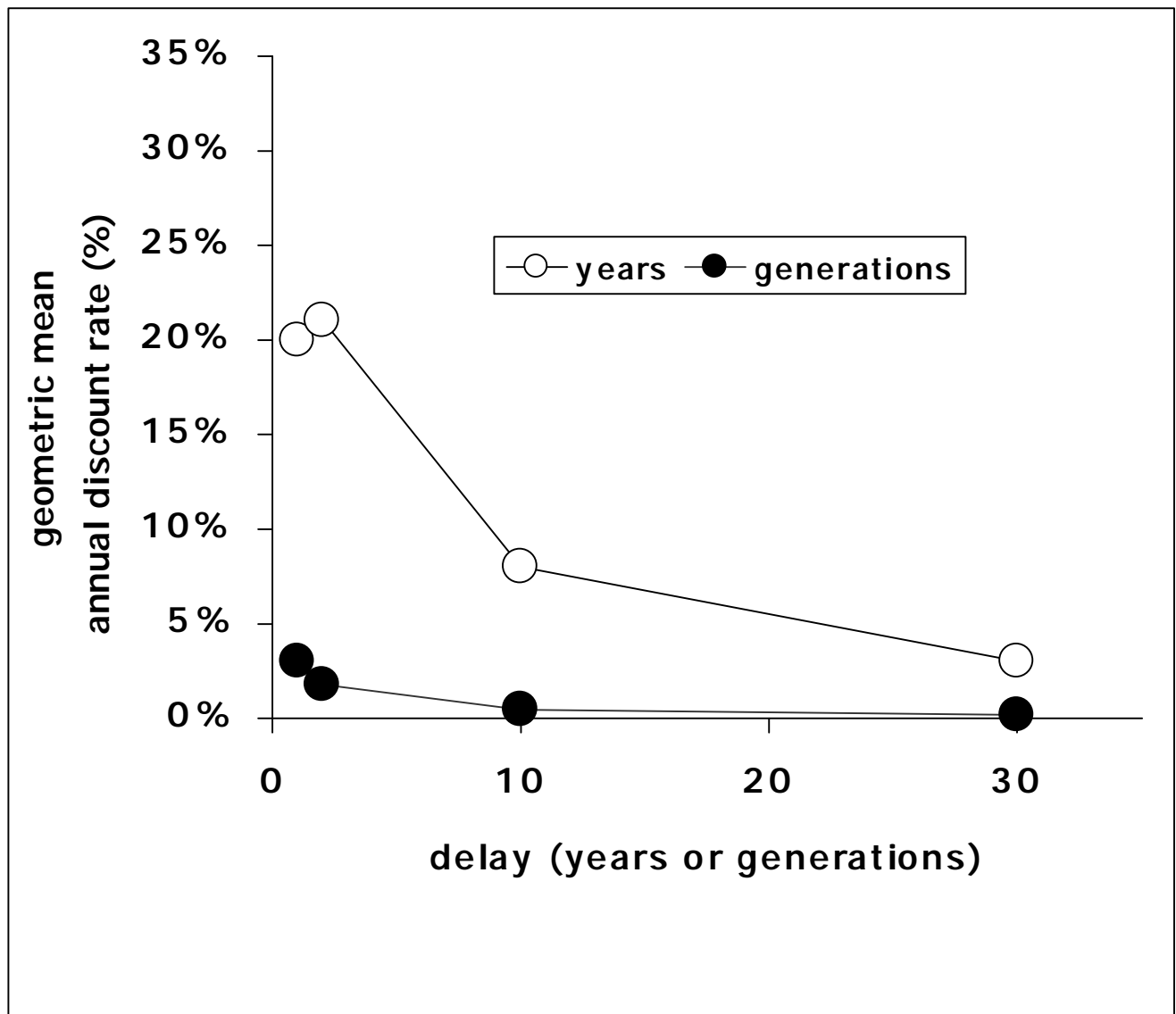
Number of people saved after D delay equivalent to 100 people saved now



Discounting of delayed outcomes that happen at an older age or to a future generation



Discounting of years or generations



Additional Questions

- *Question i.* Is it more important to save lives this year or many years from now?
 - 9% this year
 - 0% many years from now
 - 91% both equally important
- *Question ii.* Is it more important to save the lives of younger people or older people?
 - 54% younger people
 - 0% older people
 - 46% both equally important
- *Question iii.* Is it more important to save the lives of people in this generation or a future generation?
 - 16% this generation
 - 7% future generation
 - 77% both equally important

Additional Questions

- 23 subjects answered “both equally important” to all 3 questions, thus professing a 0 discount rate.
- How did they compare to everyone else (n=34)?
 - Geometric mean discount rate: 10.9% vs. 7.3% (*n.s.*)
 - % of zero discount rates: 28% vs. 26% (*n.s.*)

Conclusions

- Discount rates are unaffected by “age” vs. “generation” interpretations of the delay.
- Annual discount rates decrease with delay, even for delays that extend into future generations.
- Zero discount rates more common for short delays, likely because of poor resolution.

Experiment 2

- Purpose: Compare inter- and intra-generational discounting for different outcome types:
 - lives saved
 - health improved
 - money
- Used only the “generation” question formats from Experiment 1

Predictions

- Discount rates found in inter-generational studies may be very low because they used life saving outcomes.
- If so, discount rates for lives saved should be lower than rates for other outcomes (health and money)

Methods

- Subjects: 54 college students.
(2 removed for missing data)
- Procedure: Questionnaire with 3 scenarios:
 - lives saved
 - health improved
 - financial assistance
- 4 delay periods
 - 1, 10, 30, 300 years

Scenarios

Lives Saved

People affected are those who would ordinarily die at age 30, but will instead live to age 75.

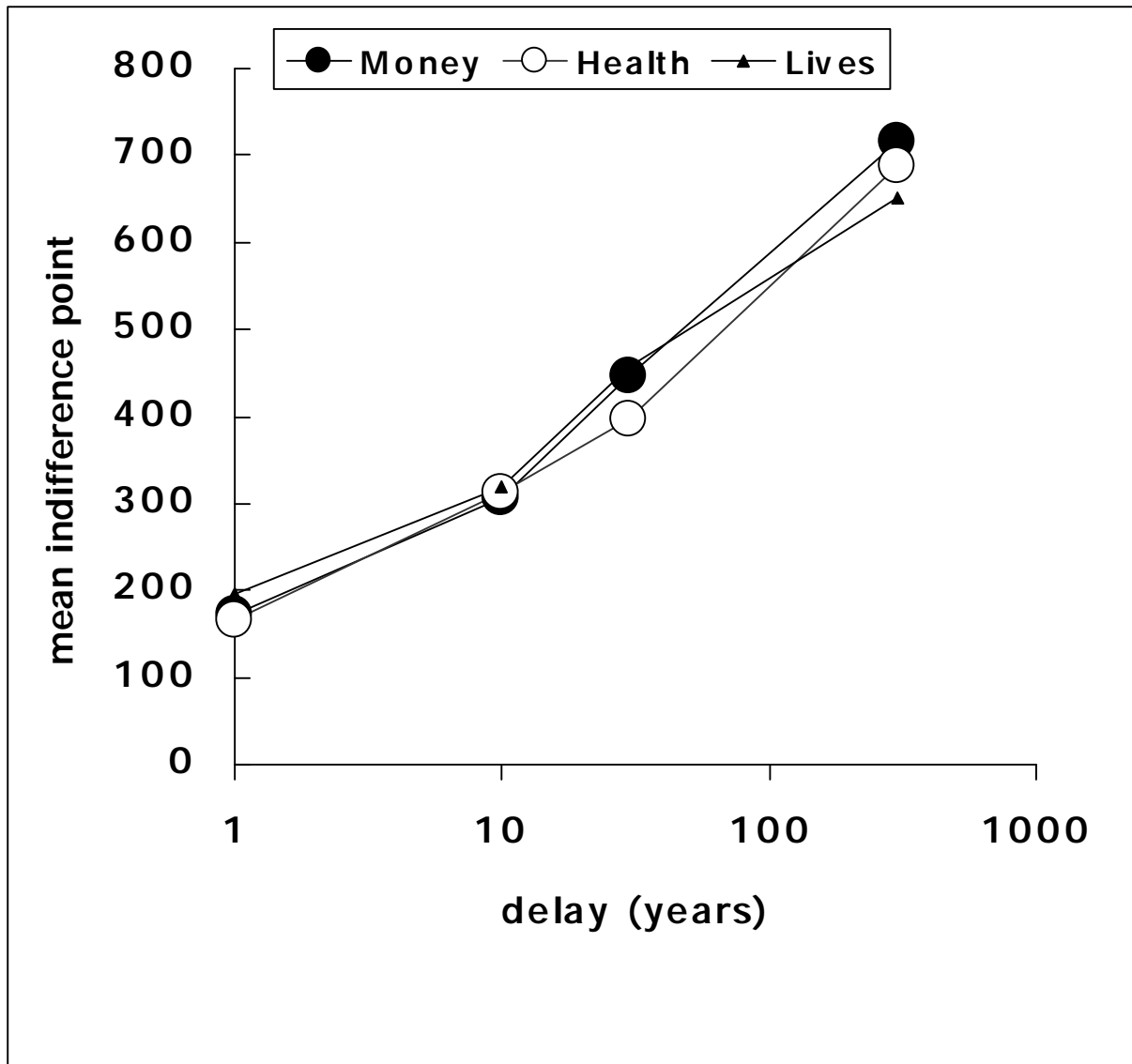
Health Improved

People affected are 30-year-olds with painful arthritis who would normally have arthritis for the rest of their lives (until age 75) but now will be arthritis-free.

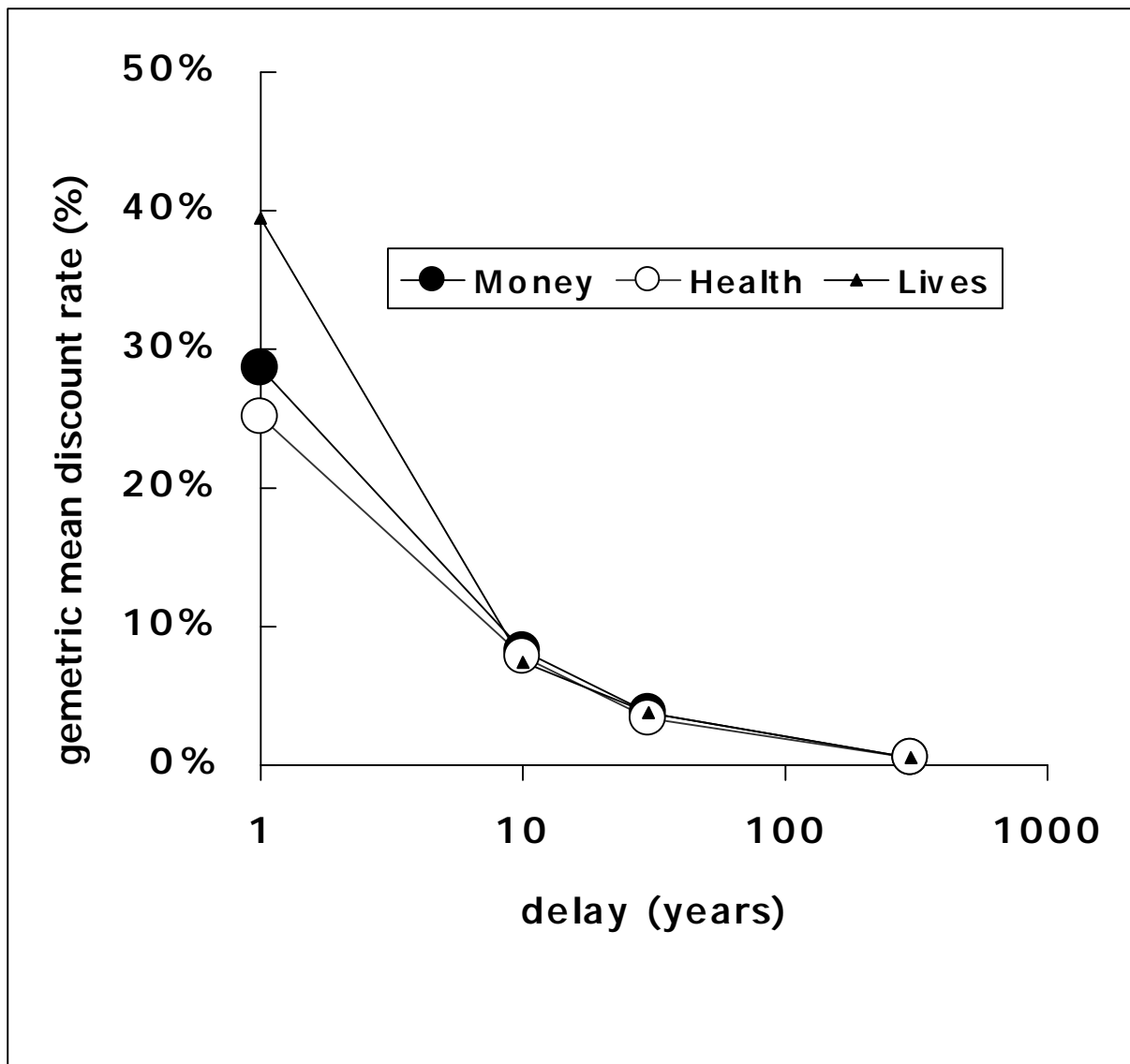
Financial Assistance

People affected are 30-year-old single parents with low incomes who receive a one-time grant of \$10,000 to be used for college tuition, training, purchase of a home or car, etc.

Number of people benefitted after D delay equivalent to 100 people benefitted now



Geometric mean annual discount rates



Conclusions

- Intergenerational discount rates do not differ across different types of outcomes (health, money, lives).
- Self report of using zero discount rates is not very predictive
- Factor analysis shows that 1- and 300-year delays are treated specially.

Experiment 3

- Purpose: examine the impact of “psychological closeness” on inter-generational discounting
- New Jersey college students evaluated delayed life-saving programs that benefited
 - young adults in NJ
 - young adults in Thailand

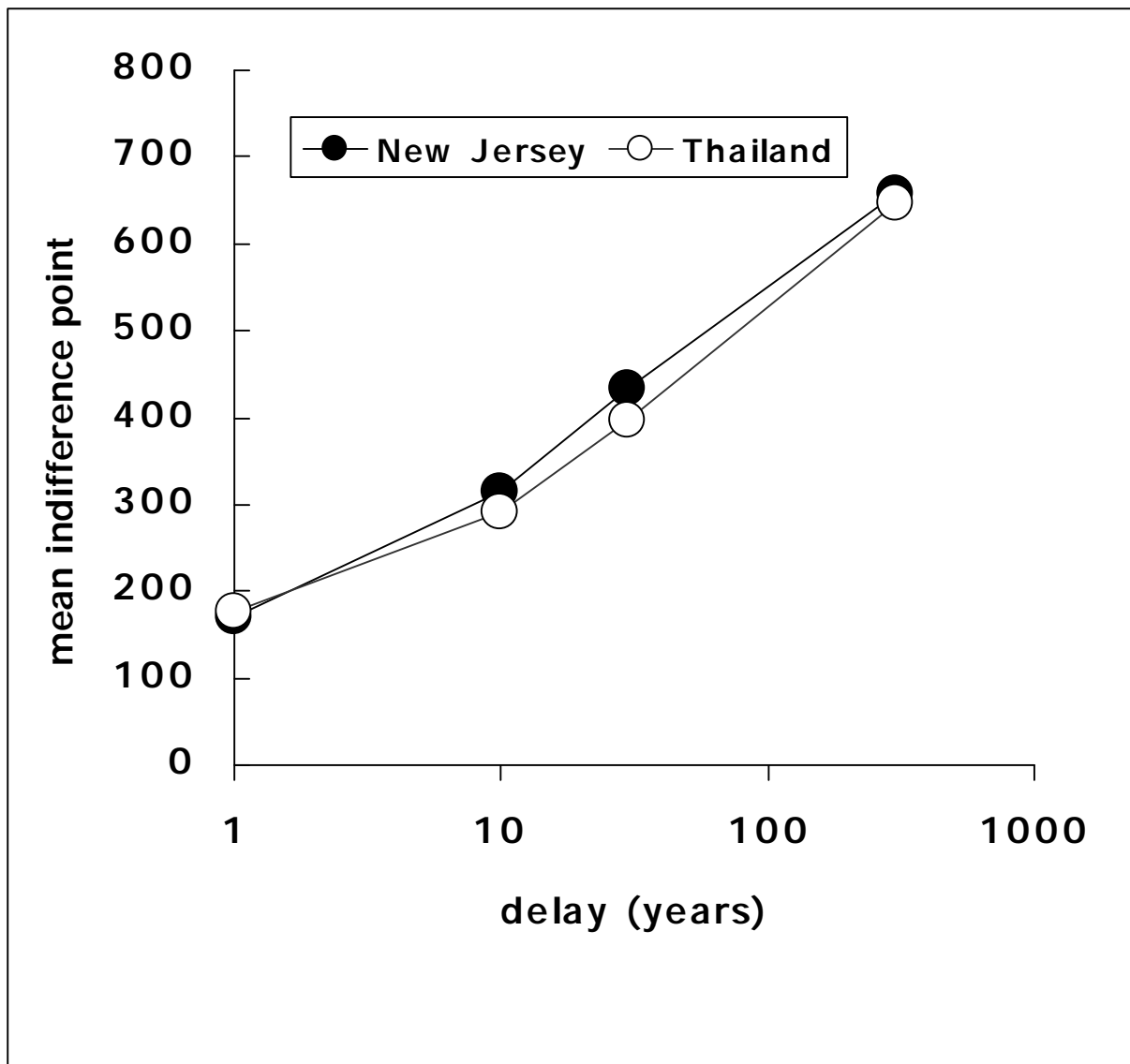
Predictions

- If future generations are discounted because of “psychological distance,” then:
 - remote (Thailand) but immediate outcomes should also be de-valued
 - temporal discount rate should be lower for the Thailand condition because both immediate and delayed outcomes are remote

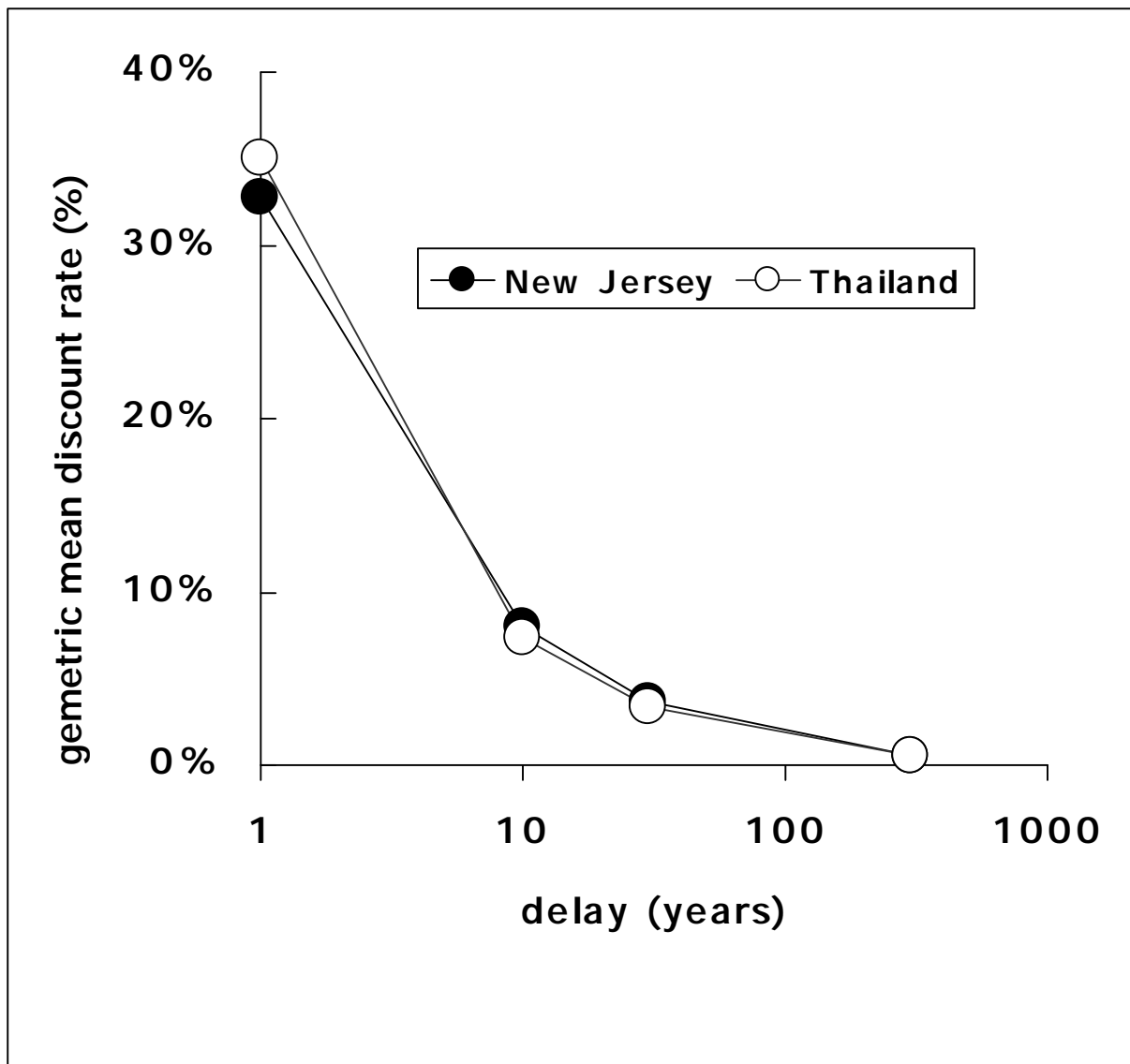
Method

- Subjects: 80 college students (1 removed for missing data)
- Method: Questionnaire with
 - delays of 1, 10, 30, 300 years
 - all outcomes are lives saved
- People whose lives are saved are
 - college-aged people living in New Jersey
 - college-aged people living in Thailand
- 73% of subjects had lived in NJ at least 3/4 of their lives. No subject had lived in Thailand or was of Thai descent.

Number of people saved after D delay equivalent to 100 people saved now



Geometric mean annual discount rates



Conclusions

- “Psychological distance” did not affect discount rates or the effect of day on discount rates
- Once again, self reports of zero discount rates were not predictive
- Factor analysis indicated that 1-year delays are treated specially. Did not show that 300-year delays are treated specially.

Overall Summary

- Inter-generational discount rates are very low
 - can be explained by the fact that discount rates decrease with delay
 - other than longer delays, inter-generation rates do not seem to differ from intra-generational rates
- Discount rates were not influenced by
 - type of benefit
 - beneficiary (near or far)
- Subjects who profess zero discounting do not demonstrate it.

Future Directions

- Scenarios that describe real inter-generational decisions
 - environmental concerns
 - public health
 - government debt
- Use of broader subject population
 - international comparisons