What does the excessive use of 50% mean?

Sanne Willems - Reading Group, 2021-09-14


50% "blips"

Figure 1: Response distributions for judged probabilities of (A) surviving in the next 10 years and (B) dying in the next 10 years.
Why a problem?

50 blips give an artificial increase (/decrease) in aggregated judgments for events that typically have smaller (/larger) probabilities.

-> as suggested by Ruben during my previous presentation
What do they mean?

Some possibilities mentioned by Fischhoff & Bruine de Bruin (1999):

• Insensitivity to probabilities in the middle range, i.e. participants use 50% for anything in the 40-60% range
  -> probably not, lump remains if you spread the responses over 40-60% interval

• Real differences in beliefs; it is a coincidence?

• Other meaning -> “I really don’t know”
  • Laplacian = placing equal probability on all hypothesis (2 outcomes here)
  • Epistemic uncertainty = not knowing what probabilities to use to express one’s state of belief
Does the answer mode have an influence?
Fischhoff & Bruine de Bruin (1999) – study 2

Estimative probability:
• Open-ended question: .......... %
• Linear scale: 0 –100%
• Log-linear scale: 0-100% + log scale extension between 0-1%
Does the answer mode have an influence?
Fischhoff & Bruine de Bruin (1999) – study 2

Results:

Open-ended

Linear 0-100 %

Log-linear 0-1% and −100%
50% = Absolutely no idea?
Fischhoff & Bruine de Bruin (1999) – study 1

2 answer modes:
• Open-ended question: .......... %
• Linear scale: 0 –100%

Additional option: check box “absolutely no idea”

Option was given to about half of the participants in each of the answer modes conditions -> four groups
50% = Absolutely no idea?
Fischhoff & Bruine de Bruin (1999) – study 1

Results:

• 27.5% of participants used the “absolutely no idea” option
• “absolutely no idea” option was used almost twice as frequently when no scale was presented (13.9% vs. 7.9%, but difference not significant)
• Responses of 50% were less common with the “absolutely no idea” option (6.8% vs. 1.8%)
Further investigating “no idea” option
Bruine de Bruin & Carman (2012)

New study; ask participants to explain their probabilities

1. Fill in the blank:
   I have a ..........% probability of living/dying in the next 10 years.

2. Explain your probability; good estimate vs. don’t know:
   • I think that x% is a relatively good estimate, but I’m not quite sure it’s right
   • I think that x% is a relatively good estimate, but I don’t like to think about it too much.
   • I actually have no idea about the chances
   • No one can know the chances

3. Other measures (numeracy, education, age, self-reported serious health issues, number of visits to medical specialist)
Further investigating “no idea” option
Bruine de Bruin & Carman (2012)

Main research question:
Is 50% more likely than other probabilities to be used as an expression of not knowing what number to use?
Further investigating “no idea” option
Bruine de Bruin & Carman (2012)

Results:

• Peaks in both framings
  (17.5% v. 16.4%, $\chi(1) = 0.25$, $p = 0.62$)

• People who used 50%
  • had lower levels of education:
    10.3% vs 19.8% having a college degree
    ($\chi(1) = 13.21$, $p < 0.001$)
  • Answered a lower proportion of the numeracy
    questions correctly:
    0.63 [0.23] vs. 0.67 [0.25]
    ($t(1018) = 2.15$, $p = 0.03$)
Further investigating “no idea” option
Bruine de Bruin & Carman (2012)

Results:

• 50% was more likely than other probabilities to be explained as “don’t know”

• Also after controlling for other characteristics

Table 1: Percent of Respondents Using Different Explanations for Their Probability Judgments, in Overall Sample, and by Probability Judgment, Education and Numeracy

<table>
<thead>
<tr>
<th></th>
<th>Overall sample</th>
<th>Probability judgment</th>
<th>Education</th>
<th>Numeracy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Not Quite Sure</td>
<td>Don’t Like to Think about It</td>
<td>No Idea</td>
</tr>
<tr>
<td>Overall sample</td>
<td>1020</td>
<td>16.5</td>
<td>20.2</td>
<td>11.6</td>
</tr>
<tr>
<td>Probability judgment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50%</td>
<td>173</td>
<td>6.4</td>
<td>12.7</td>
<td>13.9</td>
</tr>
<tr>
<td>Other</td>
<td>847</td>
<td>18.5</td>
<td>21.7</td>
<td>11.1</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No college degree</td>
<td>676</td>
<td>11.8</td>
<td>19.5</td>
<td>10.1</td>
</tr>
<tr>
<td>College degree</td>
<td>292</td>
<td>27.7</td>
<td>22.3</td>
<td>14.0</td>
</tr>
<tr>
<td>Numeracy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low numeracy</td>
<td>585</td>
<td>11.3</td>
<td>19.0</td>
<td>12.1</td>
</tr>
<tr>
<td>High numeracy</td>
<td>435</td>
<td>23.4</td>
<td>21.8</td>
<td>10.8</td>
</tr>
</tbody>
</table>

*aA total of 968 respondents reported whether or not they had a college education.
*bNumeracy groups were split by their median ($= .73$). Mean numeracy differed significantly across the 4 respective explanations ($t = .75$ $[.22]$ v. $ .69$ $[.24]$ v. $.66$ $[.23]$ v. $.63$ $[.25]$), $F(3, 1016) = 9.95$, $P < 0.001$, as well as their “good estimate” ($t = .71$ $[.23]$) v. “don’t know” categories ($t = .64$ $[.25]$), $t(1016) = 4.73$, $P < 0.001$. 
Further investigating “no idea” option
Bruine de Bruin & Carman (2012)

Results:
• Respondents with lower education and numeracy were relatively more likely to use the “don’t” know option.
Further investigating “no idea” option
Bruine de Bruin & Carman (2012)

Conclusions:
• 50% is more likely than other probabilities to be explained as not knowing what number to use
• especially among individuals with low education and numeracy

Limitation?
• Only looked at judged probabilities of living or dying. Will “don’t know” explanations be less common with probabilities about events that evoke less uncertainty?
Further investigating “no idea” option
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Limitations

• Only looked at judged probabilities of living or dying. Will “don’t know” explanations be less common with probabilities about events that evoke less uncertainty?

• The follow-up question does not specify *how much* uncertainty the respondents experienced.

Advice: the follow-up question can be used to assess how well a person understands a risk.
Did we find the 50% blips too?

Ruben  
Sanne, Casper, Ionica

<table>
<thead>
<tr>
<th>Risk Information</th>
<th>Less Numerate</th>
<th>Highly Numerate</th>
</tr>
</thead>
<tbody>
<tr>
<td>No comparative risk information</td>
<td><img src="image1.png" alt="Graph" /></td>
<td><img src="image2.png" alt="Graph" /></td>
</tr>
<tr>
<td>Personalized risk above average (10%)</td>
<td><img src="image3.png" alt="Graph" /></td>
<td><img src="image4.png" alt="Graph" /></td>
</tr>
<tr>
<td>Personalized risk below average (40%)</td>
<td><img src="image5.png" alt="Graph" /></td>
<td><img src="image6.png" alt="Graph" /></td>
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</tbody>
</table>