Mixed views about radical life extension

Allen Alvarez[1], Lumberto Mendoza[2], & Peter Danielson[3]

[1]Department of Philosophy & Religious Studies, Norwegian University of Science and
  Technology, Trondheim, allen.alvarez@ntnu.no
[2]Department of Philosophy, University of the Philippines Diliman,
  lumberto.mendoza@up.edu.ph
[3]Centre for Applied Ethics, School of Population & Public Health, University of British
  Columbia, Vancouver, Canada, danielsn@exchange.ubc.ca

Recent studies on public attitudes toward life extension technologies show a mix of ambivalence toward and support for extending the human lifespan (Partridge 2009; Dragojlovic 2013; Funk et al. 2013). Attitudes toward technological enhancements may be used to categorize individuals according to political or ideological orientation such as technoprogressive or conservative (Hughes 2010) and it could be easy to assume that these categories are related to more general categorizations related to culture, e.g. between Traditional and Secular-rational values in the World Values Survey (Ingelhart & Welzel 2010). This paper discusses how attitudes toward aspects of radical life extension may be related to cultural values as revealed in an online deliberative survey among university students conducted between January 2012 to January 2013. Survey results suggest that attitudes toward radical life extension tend to be mixed among groups categorized as Traditional, Secular-rational, Survivalist, and Self-expressionist. The study explored the relation between responses of 326 university students to 5 key questions on radical life extension (RLE) and the cultural values they tend to favor as indicated by their response to 20 statements from the World Values Survey.

Design and Method: The survey consisted of 3 stages: an online pre-discussion survey, face-to-face discussion, and post-discussion survey. After completing the 5 main survey questions in stage 1, participants were presented two additional questionnaires: one on cultural attitudes using 20 statements from the 2004-2008 World Values Survey (WVS) and another on health attitudes with 12 statements from Dutta-Bergman's 2004 study. In stage 2, participants were engaged in a face-to-face discussion in class focusing on their responses to the five key questions. After the discussion, they were invited to reconsider the choices and reasons they posted in stage 1 in the light of the face-to-face class discussion in stage 2.

Results: Responses to the five survey questions showed that there tended to be more individuals across groups who disagreed with adopting technologies that radically extend the human lifespan beyond the current limit of 120 years. Attitudes toward radical life extension did not correspond to cultural attitudes indicated by responses to the WVS questions. The proportion of agreement/disagreement to statements presented in each of the five questions varied across cultural groups and there tended to be more individuals who disagreed with radical life extension in all groups. Changes in responses after the discussion stage were not significant and most respondents maintained their prior views.

Discussion: Cultural attitudes associated with familiar technologies may not correspond with attitudes toward newer technologies since beliefs and values may need to be adapted to new imagined situations that the new technologies elicit. Moral understandings associated with familiar technological habits and beliefs are not necessarily carried over to new technologies.

Keywords: Radical life extension ethics, online deliberative survey, cultural values

Introduction

A number of studies have explored public attitudes toward life extension technologies. A telephone interview survey conducted among 605 members of the Australian public reveals ambivalence on the issue of extending the human lifespan (Partridge, Lucke, Bartlett, & Hall, 2009). A recent study conducted in 2012 among the Canadian public suggests that moderate life extension of up to 120 years is supported by 59% of 1,231 survey participants (Dragojlovic, 2013). That recent study also suggests that individuals' general orientation towards science and technology may strongly predict support for radical life extension. In another recent (2013) study conducted among 2,012 nationally representative cohorts in the United States by the Pew Research Center, 51% said that radical life extension (RLE) would be a bad thing for society while 41% said that it would be a good thing (Funk et al., 2013). Since the prospect of extending healthy human lifespan beyond 120 years is still a very controversial issue, it would be informative to explore how the cultural values or attitudes of the public are related to their views about RLE, i.e. their support for or rejection of the prospect of radically extending healthy human lifespan. Our current study explored the relation between responses of 326 university students to five key questions on RLE and their cultural attitudes as indicated by their responses to 20 statements derived from the World Values Survey.

Design and Method

An online deliberative survey among university students using the "N-Reasons platform" (Danielson, 2010) was conducted between January 2012 and January 2013. The aim of the survey was to explore attitudes to RLE and compare cultural attitudes with responses to five main survey questions related to biomedical research in RLE, means of life extension, effects of RLE on global population growth, compatibility of deeply held beliefs with RLE and interest in using RLE in advanced years. (See Appendix 1 for details of the five main survey questions). The survey consists of three stages (see Fig. 1 below). In stage 1, five main survey questions were asked. Prior to asking each question, a paragraph (authored by Alvarez) discussing relevant information on life extension research was presented with web links to relevant journal articles. In the invitation page (which was part of stage 1), web links to two journal articles were also provided (in particular, a link to the article by Jim Oeppen and James Vaupel, published in *Science* in 2002, arguing that life expectancy continues to increase; another by Aubrey de Grey, published in *Experimental Gerontology* in 2003, criticizing arguments for rejecting foreseeability and desirability of anti-aging medicine)[1]. In survey question 1, the first sentence about life expectancy included links to a web article showing current life expectancy averages around the world and a New York Times article reporting the death of the world's oldest person, Jeanne Calment.[2] In survey question 3, web links to two articles were provided, one[3] supporting the idea that overpopulation could result from using RLE while another[4] showing the opposite. In survey question 4, a web link was provided to an article citing surveys around the world indicating that many elderly people want to be resuscitated.[5] After completing the five main survey questions, participants were then presented two additional questionnaires: one on cultural attitudes using 20 statements from the World Values Survey (WVS)[6] and another on health attitudes using 12 statements from Dutta-Bergman's 2004 study (see Appendix 3 for details).

In stage 2, participants (who were members of a university class) were then engaged in a face-to-face discussion with their fellow students and facilitating instructors (Alvarez, Mendoza and Evangelista)[7] focusing on the five main questions. They were then invited to

take the survey a second time in stage 3 to reconsider their choices and the reasons they posted, giving them the opportunity to change these in the light of the class discussion in stage 2.

Participant Recruitment

Eleven classes were recruited from four universities in Norway and the Philippines, including two public cohorts with participation by students from Canada and public participants who discovered the survey site on the Web. Our participant recruitment follows what is called a non-probability/accidental or convenience sampling technique. We do not claim that the results are generalizable to the population (or country) from which the participants came. Most of the participants who are members of the 11 classes were asked to participate in all three stages of the survey where two of the authors (Alvarez and Mendoza) and one university professor facilitated the face-to-face discussion stage. The classes that participated in Norway consisted of courses in technology and ethics and corporate social responsibility. Both classes consisted of a mix of students from natural sciences, engineering, social sciences and humanities, including philosophy. The classes from the Philippines consisted of two courses in critical thinking, five introductory courses in philosophy and two courses in science and technology studies (see Table 1). All classes consisted of a mix of students majoring in different study programs from the natural sciences, engineering, social sciences and humanities, including philosophy. There were 489 registered participants but only 326 were included in the analysis. One-hundred and sixty-three were excluded due to incomplete responses in the cultural attitudes questionnaire, which is key to addressing one of the main research question on how cultural attitudes relate to views about RLE. We excluded responses that contained inconsistent answers, where participants responded with Agree and Disagree on the same question. This was done using a quantitative analysis software command that automatically excluded those responses.

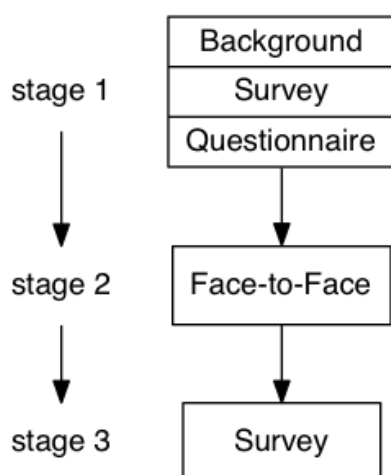### Figure 1. Three stages in the N-Reasons survey

Table 1. List of participating classes

Class ID	Subject	Composition
20	Not specified	public
30	Not specified	public
31	Technology and ethics	class
33	Business ethics	class
43	Reasoning	class
57	Reasoning	class
74	Introduction to philosophy	class
111	Introduction to philosophy	class
112	Introduction to philosophy	class
197	Introduction to philosophy	class
198	Introduction to philosophy	class
75	Science and technology studies	class
113	Science and technology studies	class

The classes that had face-to-face discussions in stage 2 were shown a short video (seven minutes) on life extension[8] followed by a discussion of the reasons for and against RLE technologies. All classes that had face-to-face discussions were invited to take the survey again in stage 3 to reconsider the choices and reasons they posted.

Members of the public who discovered the survey site on the Internet or were referred to the survey by their contacts were randomly assigned to the listed classes but were marked in the data tables for exclusion. This mechanism of random assignment of public participants to classes is part of the general design of most N-Reasons surveys to enhance anonymity of responses when participants post reasons.

Results

Quantitative Analysis Aggregated by Question

The aggregated results of all classes indicate a tendency to disagree with statements suggesting that RLE be adopted. Regarding the question on whether RLE is a desirable goal for biomedical research (see Chart 1), 50% disagreed (including 4% who strongly disagreed) versus 13% who agreed (11% strongly) and 37% neutral. When asked if they would avail themselves of RLE in their old age (Chart 1), 56% were neutral and 39% disagreed (26% strongly) versus 5% who agreed (4% strongly). Seventy-nine percent disagreed (59% strongly) that RLE is compatible with their deeply held beliefs.

Chart 1. Distribution of responses to questions 1, 4, and 5
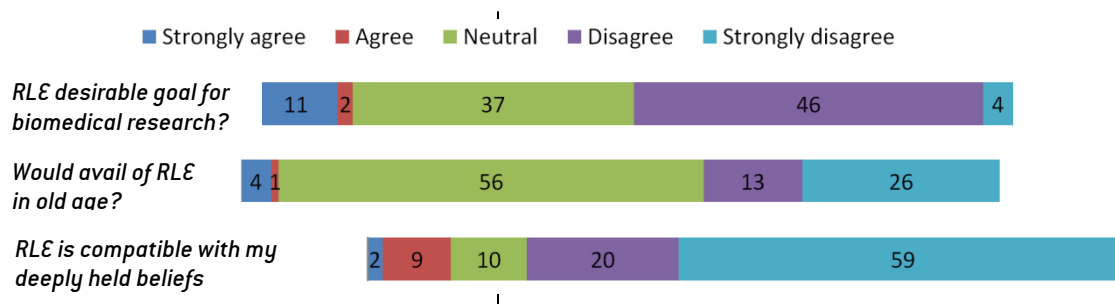Percent of respondents who agree/disagree with each statement

■ Strongly agree ■ Agree ■ Neutral ■ Disagree ■ Strongly disagree

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
RLE desirable goal for biomedical research?	11	2	37	46	4
Would avail of RLE in old age?	4	1	56	13	26
RLE is compatible with my deeply held beliefs	2	9	10	20	59

Chart 2. Distribution of responses to question 3
Percent of respondents who agree/disagree with the statement

■ Strongly disagree ■ Disagree ■ Neutral ■ Agree ■ Strongly agree

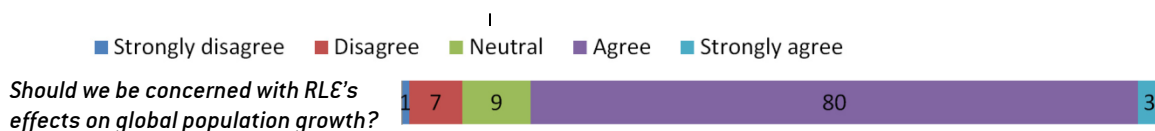| Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Should we be concerned with RLE's effects on global population growth?	1	7	9	80	3

Chart 3. Distribution of responses to question 2
Percent of respondents who prefer particular means to life extension

■ Option B: natural & artificial ■ Option A: natural only ■ Neither A nor B

Statement	Option B: natural & artificial	Option A: natural only	Neither A nor B
Means to RLE that would be chosen, if safe and effective	24	62	14

The overall response to the question related to effects on global population growth (see Chart 2) shows that 83% agreed (including 3% who strongly agreed) that we should be concerned with RLE effects on population growth versus 8% who disagreed (1% strongly) and 9% who were neutral.

Regarding the hypothetical question about which safe and effective method of RLE participants would prefer (see Chart 3), 14% seem to reject any method versus 24% who are willing to use combined natural and artificial methods and an overwhelming 62% who insisted on using only natural means to life extension.

Participants' cultural values and their responses to survey questions

The World Values Survey (WVS) (Inglehart & Welzel, 2010) has been used in other studies to classify the different cultural attitudes of different populations around the world. Four cultural values are paired in two dimensions/continuum in the WVS. These paired values are mapped in such a way that the Traditional versus Secular-rational values are graphed on the y-axis and the Survival versus Self-expression values on the x-axis. The values that respondents of the WVS tend to favor can then be mapped where the two dimensions intersect (see WVS wave 5 (2004-2008) in Fig. 2 below).

Our survey adopted four cultural categories from the WVS as a proxy to describe cultural attitudes by which our survey participants could be grouped. This was not meant to test generalizable theses similar to those made in the original WVS. The 20 statements from the WVS (see Appendix 2) are presented in the survey to ask which cultural values participants are inclined to favor as indicated by a five-point Likert scale (strongly agree, agree, neutral, disagree, strongly disagree).

As presented in the 20 statements, those who favor *Traditional* values reject divorce, abortion, euthanasia and suicide, and tend to have high levels of national pride and a nationalistic outlook, value religion, parent-child ties, submission to authority and traditional family. Could it be possible that those who have these attitudes would tend to reject RLE as well?

Figure 2. World Values Survey Wave 5 (2004-2008) Cultural Map of the World[9]
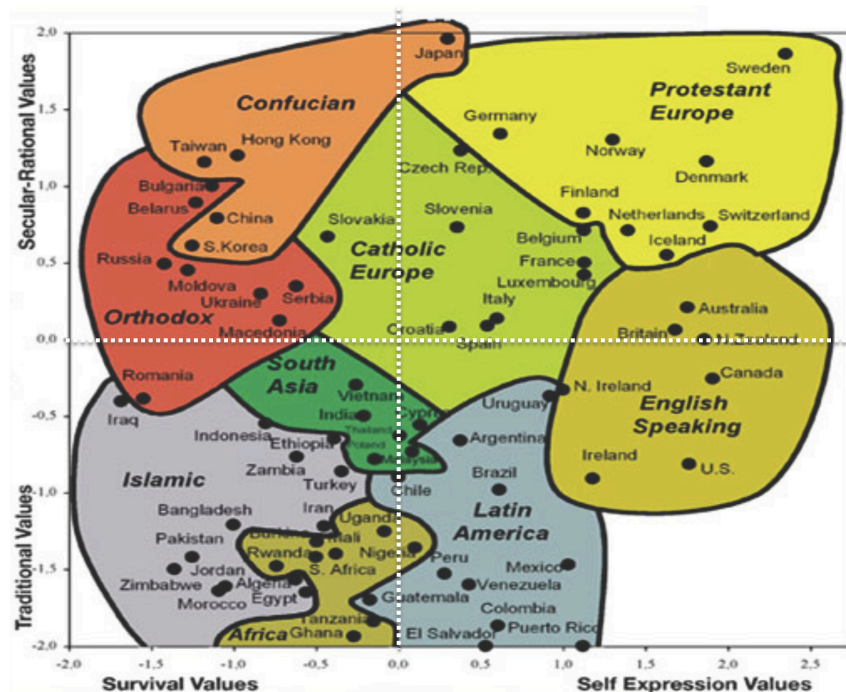
Those who favor *Secular-rational* values give less importance to religion, authority, and traditional family values and tend to accept divorce, abortion, and euthanasia. Could it be possible that those who have these attitudes would tend to approve RLE parallel to their openness to new ways of doing things?

Those who favor *Survival* values give importance to economic and physical security, tend to be ethnocentric in outlook, and have low levels of trust and tolerance. It is not obvious what sorts of attitudes towards RLE are related to these values.

Those who favor *Self-expression* values prioritize protecting the environment, inclined to be involved in policy decisions in economic and political affairs, and give importance to gender equality and being more and more tolerant of foreigners, gays and lesbians. It is also not obvious what sorts of attitudes to RLE are related to these values since the tendency to protect the environment might correspond to rejection of RLE as possibly resource-demanding, while being tolerant to differences may possibly suggest openness to new technologies.

We categorized the responses to the 20 statements and the results showed that 43% of our survey participants favored the combination of Traditional and Survival values, 36% a combination of Traditional and Self-expression values, 19% a combination of Secular-rational and Self-expression values, and only 2% favored a combination of Secular-rational and Survival values. We also grouped the responses separately into the four categories (see Table 2) and observed that in the Traditional and Survival values dimension 78% of all the 326 participants favored Traditional values and only 22% favored Secular-rational values. The same group of participants had 54% who favored Survival values and 46% who favored Self-expression values in the Survival values versus Self-expression dimension.

Table 2. Distribution of participants according to preferred cultural values

Dimension	Preferred cultural values	Individuals
1. Traditional vs. secular-rational	Secular-rational	70
	Traditional	256
		Total of 326
2. Survival vs. self-expression	Self-expression	177
	Survival	149
		Total of 326

We created a scatter-plot chart of the cultural values favored by survey participants (see Fig. 3) to illustrate how this would situate their responses on the WVS cultural map. The numbers on each axis correspond to the equivalent score for all the responses to the 20 statements (see Appendix 2).

We tested the relation between the cultural values of participants and their responses to the survey questions. One hypothesis we tested is that the more participants favored traditional and/or survival values the more they would disagree with using RLE, and the more they favored Secular-rational and/or Self-expression values the more they would agree with using RLE. Surprisingly, however, there were those who strongly favored Secular-rational and/or Self-expression values but who also disagreed with adopting RLE technologies. There were those who strongly agreed with Traditional and/or Survival values but also agreed with

using RLE. There could be more fine-grained variations in between extremes, of course. To account for such fine-grained variations, we superimposed a slope-like series of shaded areas on the scatter-plot chart to indicate the cultural attitudes versus response to each of the five questions. The series of shaded areas suggests that the more Secular-rational values were preferred, the more biomedical research on RLE would be agreeable (see Fig. 4, for example). The same figure, however, show that this prediction does not necessarily hold true because some of those who selected Traditional values, like those who selected Secular-rational values, also strongly agreed with pursuing biomedical research on RLE. Similar observations were made in all cultural categories for each of the four other questions (see Figs. 5 – 13).

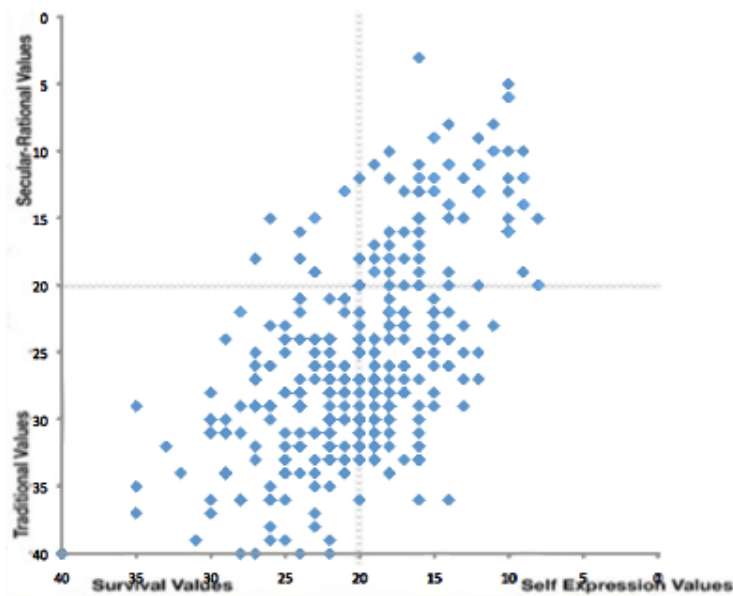Figure 3. Cultural Attitudes Map of Survey Participants. N=326

Figure 4. Question 1 decisions and Traditional vs. Secular-rational dimension Q1. Is RLE a desirable goal for biomedical research?
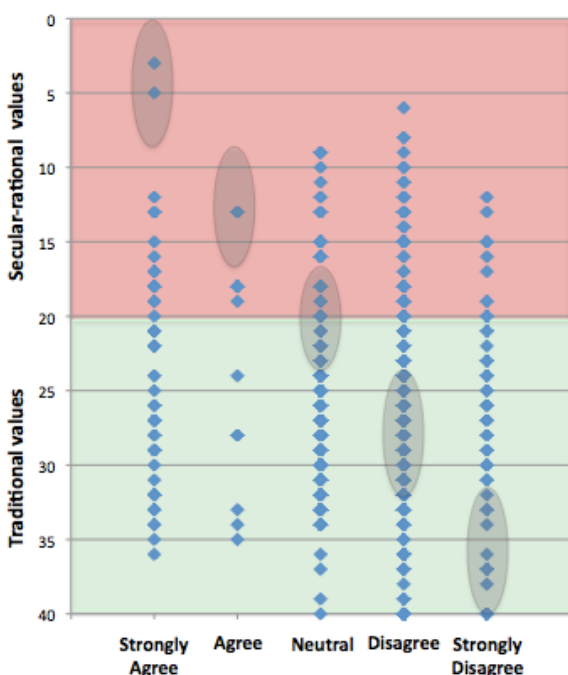

Figure 5. Question 1 decisions and Survival vs. Self-expression dimension. Q1. Is RLE a desirable goal for biomedical research?
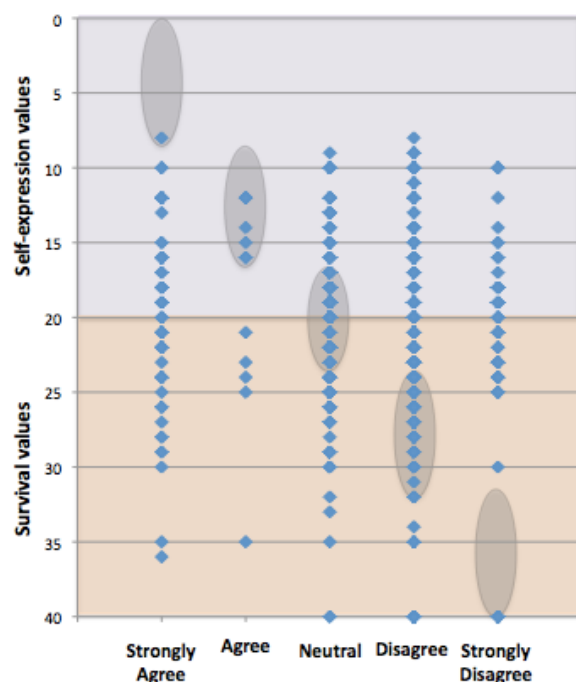
Figure 6. Question 4 decisions and Traditional vs. Secular-rational dimension. Q4. Would you avail of RLE if already in your advanced years?
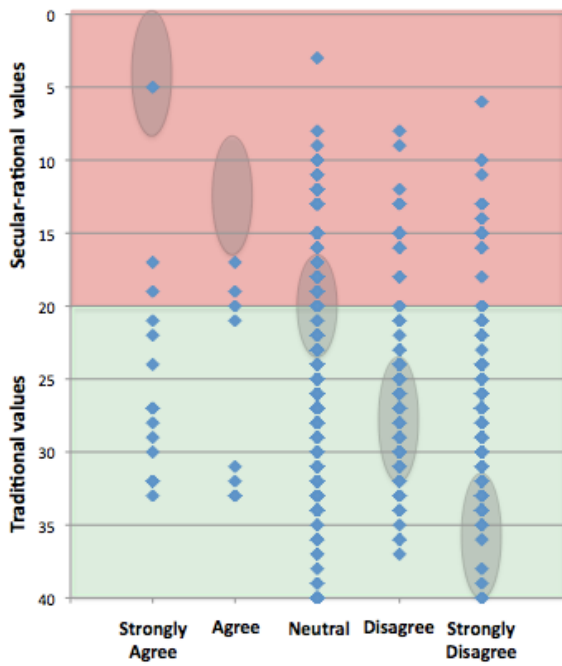
Figure 7. Question 4 decisions and Survival vs.Self-expression dimension. Q4. Would you avail of RLE if already in your advanced years?
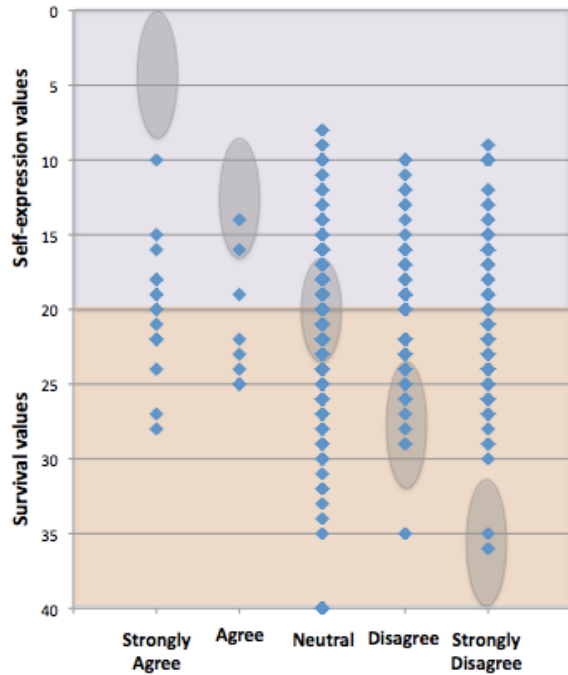

Figure 8. Question 5 decisions and Traditional vs. Secular-rational dimension. Q5. Is RLE compatible with your cultural values?
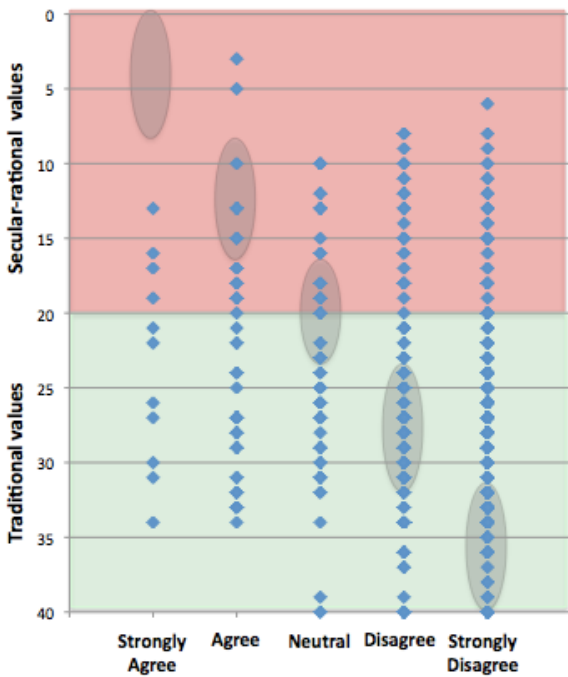
Figure 9. Question 5 decisions and Survival vs. Self-expression dimension. Q5. Is RLE compatible with your cultural values?

Figure 10. Question 3 decisions and Traditional vs. Secular-rational dimension. Q3. Should we be concerned about effects on population growth?

Figure 11. Question 3 decisions and Survival vs. Self-expression dimension. Q3. Should we be concerned about effects on population growth?

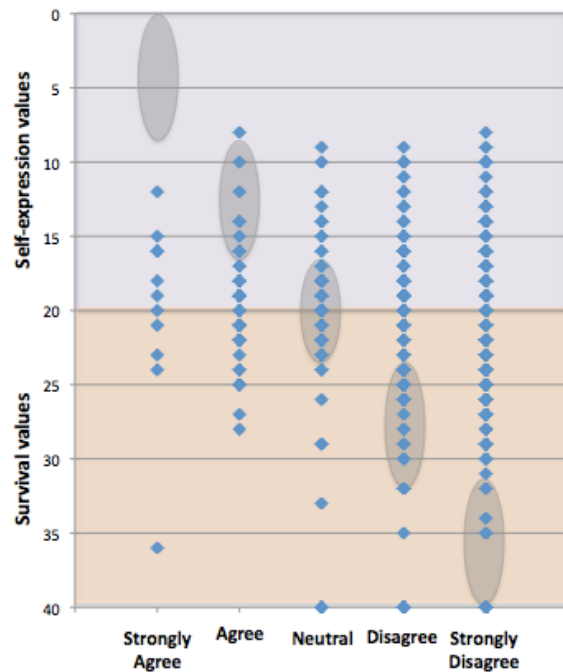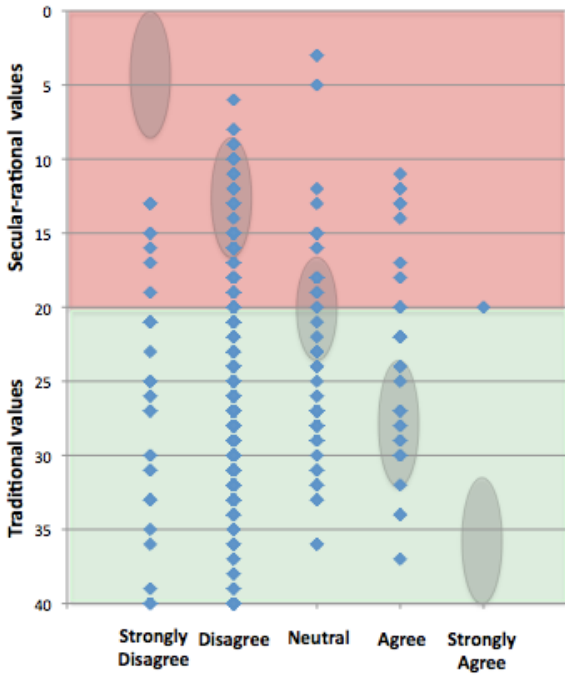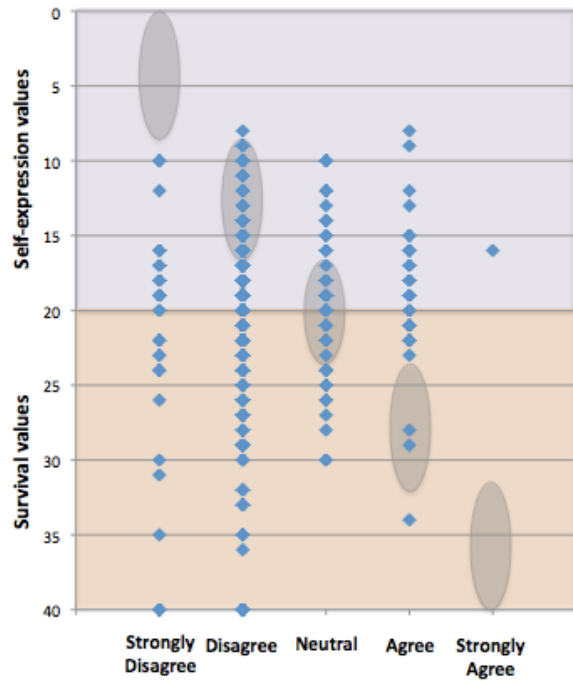Figure 12. Question 2 decisions and Traditional vs. Secular-rational dimension. Q2. Which means to RLE is acceptable?
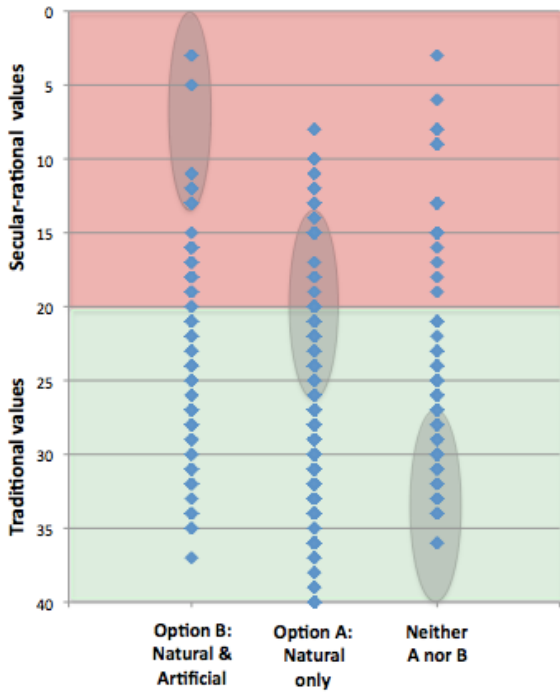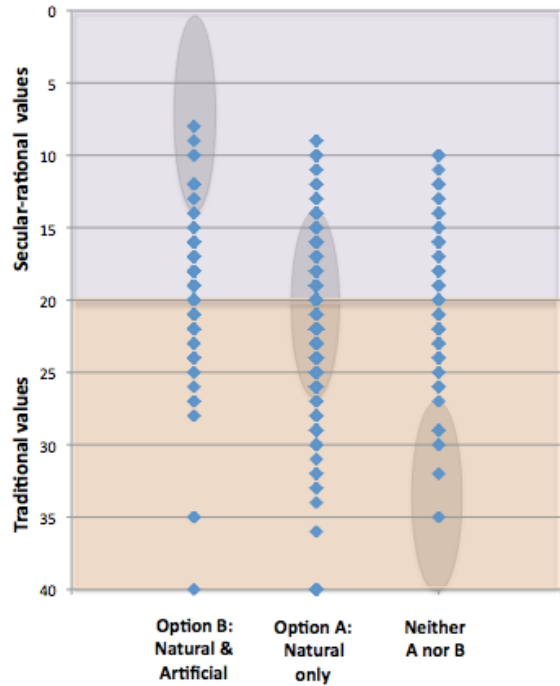

Figure 13. Question 2 decisions and Survival vs. Self-expression dimension. Q2. Which means to RLE is acceptable?

Distribution of responses per cultural group

Q1. Biomedical research

Chart 4 shows that those who preferred Traditional values were inclined to disagree (45%) that RLE is a desirable goal for biomedical research and be neutral (39%) about it. Only 10% strongly agreed.
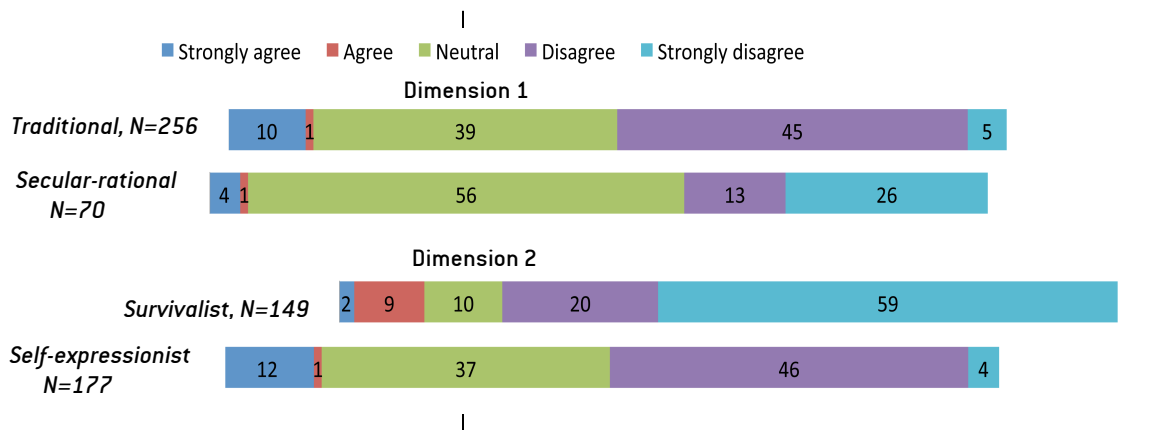
Those who preferred Secular-rational values were inclined to be neutral (56%), with 13% who disagreed and 26% who strongly disagreed. Only a few agreed (1%) and strongly agreed (4%).

In contrast, the majority of Survivalists (59%) strongly disagreed that RLE is a desirable goal for biomedical research (20% disagreed). A few were divided between being neutral (10%) and agreeing (9% plus 2% strongly agreeing).

Half of Self-expressionists (50%) disagreed but many (37%) were neutral about it. A few agreed (1%) and strongly agreed (12%).

Chart 4. Distribution of responses to question 1 by cultural attitudes
Percent of respondents who agreed/disagreed with pursuing biomedical research in RLE per cultural attitudes group (where respondents, N=326, indicate their cultural preferences in two dimensions)

Legend: Strongly agree · Agree · Neutral · Disagree · Strongly disagree

Dimension 1
Traditional, N=256: 10 | 1 | 39 | 45 | 5
Secular-rational N=70: 4 | 1 | 56 | 13 | 26

Dimension 2
Survivalist, N=149: 2 | 9 | 10 | 20 | 59
Self-expressionist N=177: 12 | 1 | 37 | 46 | 4

Q4. Avail of RLE in old age

The majority of participants across cultural attitudes were neutral as to whether they would avail themselves of RLE in their advanced years (see Chart 5). The most neutral were Secular-rationalists (63%) followed by Self-expressionists (58%). Traditionalists and Survivalists were equally neutral (both 54%) on the issue. There were also similarities between these groups in terms of being more inclined to disagree (21% to 29% strongly disagree) than agree (3% to 4% strongly agree). These observations show that regardless of cultural attitudes, survey participants tended to have similar responses to the question of whether they would avail themselves of RLE technologies in their advanced years. It is interesting to note that when participants were presented with different reasons for being neutral, the top reason chosen was that they would not know how they would feel (262 votes) when they are in their advanced years (see Table 3 under the section *Analysis of Reasons*).

Q5. Compatible with deeply held beliefs

Many participants thought that RLE is not compatible with their deeply held beliefs. There were close similarities in how participants across cultural attitudes responded to the question whether RLE is compatible with their deeply held beliefs (see Chart 6). The majority of respondents from Traditionalists (64%), Survivalists (61%) and Self-expressionists (57%)

strongly disagreed. A similar, but small percentage of these three groups chose to be neutral (8%, 8% and 12% respectively); agreed (8%, 10% and 8%) and strongly agreed (1%, 1% and 2%). Less than half but still significantly many (40%) of Secular-rationalists strongly disagreed that RLE is compatible with their deeply held beliefs followed by those who disagreed (25%) and were neutral (18%) with 13% who agreed and 3% who strongly disagreed.

Chart 5. Distribution of responses to question 4 by cultural attitudes

Percent of respondents who agreed/disagreed to avail themselves of RLE in old age per cultural attitudes group (where respondents, N=326, indicate their cultural preferences in two dimensions)
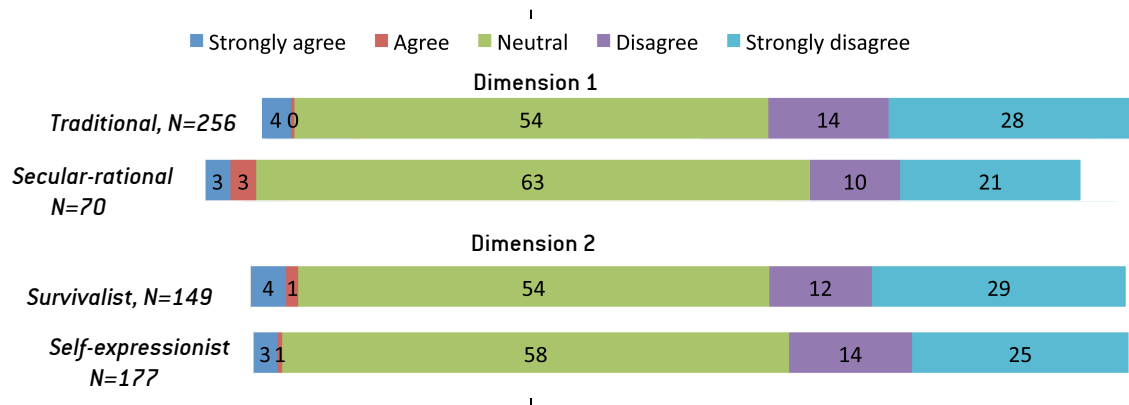
■ Strongly agree　■ Agree　■ Neutral　■ Disagree　■ Strongly disagree

Dimension 1

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Traditional, N=256	4	0	54	14	28
Secular-rational N=70	3	3	63	10	21

Dimension 2

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Survivalist, N=149	4	1	54	12	29
Self-expressionist N=177	3	1	58	14	25

Chart 6. Distribution of responses to question 5 by cultural attitudes

Percent of respondents who agreed/disagreed regarding compatibility of RLE with deeply held beliefs per cultural attitudes group (where respondents, N=326, indicate their cultural preferences in two dimensions)

■ Strongly agree　■ Agree　■ Neutral　■ Disagree　■ Strongly disagree

Dimension 1

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Traditional, N=256	1	8	8	19	64
Secular-rational N=70	3	13	18	25	40

Dimension 2

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Survivalist, N=149	1	10	8	19	61
Self-expressionist N=177	2	8	12	21	57
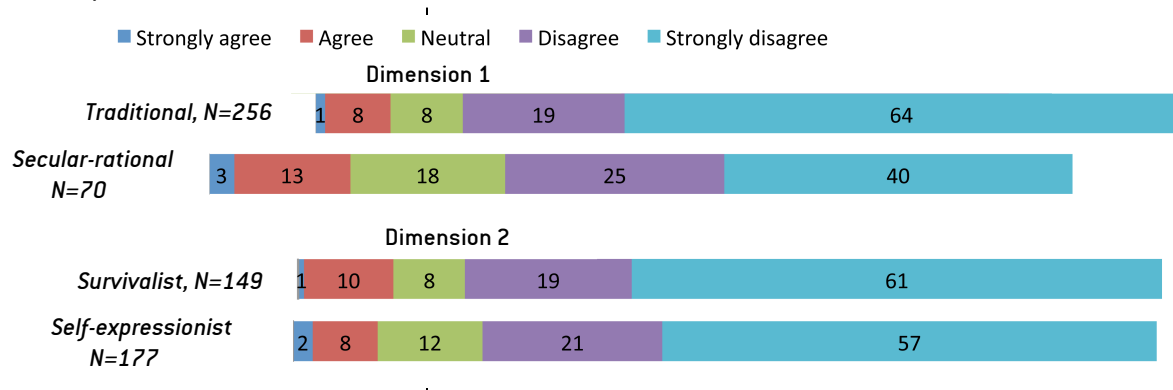
Q3. Concern about effects on global population growth

When asked whether we should be concerned about RLE's effects on global population growth, a significant majority of participants across all four dimensions of cultural attitudes responded that they agreed (see Chart 7): Traditionalists (82%), Survivalist (81%), Self-expressionists (79%) and Secular-rationalists (72%), with a few who strongly disagreed (between 3% to 4%). A few others chose to be neutral (between 8% to 14%). Even fewer disagreed with the statement (between 5% to 10%). Only a few strongly disagreed.

Q2. Means to RLE

The majority of Traditionalists (67%) preferred only natural means for facilitating RLE (see Chart 8). Some (19%) were open to using artificial means in addition to natural means while

others (14%) preferred neither.

Secular-rationalists were divided between those who would allow natural means only (42%) and those who would accept artificial means in addition to natural means (43%). A few (15%) preferred neither option, perhaps, because they reject RLE.

A majority of Survivalists (70%) preferred only natural means to achieve RLE. However, a few (18%) were open to artificial means in addition to natural means. The rest (12%) preferred neither option.

Similarly, the majority of Self-expressionists (54%) also preferred natural means only, but many (30%) were open to artificial means in addition to natural means. The remainder (16%) preferred neither option.

There seems to be some broad similarities in patterns in the way each cultural group responded to the questions (see Charts 9 – 12).

Chart 7. Distribution of responses to question 3 by cultural attitudes
Percent of respondents (per cultural attitudes group) who disagreed/agreed that we should be concerned with RLE's effects on global population growth (where respondents, N=326, indicate their cultural preferences in two dimensions)

■ Strongly disagree ■ Disagree ■ Neutral ■ Agree ■ Strongly agree

Dimension 1
Traditional, N=256: 0 | 6 | 8 | 82 | 3
Secular-rational N=70: 1 | 10 | 14 | 72 | 3

Dimension 2
Survivalist, N=149: 0 | 5 | 9 | 81 | 4
Self-expressionist N=177: 1 | 8 | 10 | 79 | 3
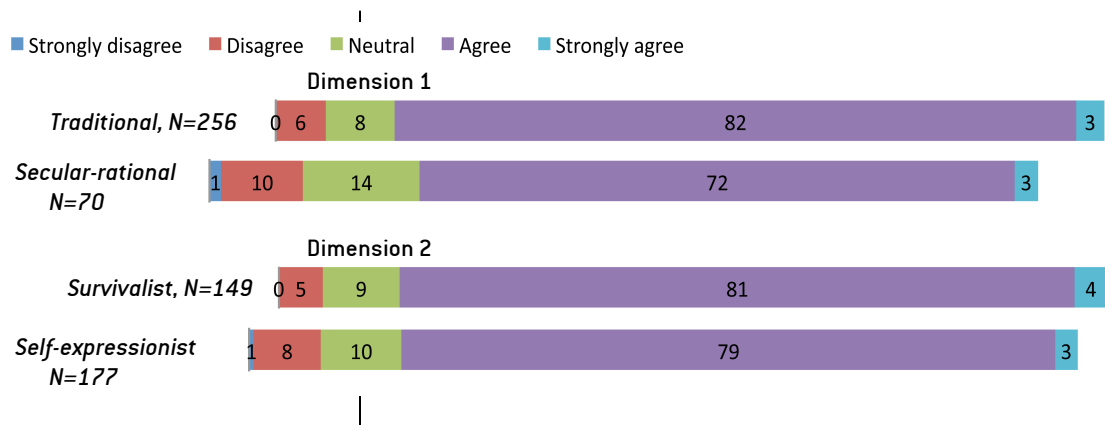
Chart 8. Distribution of responses to question 2 by cultural attitudes
Percent of respondents (per cultural attitudes group) who preferred a particular approach to RLE (where respondents, N=326, indicate their cultural preferences in two dimensions)

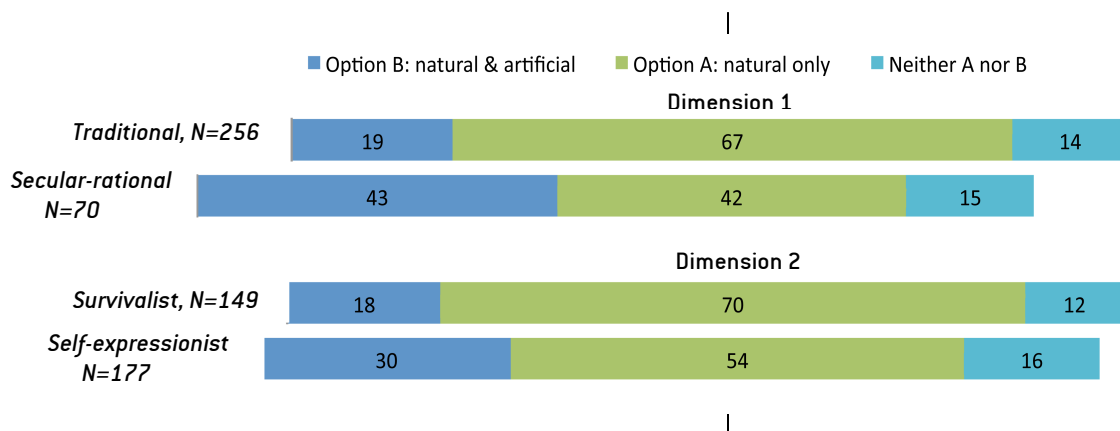■ Option B: natural & artificial ■ Option A: natural only ■ Neither A nor B

Dimension 1
Traditional, N=256: 19 | 67 | 14
Secular-rational N=70: 43 | 42 | 15

Dimension 2
Survivalist, N=149: 18 | 70 | 12
Self-expressionist N=177: 30 | 54 | 16

Chart 9. Distribution of responses to questions among Traditionalists
Percent of respondents' response to each statement

■ Strongly agree ■ Agree ■ Neutral ■ Disagree ■ Strongly disagree

Q1. Biomedical research: 10 | 1 | 39 | 45 | 5
Q4. Avail in old-age: 4 | 0 | 54 | 14 | 28
Q5. Compatible with beliefs: 1 | 8 | 8 | 19 | 64

■ Strongly disagree ■ Disagree ■ Neutral ■ Agree ■ Strongly agree

Q3. Effects on population growth: 0 | 6 | 8 | 82 | 3

■ Option B: natural & artificial ■ Option A: natural only ■ Neither A nor B
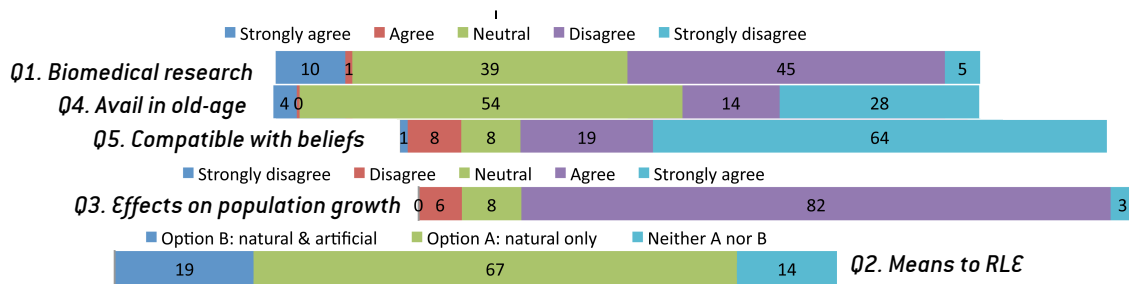
19 | 67 | 14   Q2. Means to RLE

Chart 10. Distribution of responses to questions among Secular-rationals
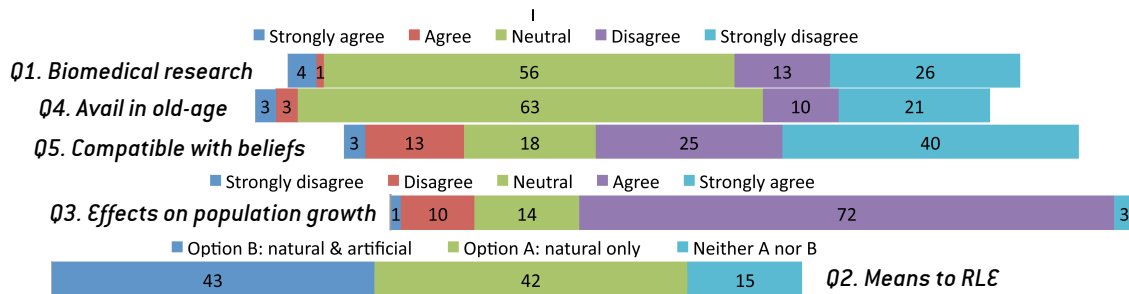### Percent of respondents' response to each statement

■ Strongly agree ■ Agree ■ Neutral ■ Disagree ■ Strongly disagree

Q1. Biomedical research: 4 | 1 | 56 | 13 | 26
Q4. Avail in old-age: 3 | 3 | 63 | 10 | 21
Q5. Compatible with beliefs: 3 | 13 | 18 | 25 | 40

■ Strongly disagree ■ Disagree ■ Neutral ■ Agree ■ Strongly agree

Q3. Effects on population growth: 1 | 10 | 14 | 72 | 3

■ Option B: natural & artificial ■ Option A: natural only ■ Neither A nor B

43 | 42 | 15   Q2. Means to RLE

Chart 11. Distribution of responses to questions among Survivalists
Percent of respondents' response to each statement

■ Strongly agree ■ Agree ■ Neutral ■ Disagree ■ Strongly disagree

Q1. Biomedical research: 10 | 1 | 39 | 45 | 5
Q4. Avail in old-age: 4 | 1 | 54 | 12 | 29
Q5. Compatible with beliefs: 1 | 10 | 8 | 19 | 61

■ Strongly disagree ■ Disagree ■ Neutral ■ Agree ■ Strongly agree

Q3. Effects on population growth: 0 | 5 | 9 | 81 | 4

■ Option B: natural & artificial ■ Option A: natural only ■ Neither A nor B
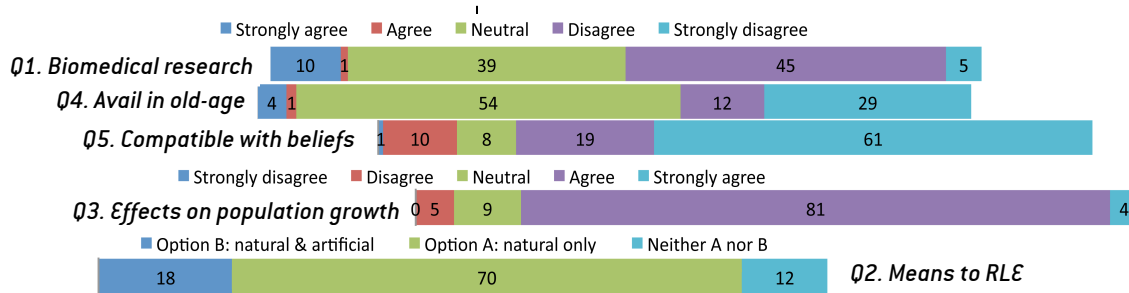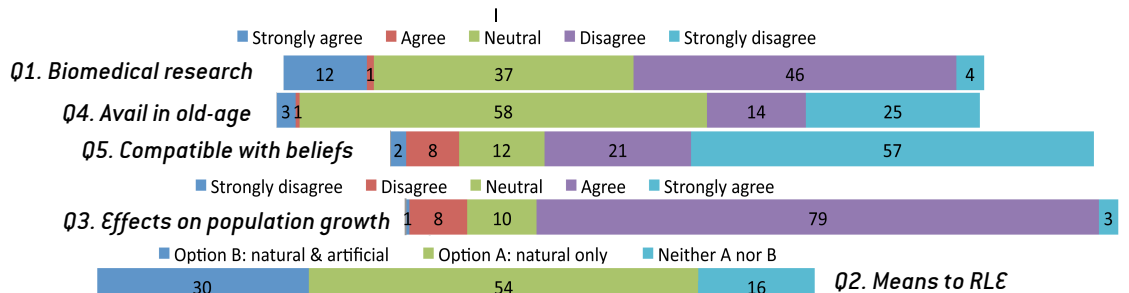
18 | 70 | 12   Q2. Means to RLE

Chart 12. Distribution of responses to questions among Self-expressionists
Percent of respondents' response to each statement

■ Strongly agree ■ Agree ■ Neutral ■ Disagree ■ Strongly disagree

Q1. Biomedical research: 12 | 1 | 37 | 46 | 4
Q4. Avail in old-age: 3 | 1 | 58 | 14 | 25
Q5. Compatible with beliefs: 2 | 8 | 12 | 21 | 57

■ Strongly disagree ■ Disagree ■ Neutral ■ Agree ■ Strongly agree

Q3. Effects on population growth: 1 | 8 | 10 | 79 | 3

■ Option B: natural & artificial ■ Option A: natural only ■ Neither A nor B

30 | 54 | 16   Q2. Means to RLE

Analysis of Reasons

We selected the top two reasons per decision in Tables 3 - 7 to explore the reasoning behind the mixed responses observed in the aggregated and group-based decisions. The reasons that were included in the tables were quoted verbatim from the online survey. We chose to present these as they were posted by participants without correcting for typographical or grammatical errors to present the actual words in their original form as written by participants. Adhering to a naturalized presentation of the actual words written by participants allowed us to capture a wealth of information and add rich detail to our analysis of these texts as dialogue between participants.[10] Favoring the natural as opposed to the idealized presentation of these reasons also made our analysis more transparent because it shows what the participants actually wrote.

The top reasons provide some details as to what participants think about ethical controversies surrounding RLE. Perhaps the dominance of disapproval of RLE across cultural groups corresponds to the kind of response that the disruption of well-established moral routines elicits (Swierstra & Rip, 2007), especially among those who may have undergone formal training or education that might have influenced moral routines related to existing technologies. As observed in the 2013 Pew Research study (Funk et al., 2013), those who have more formal education are slightly less inclined to say that RLE is a positive development for society.

'No' to RLE research because of overpopulation risk

Question 1 asks about the desirability of RLE biomedical research (Table 3). The top reason for disagreeing with allowing the pursuit of biomedical research on RLE (Q1) concerns the risk of overpopulation (197 votes). The same concern was mentioned in the top two reasons for strongly disagreeing. The top reason for being neutral was because of worries about extending life without quality (103 votes). The top reason for strongly agreeing was based on optimism that if technologies can be developed to extend life, then technologies can also be developed to solve problems associated with overpopulation (69 votes).

Don't know if I would avail myself of RLE when I am old

Question 4 asks whether participants would avail themselves of RLE in their old age (see Table 4). Most respondents (262 votes) who selected neutral chose the reason "Do not know how I will feel when old." Could the fact that most respondents were young university students be related to this response? We do not have survey participants in their advanced years so we do not know if age is correlated to this response.[11] The next reason chosen by most participants (101 votes) was *strongly agreeing* because aging is natural and RLE is selfish followed by *disagreeing* (69 votes) because of the risk of life extension without quality of life. Those who chose reasons to *agree* and *strongly agree* were optimistic about the greater opportunities RLE could offer.

To age is natural: accept death!

That aging is natural and death is acceptable was chosen by many (215 votes) as the reason for strongly disagreeing that RLE is compatible with deeply held beliefs (see Table 5). This was followed by responses that highlighted the risk of societal stagnation when lives are radically extended (124 votes). A few who were neutral chose the reason that death is acceptable. The top reasons cited for agreeing and disagreeing expressed optimism about opportunities and the value of freedom to choose.

Table 3. Top two reasons for each decision in Question 1

Decision	Vote	Rank	Reason	Code(s)	Cls
Strongly Disagree	14	1	RLE needs a great fund…Why not help the ones in need … you're not sure if it will be successful or not!? …if RLE will be successful, then the over-populated world will be more populated…be a big depletion of resources for sure because there will be a big competition for it. Third, the bad habits of people will continue like smoking, taking prohibited drugs, and many more. This is because …there's…RLE..	a. RLE is resource demanding b. Meeting needs should be prioritized c. RLE success uncertain d. overpopulation risk e. Depletion of resources f. Risk of careless living due to reliance on RLE	112
	13	2	…Extending the life of a person would add to the population and we cannot afford to have huge population now for we can't sustain it's needs.	a. overpopulation risk b. Depletion of resources	20
Disagree	197	1	The population on earth is increasing due to the fact that peoples live longer…The population on earth should follow the degree of increase in total technology development.	a. overpopulation risk b. Develop technology first before increasing population	31
	30	2	People wouldn't give importance much to their life because…there is RLE…They won't live their life to the fullest…	Risk of careless living due to reliance on RLE	57
Neutral	103	1	…trying to extend life without attention on improving the quality of life... Living life is about the person's ability not their age.	Risk of life extension without quality	33
	60	2	it is more like quality over quantity...A long life would be meaningless if there is an absence of value and love in that life and in the person living it…we…can never control or choose our death; but only choose how we will live.	a. Risk of life extension without quality b. Death unavoidable	30
Agree	6	1	…it may result in valuable technology across a range of fields, not necessarily just to make the technology available and extend normal people's lives by X years.	RLE may result to valuable technology	33
	2	2	…living healthy is not dangerous at all…It will also teach the people discipline…which can answer the issue others are saying-hunger and overpopulation's negative side effects. [*responds to overpop…]	a. RLE as healthy living b. Healthy living teach discipline c. Discipline will solve hunger and overpopulation	74
Strongly Agree	69	1	…one of the many ways that we can use technology…to create solutions for the overpopulation problem	Technology may solve overpopulation	43
	16	2	RLE is not just a matter of quantity, but of quality as well.	RLE can increase quality of life	43

Table 4. Top two reasons for each decision in Question 4

Decision	Vote	Rank	Reason	Code(s)	Cls
Strongly Disagree	101	1	when my natural life has run its course, I do not wish to…selfishly, extend it.	a. Aging is natural b. RLE is selfish	3
	10	2	If God wants me to live longer, He will heal me- no need for anything artificial. And, I want to meet my Savior.	a. Living longer is not up to me b. Death is acceptable	74
Disagree	69	1	I would not wish to extend my life if it did not include improving the quality of my life.	Risk of life extension without quality	33
	6	2	Life is a precious gift. Death is a limitation which is set in order for men to live their lives to the fullest, to value it, and to not take it for granted.	a. Acceptance of death b. Valuing life	11 1
Neutral	262	1	I am not in my advanced years, and have no notion about how I may or may not feel when I am	Do not know how I feel when old	33
	29	2	…I don't know what my life would be being an old man/lady..	Do not know how I feel when old	43
Agree	6	1	…the thought of passing on such an opportunity seems so idiotic. There are a lot of things that you can do here on earth that you cannot with only 80 years at hand…	RLE provides more opportunities	75
Strongly Agree	21	1	…It would give me more opportunities to be with the ones I love and care about. maybe, to do something else…	RLE provides more opportunities	33
	1	2	one lifetime is not enough to do all things in the world. We are human, we always crave for something. In the future, technologies will evolve very fast and new and new discoveries will arise, one lifetime is not enough to witness this, it is a waste not to chose to see the future that we could only imagine for now	RLE provides more opportunities	74

We should be concerned about overpopulation

Question 3 explicitly asked whether we should be concerned with overpopulation (see Table 6). Many (313 votes) said the reason they agreed was because we should be concerned that sustainable policy be prioritized and quality of life improved first. This was followed by reasons that expressed worry about the risk of further worsening the problem of unemployment (97 votes). Those who chose reasons to be neutral were unsure whether the benefits could outweigh the risks. Some participants who chose reasons to disagree seemed to disagree with RLE rather than with the statement about being concerned with the effect of RLE on population growth. Those reasons (not shown in the tables) are about the risk of boredom, the risk of increasing the number of retirees due to RLE, and preference of death over RLE.

Table 5. Top two reasons for each decision in Question 5

Decision	Vote	Rank	Reason	Code(s)	Cls
Strongly Disagree	215	1	People grow old, this has been a natural law for as long as human kind has existed...	a. Aging is natural b. Death is acceptable	31
	36	2	… unfair to the vast majority of the current population who are suffering because of the unsustainable way in which we have treated the earth so far, but also to future generations who must be denied life because we want to be here longer (if we are to ensure a sustainable population size in the futire)…	RLE is unfair to present and future generation	33
Disagree	124	1	eternal life seems like it would lead to a stagnant society - when everyone lives forever, new ideas get drowned in an ocean of preconception. Death, if nothing else, ensures motion.	Risk of societal stagnation	31
	6	2	…society is a mix of old and new values and is a balance between the two. If I live longer that I am prone to make decisions for society based on old values and hampering new values from existing...	Risk of societal stagnation	33
Neutral	33	1	RLE doesn't make death impossible. It just postpones it. So, even with the use of RLE accepting and coping with death will never disappear from our culture.	a. RLE postpones death b. Death is acceptable	74
	8	2	death is a sweet release for me if I were suffering so much for so long. Otherwise, it's perfectly reasonable that I want to extend my life if I would be able to do more being alive than dead for that particular period in my lifetime...	a. Death is acceptable if suffering b. RLE provides more opportunities	74
Agree	18	1	… we should study and Explorer all options available.	RLE should be studied and explored	33
	15	2	…While I do not wish to be physically immortal, being given the choice of extending my time in this world in order to appreciate and understand life better is always a plus for me.	RLE provides more opportunities	43
Strongly Agree	8	1	life is all about choices … extending the lives of those who wishes to do so is not entirely equivalent to denying life to the future generations.	RLE does not deny life to future persons	74
	1	2	I believe that we are born to live the life that we choose, if I choose to live longer that is my prerogative, I believe that we should always have a choice.	RLE should be allowed if chosen	74

Table 6. Top two reasons for each decision in Question 3

Decision	Vote	Rank	Reason	Code(s)	Cls
Strongly Disagree	1	1	overpopulation is not a problem if they can work harmoniously.	Overpopulation not a problem	74
Neutral	39	1	If there are little recourses due to overpopulation than persons can not benefit society - however if a person lives longer they can in return provide more benefit to society with the recourses that where already invested. What is true that in order to grow as a society we need a constant recycle of persons…	a. Overpopulation risk b. longer life benefits society c. constant replacement of people good for society	33
	21	2	We do not know enough about overpopulation. With the technology level RLE requires, technologies to address possible problems concerning overpopulation may be available at the time it would be necessary in a RLE perspective.	a. Overpopulation risk b. RLE requires technologies to solve overpopulation	33
Agree	313	1	… we must first worry about developing a sustainable and compassionate policy to raise the quality of life for all persons before we start worrying about extending life beyond what is currently unsustainable.	Sustainable policy priority over RLE	33
	97	2	it seems unlikely that there would be enough jobs for everyone. By not having any retirement, the positions in various companies would be extremely rigid - you can not easily fire someone who has held the same job for 40 years, let alone 100. The prospects for new employees would thus be low, and we could see a class division arising between old and young.	a. Jobs will become scarce b. Hiring requirements will become rigid c. Risk of conflict between young and old workers	31
	6	1	… not aging at all means that there's no purpose on having a child thus no evolution will happen.	Risk of societal stagnation	74
Strongly Agree	2	2	…If the average life span of the individual is going to rise by RLE, then feeding, curing and housing will be more complex issues than ever before.	Meeting basic needs will become more difficult	198

OK if RLE is done in a natural way?

Question 2 tested whether participants were willing to consider natural means to achieve RLE (Table 7). Many chose the reason (230 votes) that expressed willingness to support RLE if the methods to be used were exclusively natural. This was followed by the reason that supported combining natural with artificial means if proven safe and effective (76 votes). Some insisted that RLE couldn't be natural (36 votes). A significant number of participants (65 votes) said

the reason for rejecting RLE whether by natural or artificial means was because improving the environment should be the priority.

Table 7. Top two reasons for each decision in Question 2

Decision	Vote	Rank	Reason	Code(s)	Cls
I prefer neither A nor B	65	1	…If we want to extend life then we need to extend it first and foremost by improving our enviroment (what is the point of living longer in an unhealthy enviroment?).	Improving the environment is priority	33
	14	2	i don't think RLE is a desirable approach, therefore of course i can not prefer a method heading towards it.	RLE is not desirable	31
Option A: natural only	230	1	This is the natural way of dealing with aging.	This is the natural way	31
	23	2	the long-term side effects of option B will take a long time to discover, especially because large companies have an interest in them not to be discovered.	Artificial means will have side effects in the long-term	33
Option B: natural and artificial	76	1	with the help of natural means and the additional aid of pharmaceuticals, genetic engineering, and nanotechnology, it is not beyond the realm of possibility for us to be capable of altering ourselves to someday become immune to diseases… This is all in the context of a situation wherein both natural and artificial methods are already proven to be safe and effective…	a. combining natural and artificial means makes RLE possible b. if proven safe and affective	43
	36	2	there is nothing natural about RLE - making this seperation seems pointless.	RLE is not natural	31

The effect of face-to-face discussions

The face-to-face discussion in stage 2 of the N-Reasons survey seems to have had little effect on participants with respect to changing their decisions. The majority seemed to persist in disagreeing with statements and reasons that support RLE. Out of the 40 participants who reconsidered their choice of reasons posted on each of the five questions in stage 3, only five participants changed their responses.

Discussion

Attitudes toward radical life extension did not correspond to cultural attitudes indicated by responses to the World Values Survey questions. The proportion of agreement/disagreement to statements presented in each of the five questions varied across cultural groups and there

tended to be more individuals who disagreed with radical life extension in all groups. Changes in responses after the discussion stage were not significant and most respondents maintained their prior views about the technology.

James Hughes (2010) has suggested that in biopolitics technoprogressives will not be able to forge consensus on issues related to human enhancement technologies (such as RLE) with right-bioconservatives because members of this latter group are ideologically opposed to the cultural values that members of the former group hold. Technoprogressives should rather strategically forge alliances with left-bioconservatives (e.g. greens and environmental activists) since this group shares some cultural values that their members favor. However, as suggested by responses to the five questions in our survey, there tends to be a mix from each of the cultural groups, categorized according to WVS categories, of those who agree and disagree with RLE as enhancement technology. Analyzing group responses, categorized according to certain cultural categories as biopolitical values or ideology, may not be as simple and straightforward as one could expect, since mixed preferences may be observed within groups who are asked to make decisions about certain technoethical issues. This is especially the case with new technologies that have not yet been subjected to the evolving societal response that creates certain moral routines or habits with regard to such technologies (Swierstra & Rip, 2007). As is the case with new and emerging technologies, these will disturb previously created moral routines and elicit opposition across groups who will disagree with such routines and adopt new ones. It remains to be seen whether this kind of disturbance will create new moral routines or the old will be reasserted. The decision might hinge on whichever old or new moral routine emerges as a successful strategy in dealing with the new technology. In any case, the majority might adopt the successful strategy but this does not necessarily mean that the group will adopt pure strategies (Danielson, 2006). Our observation of mixed responses across cultural groups seems to support this possibility and the dominance of opposition to RLE as a new/emerging technology seems consistent with the disturbance of moral routines pattern suggested by Swierstra & Rip (2007).

Conclusion

The categorization of cultural attitudes toward more familiar technologies may not correspond with attitudes to newer technologies since beliefs and values may need to adapt to new imagined situations that new technologies elicit. Moral understandings associated with familiar technoethical habits and beliefs are not necessarily carried over in relation to new technologies. This will depend on how successful these habits and beliefs are in dealing with new technologies. Existing resource-demanding life extension technologies used to treat the terminally ill and very old yield little gains such that people tend to oppose these technologies as wasteful if not lowest priority. When futuristic radical extension technologies appear to resemble the same cost-inefficiencies as are found in existing expensive treatments, similar responses could be expected. However, more cost-effective life extending technologies such as vaccinations, antibiotics, and preventive measures are associated with moral routines that seem to successfully support these technologies such that any resemblance found in new emerging technologies as RLE would be invoked as reasons to support or consider these new technologies.

Acknowledgements

Notes

[1] The journal articles are (Oeppen & Vaupel, 2002) and (de Grey, 2003).

[2] The articles included were (Central Intelligence Agency, 2013) and (Whitney, 1997).

[3] See (G. C. Daily, Ehrlich, & Ehrlich, 1993) cf. (G. Daily, Ehrlich, & Ehrlich, 1994).

[4] See (Gavrilov & Gavrilova, 2010).

[5] See (Gunasekera, Tiller, Clements, & Bhattacharya, 1986).

[6] See (Inglehart & Welzel, 2010) and Appendix 2 for the list of statements included.

[7] Two of the authors, Alvarez and Mendoza, were guest instructors for a couple of classes that adopted the survey. Mendoza adopted the survey in a few his courses and Francis Evangelista adopted the survey in two of his critical thinking courses as application exercises to sharpen student skills in reasoning in relation to controversial issues.

[8] Selected key scenes from the CBC documentary on life extension *Living Forever: The Longevity Revolution* (2007) from The Nature of Things series with David Suzuki.

[9] Fig. 2 is adopted from WVS http://www.worldvaluessurvey.org. A copy of the map is available at http://www.iffs.se/wp-content/uploads/2012/12/Culture-Map_WVS5.jpg. Retrieved 24 April 2015.

[10] This is referred to in transcription literature as "naturalism" or "naturalized approach" to conversation analysis (Oliver, Serovich, & Mason, 2005).

[11] The authors are not aware of similar surveys on RLE conducted among elderly cohorts but surveys on preference for Cardio Pulmonary Resuscitation (CPR) conducted among elderly participants seem to indicate that old people would prefer some form of life extension made possible, for example, by CPR. The following studies report that elderly people prefer CPR: (Cherniack, 2002); (Bruce-Jones, Roberts, Bowker, & Cooney, 1996); (O'Brien, Grisso, Maislin, et al., 1995); (Gunasekera et al., 1986).

References

Bruce-Jones, P., Roberts, H., Bowker, L., & Cooney, V. (1996). Resuscitating the elderly: what do the patients want? *Journal of medical ethics, 22*(3), 154-159. doi: 10.1136/jme.22.3.154

Central Intelligence Agency. (2013). Country Comparison: Life Expectancy at Birth *The World Factbook* Retrieved from https://www.cia.gov/library/publications/the-world-factbook/rankorder/2102rank.html

Cherniack, E. P. (2002). Increasing use of DNR orders in the elderly worldwide: whose choice is it? *Journal of medical ethics, 28*(5), 303-307. doi: 10.1136/jme.28.5.303

Daily, G., Ehrlich, A., & Ehrlich, P. (1994). Optimum human population size. *Population and Environment, 15*(6), 469-475. doi: 10.1007/bf02211719

Daily, G. C., Ehrlich, A. H., & Ehrlich, P. R. (1993). Optimum Human Population Size. *Race, Poverty and Environment, 4*(2).

Danielson, P. (2006). From artificial morality to NERD: models, experiments, and robust reflective equilibrium. In L. M. Rocha, L. S. Yaeger, M. A. Bedau, D. Floreano, R. L. Goldstone & A. Vespignani (Eds.), *Artificial Life X: Proceedings of the Tenth International Conference on the Synthesis and Simulation of Living Systems* (pp. 45-48). Cambridge: MIT Press.

Danielson, P. (2010). Designing a machine to learn about the ethics of robotics: the N-reasons platform. *Ethics and information technology, 12*(3), 251-261.

de Grey, A. D. N. J. (2003). The foreseeability of real anti-aging medicine: focusing the debate. *Experimental Gerontology, 38*(9), 927-934. doi: http://dx.doi.org/10.1016/S0531-5565(03)00155-4

Dragojlovic, N. (2013). Canadians' support for radical life extension resulting from advances in regenerative medicine. *Journal of Aging Studies, 27*(2), 151-158. doi: http://dx.doi.org/10.1016/j.jaging.2012.12.008

Dutta-Bergman, M. J. (2004). Primary Sources of Health Information: Comparisons in the Domain of Health Attitudes, Health Cognitions, and Health Behaviors. *Health Communication, 16*(3), 273-288. doi: 10.1207/s15327027hc1603_1

Funk, C., Lugo, L., Cooperman, A., Masci, D., Smith, G., Martinez, J. H., Fox, S. (2013). Living to 120 and Beyond: Americans' Views on Aging, Medical Advances and Radical Life Extension Retrieved from http://www.pewforum.org/files/2013/08/Radical-life-extension-full.pdf

Gavrilov, L. A., & Gavrilova, N. S. (2010). Demographic Consequences of Defeating Aging. *Rejuvenation Research, 13*(2-3), 329-334.

Gunasekera, N. P. R., Tiller, D. J., Clements, L. T. S.-j., & Bhattacharya, B. K. (1986). Elderly patients' views on cardiopulmonary resuscitation. *Age and Ageing, 15*(6), 364-368. doi: 10.1093/ageing/15.6.364

Hughes, J. (2010). Technoprogressive Biopolitics and Human Enhancement. In J. D. Moreno & S. Berger (Eds.), *Progress in Bioethics: Science, Policy, and Politics* (pp. 163-188). Mass.: MIT Press.

Inglehart, R., & Welzel, C. (2010). Changing Mass Priorities: The Link between Modernization and Democracy. *Perspectives on Politics, 8*(02), 551-567. doi:10.1017/S1537592710001258

O'Brien, L. A., Grisso, J., Maislin, G., & et al. (1995). Nursing home residents' preferences for life-sustaining treatments. *JAMA, 274*(22), 1775-1779. doi: 10.1001/jama.1995.03530220041030

Oeppen, J., & Vaupel, J. W. (2002). Broken Limits to Life Expectancy. *Science, 296*(5570), 1029-1031. doi: 10.1126/science.1069675

Oliver, D. G., Serovich, J. M., & Mason, T. L. (2005). Constraints and Opportunities with Interview Transcription: Towards Reflection in Qualitative Research. *Social forces; a scientific medium of social study and interpretation, 84*(2), 1273-1289.

Partridge, B., Lucke, J., Bartlett, H., & Hall, W. (2009). Ethical, social, and personal implications of extended human lifespan identified by members of the public. *Rejuvenation Research, 12*(5), 351-357.

Swierstra, T., & Rip, A. (2007). Nano-ethics as NEST-ethics: patterns of moral argumentation about new and emerging science and technology. *Nanoethics, 1*(1), 3-20.

Whitney, C. R. (1997). Jeanne Calment, World's elder, dies at 122. *New York Times, 8*(5), 97.

Appendices

Appendix 1: *Five main survey questions*
   1. To what extent do you agree, disagree that RLE is a desirable goal for biomedical research?
   2. If scientists could find safe and effective ways to radically extend life, which of the following means to RLE should we choose?
      Option A**:** Only *natural* means, such as healthy diet and lifestyle.
      Option B**:** Both natural and *artificial* means, such as pharmaceuticals, genetic engineering and nanotechnology.
   3. Given the above contending projections [refers to the information presented in the vignette] of the consequences of RLE, should we be concerned about its effects on global population growth?
   4. Would you avail of radical life extension if you were already in an elder care facility or in your advanced years, say, when you are already between 80 - 100?
   5. If you compare your own values and cultural traditions with the idea of radically extending life beyond 122 years, to what extent do you agree, disagree that RLE is compatible with your own deeply held beliefs?

Appendix 2: *Cultural values questionnaire (20 statements based on World Values Survey)*
   List of statements in the cultural attitudes questionnaire (question number corresponds to the actual number assigned for data query):
   0| God is very important to my life
   4| I aim to give time for prayer, meditation or contemplation
   8| Following customs and traditions handed down by my religion and family is important to me
   10| I have a strong sense of national pride
   12| There should be greater respect for authority
   14| My family is very important to me
   16| A child needs a home with both a father and a mother in order to grow up happily
   18| A woman has to have children to be fulfilled
   24| It is more important for a child to learn obedience and religious faith than independence and determination
   26| Abortion should never be allowed
   1| Men make better political leaders than women
   7| I do not need to recycle things to protect the environment
   9| I do not need to attend a meeting or sign a petition to protect the environment
   11| A good income and safe job are more important than a feeling of accomplishment and working with people you like
   15| When jobs are scarce, a man has more right to a job than a women
   17| Government should ensure that everyone is provided for
   19| Hard work is more important to teach a child than imagination
   23| Tolerance is not of the most important things to teach a child
   25| When jobs are scarce, employers should give priority to local people over immigrants
   31| You have to be very careful about trusting people

Scores are assigned corresponding to choices:
   Strongly Agree=4, Agree=3, Neutral=2, Disagree=1, Strongly Disagree=0.

Total score between 21-40 on even-numbered statements indicates traditional values, total score of 0-20 secular-rational values. Total score between 21-40 on odd numbered statements indicates survival values, total score of 0-20 secular-rational values.

For example:
    user 624 - even number score = 15 (preference toward secular-rational values)
        - odd number score = 14 (preference toward self-expression values)

    user 403 - even number score = 22 (preference toward traditional values)
        - odd number score = 28 (preference toward survival values)

Appendix 3: *Health attitudes questionnaire (11 statements derived from Dutta-Bergman (2004) study: the first five statements are from the Health consciousness measure and seven statements from the Health-oriented beliefs measure)*

List of statements in the health attitudes questionnaire
  0| Living life in the best possible health is very important to me
  1| Eating right, exercising, and taking preventive measures will keep me healthy for life
  2| My health depends on how well I take care of myself
  3| I actively try to prevent disease and illness
  4| I do everything I can to stay healthy
  5| Eating a diet that is low in fat is important to me
  6| I aim to eat lots of fruits, vegetables and grains
  7| I aim to drink plenty of water every day
  8| Taking vitamins and mineral supplements regularly is important
  9| Not smoking cigarettes is important for my health
  10| Not drinking alcohol or drinking in moderation is my goal
  11| Maintaining a healthy body weight is important to me

Scores are assigned corresponding to choices:
    Strongly Agree=4, Agree=3, Neutral=2, Disagree=1, Strongly Disagree=0.

For example:
    user 624 total score = 25 (moderately health-conscious)
    user 757 total score = 45 (very health-conscious)

Very health conscious = score of 37 to 48
Moderately health conscious = score of 24 to 36
Not so health conscious = score of 12 to 23
Not health conscious = 0

How health-conscious were the groups in this survey?
    Results of the health attitudes questionnaire (see Chart 13 below) showed that 50% of all participants were moderately health-conscious, 49% were very health conscious, and only 1% were not so health-conscious.

Chart 13. Percent of participants indicating degree of being health-conscious (N=326)

■ Not so health-consicous   ■ Moderately health-conscious   ■ Very health-conscious

| 1 | 50 | 49 |