Getting better judgement

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A disturbing example

- Sentencing and parole decisions can depend on…

    – Irrelevant dice rolls

    – Before or after snack times

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What is expert judgement?

The Guess Universe*

Unconsidered guesses:

Do not make the optimum use of all information available

Spectrum of expert judgements currently used in actuarial work

High quality expert judgement

Considered guesses that make full use of relevant information elicited in an unbiased manner to form a coherent view

Dubious quality guesses

Uninformed or partially informed guesses:

Do not seek out further information that may be relevant for consideration

* Cambridge Online Dictionary defines 'guessing' as the act of "giving an answer to a particular question when you do not have all the facts and so you cannot be certain if you are correct". Expert judgement would hence fall into this spectrum.

Working party members

Nicholas Bonello (speaker today), Steven Fisher, Michael Garner, Sejal Haria, Bernadette Hlavka, Helen Lau, Jo Lo, Catherine Scullion, Ed Tredger (chair)

Bias, guess and expert judgement in actuarial work

A report by the Getting Better Judgement working party:

https://www.actuaries.org.uk/documents/bias-guess-and-expert-judgement-actuarial-work-gbj-wp-paper-final

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Outline

- Motivation

- **Cognitive heuristics and biases**

- The elicitation process

- Blending judgement with data

- Next steps

Cognitive heuristics and biases

Small sample bias

Anchoring

Overconfidence

Availability

Substitution
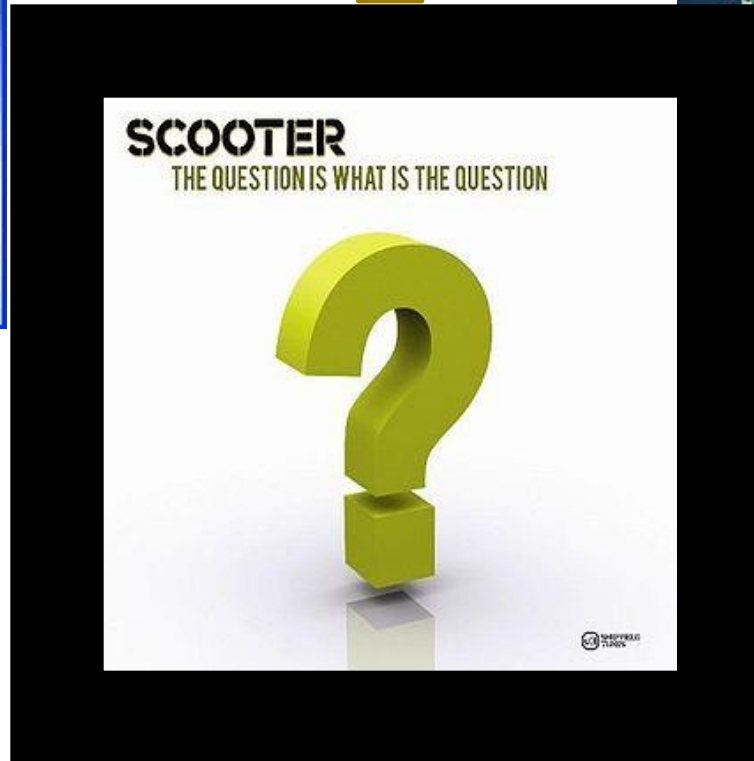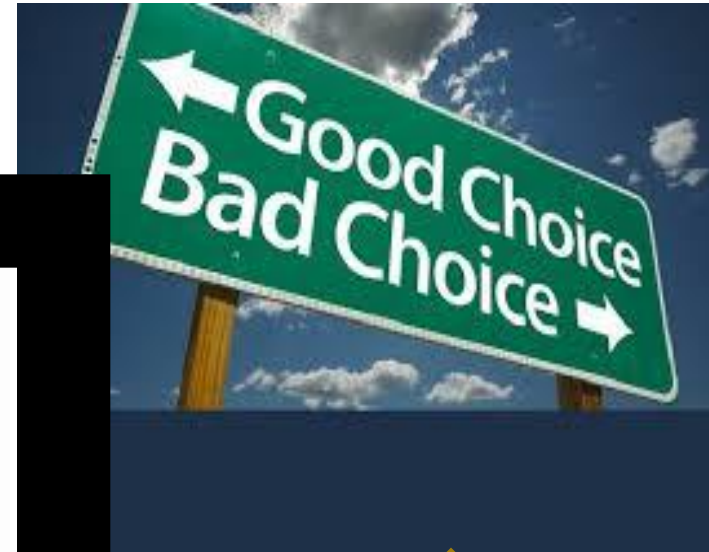
Framing

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Group elicitation

Selection / Priming of experts

Final selection and rationalisation

SCOOTER
THE QUESTION IS WHAT IS THE QUESTION

Good Choice
Bad Choice

Brainstorming

Narrowing down choices

FUNNELING
A Critical Lake Issue

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How an elicitation may be carried out

- Bias will almost always be present - there is not necessarily a 'silver bullet'

- Need to manage biases; e.g.,
    - Framing – consider how the question is asked?
    - Substitution bias – is there a risk that an easier question is being answered?
    - Availability biases – awareness of recent events may influence the results
    - Anchoring – e.g., data anchors

- Encourage thinking 'slow' rather than following 'gut feel'

- Need to show the rationale for judgements!

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The elicitation process – an example

For a portfolio similar to your own, what is the highest gross loss ratio an underwriter would expect to see in a 40 year career?

Maybe 300%?

The elicitation process – an example

For a portfolio similar to your own, what is the highest gross loss ratio an underwriter would expect to see in a 40 year career?

I've been in the market for 30 years and the worst I've seen is 200%...
That was 2005 when there were 7 major hurricanes, of which 3 incurred significant insured losses…
Now exposures are probably 20% higher and rates are 10% lower. That would make the loss ratio to about 270%...
Furthermore, an underwriter could get unlucky and be hit worse than we were in that year …
say making the overall worst in career case about **300%**.

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Another example – estimating low frequency high severity events

*What do you **expect your 1 in 200 loss** to be?*

- *"Expect"* … an implication of an (unclear) technical term?

- *"Your"* … personal?

- *"1 in 200"* … last or next? Statistically challenging?

- *"Loss"* … ambiguous?

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Some conclusions

- Capture the expert's rationale

- Be aware of the language used

- Biases will almost always be present

- Be realistic

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Blending judgement with data

- Expert judgement is not always used in isolation

  – Can be blended with the usually limited data

  – We can then determine an appropriate blended estimate

- This blending is typically carried out using actuarial judgement

  – which can be also subjective, biased etc.

- Can we improve the blending process?

Data

Expert judgement

Existing Calibration

Calibration update

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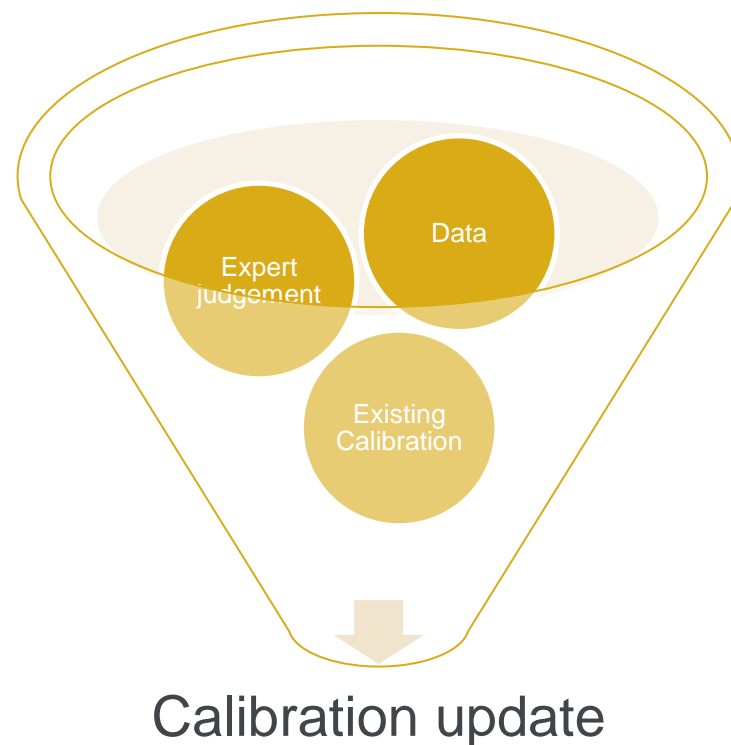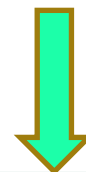
Blending judgement with data – Example 1

Testimonial evidence
- Witness(es)
- Suspect(s)
- …

Physical evidence
- DNA evidence
- Biological material
- …

Judge

- How much should I trust the *testimonials?*
- How much should I rely upon the *physical evidence*?

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Blending judgement with data – Example 2

I've been in the market for 30 years and the worst gross loss ratio I've seen is 200%...

That was 2005 when there were 7 major hurricanes, of which 3 incurred significant insured losses…

Now exposures are probably 20% higher and rates are 10% lower. That would make the loss ratio to about 270%...

Furthermore, an underwriter could get unlucky and be hit worse than we were in that year …

say making the overall worst in career case about 300%.

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Blending judgement with data – an example

I've been in the market for 30 years and the worst I've seen is 200%...

That was 2005 when there were 7 major hurricanes, of which 3 incurred significant insured losses…

DATA

Now exposures are *probably* 20% higher and rates are 10% lower. That would make the loss ratio to *about* 270%...

Furthermore, an underwriter could get unlucky and be hit worse than we were in that year …

JUDGEMENT

say making the overall worst in career case *about* 300%.

BLENDING

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Bayesian statistics

- Bayesian credibility formula:

   Blended estimate = [*Z* x data] + [(1 − *Z*) x expert judgement]

where *Z* = Bayesian credibility weight

- This question in our interest is the following:

   How does this Bayesian blended estimate compares to blending using only our judgement?
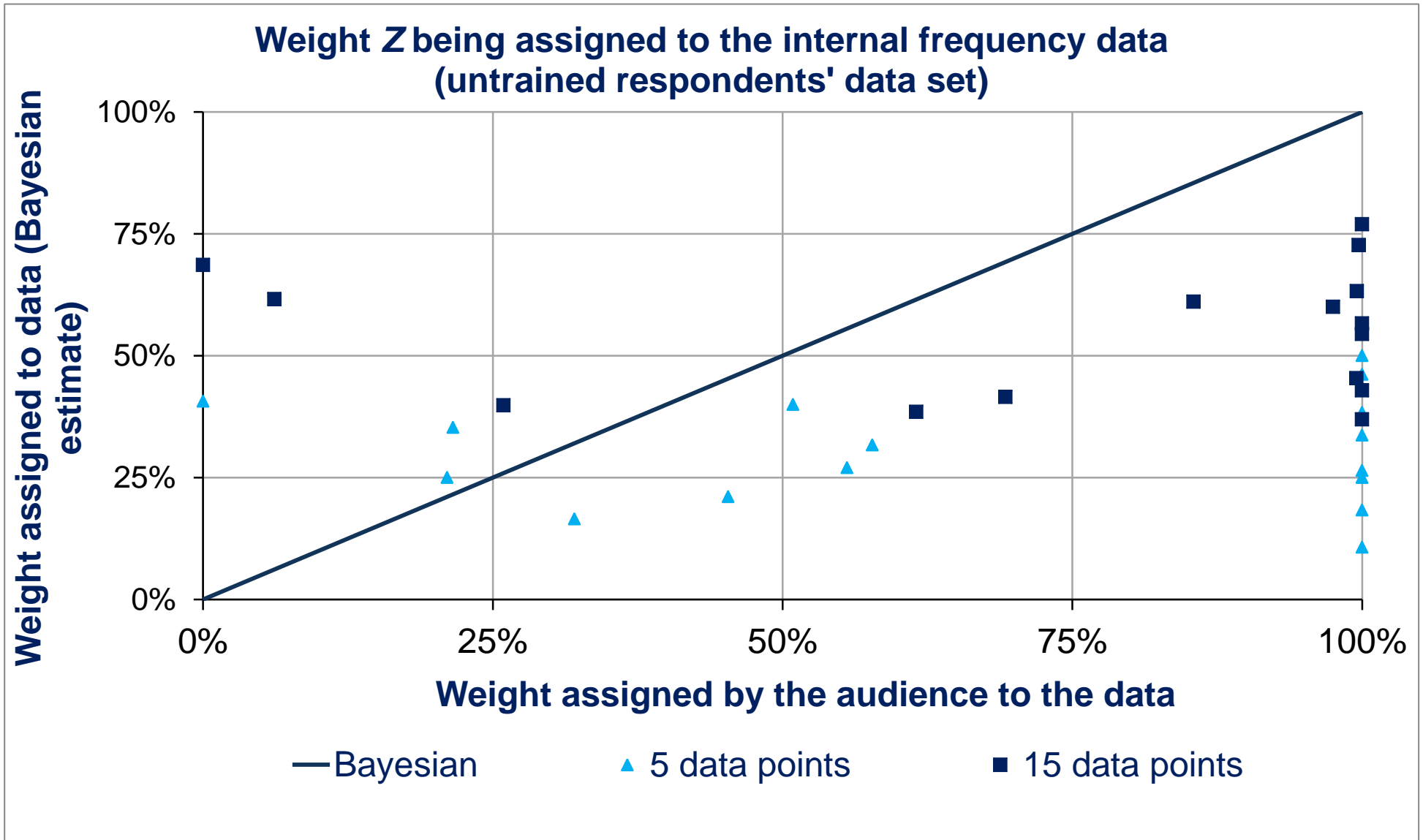
Our empirical experiment

- We have asked actuaries to update the best estimate loss frequency for a particular line of business.

- Participants were given:

  – *Internal frequency data* – each data point provided represented the loss frequency in a particular year. Some participants were provided with 5 years of internal data, others were provided with 15 years.

  – *Expert judgement* on the frequency of losses based on a survey of market experience.

- Aim was to look for evidence as to whether actuaries exhibit bias in their judgement compared with the Bayesian estimate.

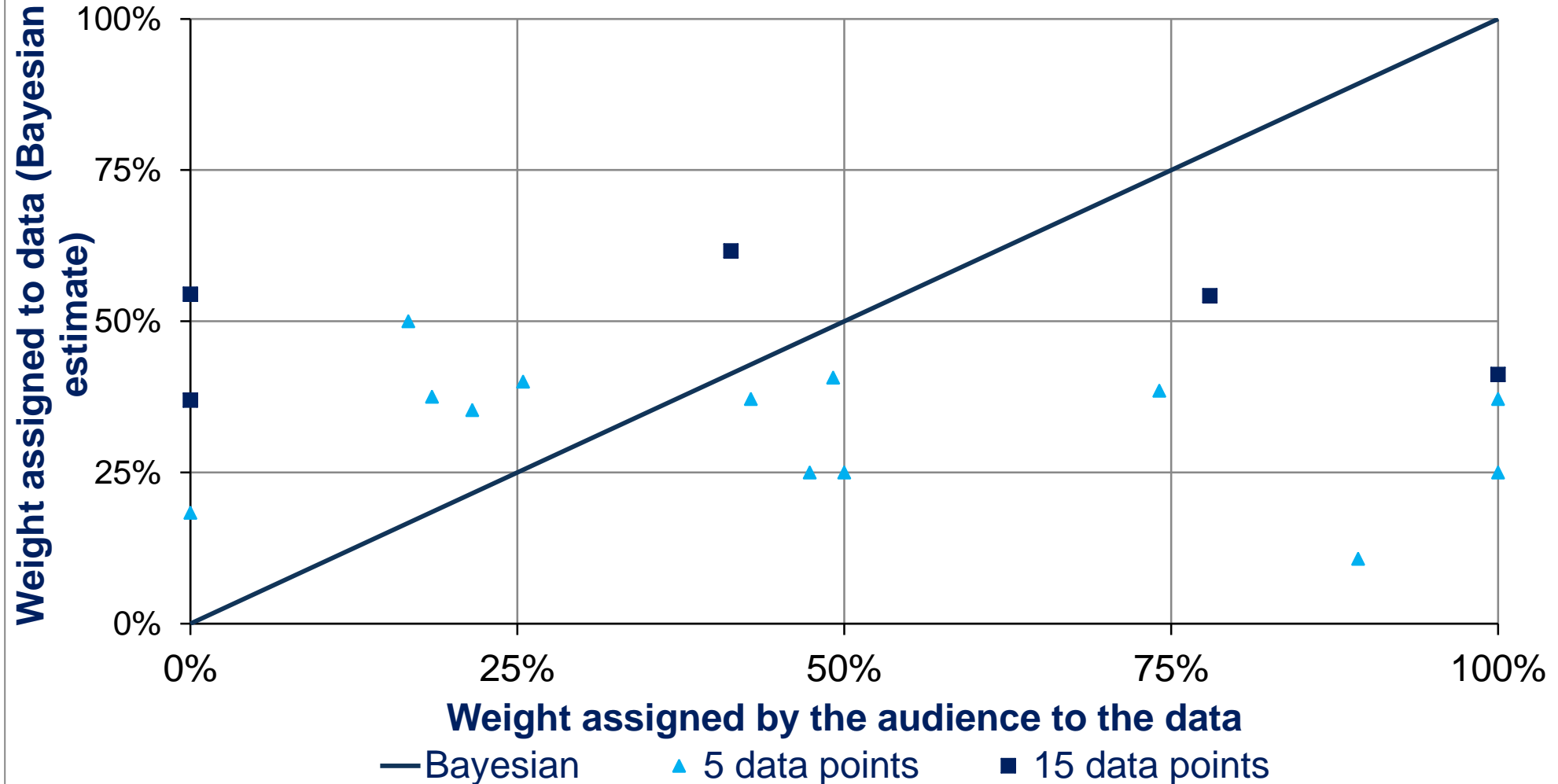- Two different audiences (untrained vs. trained)

Is the judgement of our audience Bayesian?

Weight *Z* being assigned to the internal frequency data
(untrained respondents' data set)

Y-axis: Weight assigned to data (Bayesian estimate)
X-axis: Weight assigned by the audience to the data

Legend: — Bayesian ▲ 5 data points ■ 15 data points

Can training improve the quality of judgement?

Weight *Z* being assigned to the internal frequency data
(trained respondents' data set)

Weight assigned to data (Bayesian estimate) (y-axis: 0%, 25%, 50%, 75%, 100%)

Weight assigned by the audience to the data (x-axis: 0%, 25%, 50%, 75%, 100%)

— Bayesian   ▲ 5 data points   ■ 15 data points

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What others have said - what do you say?

- "It was interesting to see behavioural theories being applied in a GI context – in particular the tips on how to use understanding of cognitive biases to improve information elicitation" (reserving actuary)

- "Using the right words to trigger the response you want is key to communication and influencing others." (financial modeller)

- "Working in reinsurance pricing, this talk was highly relevant as judgements are made on a daily basis. The topics explored are rarely talked about yet hold great significance if striving for better judgements – which I would hope most people aim for" (pricing)