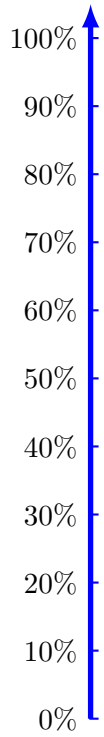
2.2 Lesson How probable is probable?

Exercise 4 — Interpretation of words for uncertainty 🖌. We all use a wide variety of terms to indicate uncertainty -'could', 'maybe', 'possible'- and so on. Can these be interpreted as numerical probabilities? Read the following paragraph.

> Arthur was worried. It was almost certain there would be a maths test today, and he hadn't been paying much attention recently. Sally would probably get more marks than him, but there was a distinct possibility that Zak would mess up. The weather forecast said it might rain, so he took a coat, and as he walked to school he thought he was likely to meet Zak, who always played around, and could make him late. If he were late, he was certain to get into trouble. Perhaps there would be a fire drill to disrupt the test? But really there was little chance of that, and it was also extremely unlikely an asteroid would hit the school. It was going to be a bothering sort of day.

Underline the words or phrases that express uncertainty, such as 'could', 'likely' etc. Make a list of these words, and rank them in terms of highest to lowest probability. Put each word on the vertical probability scale below, for example if you think that 'almost certain' is near 50%, write it next to 50%.
Collect together the responses and discuss the ranges in opinions.



In the 60s, CIA analyst **Sherman Kent** recognized the problem of using imprecise statements of uncertainty; as actions can be taken or not based on overestimations or underestimations of the content of intelligence reports.

To deal with this, Kent proposed different graduations of probability. To each he assigned a percentage range. For example 'Probable' would mean 93% (give or take about 6%). In a later experiment, 23 Nato officers were asked about the different perception of terms expressing probability. The results are shown in figure 2.1

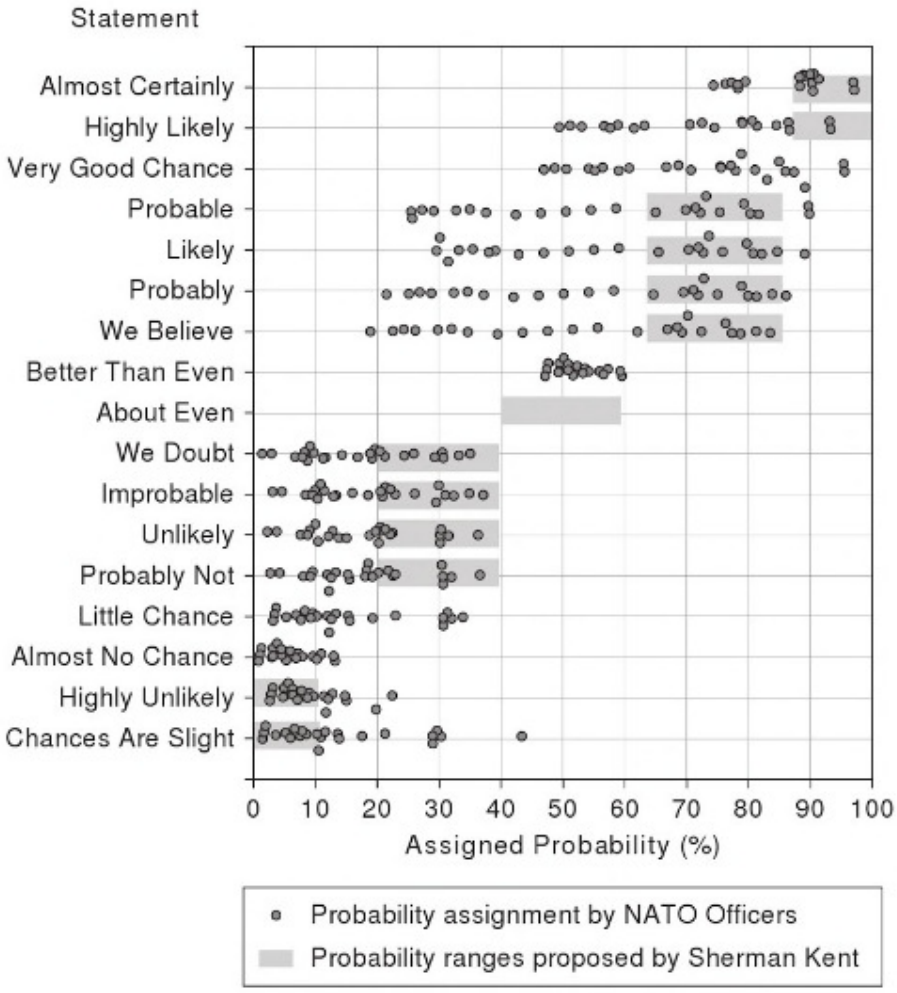


Figure 2.1 – Measuring perceptions of Uncertainty

Compare your group results with some of the terms. Can you find new ways to express probabilities?

Exercise 5 — Drug side effects.
Most medicines have occasional side effects - the drugs may make some people drowsy, make their muscles ache and so on. If you were told a side effect, say headache, was 'common', how frequently do you think it would occur, as a percentage of people taking the medicine? What is the reason the headaches were described as 'very common'?
The official European Medicines Agency scale defines 'common' as frequency between 1% and 10%, and 'very common' as anything above 10%.
What do you think of this?

Frequency Grouping	**Probability range**
Very common	$\geqslant 1/10$
common	$\geqslant 1/100$ to < 10
uncommon	$\geqslant 1/1000$ to < 100
rare	$\geqslant 1/10000$ to < 1000
very rare	$< 1/10000$
Frequency not known	cannot be estimated from available data

In some cases for common or very common reactions, and when necessary for clarity of information, frequency figures may be presented.

to lead someone to
to make someone think something

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Exercise 6 — Amniocentesis. Pregnant women usually have a screening test for possible problems with their foetus. A test result that shows any probability above 1 in 150 (0.6%) [5] of having a baby with Down's syndrome is called a 'higher risk'on the NHS Choices website. Such women are offered an amniocentesis to confirm or rule out the diagnosis, but this procedure carries some risk of causing a miscarriage - this risk is estimated to be about 1%, and is described as a 'small associated risk' by NHS choices[4].
What do you think of this? Why do you think this wording has been used?

to encourage someone to /

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Exercise 7 — IPCC scale. Many organisations have tried to standardise terms expressing uncertainty. Table 2.1 shows the scale used by the *Intergovernmental Panel on Climate Change* (IPCC). You might be more familiar with the french name 'GIEC' **Groupe d'experts intergouvernemental sur l'évolution du climat**.

Verbal expression	Numerical probability range
virtually certain	99-100%
extremely likely	95-100%
very likely	90-100%
likely	66-100%
more likely than not	50-100%
about as likely as not	33-66%
unlikely	0-33%
very unlikely	0-10%
extremely unlikely	0-5%
exceptionnally unlikely	0-1%

Table 2.1 – IPCC scale

For example in their recent report, they claimed that 'It is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century'.
What do you think of this scale? How does it fit with the numbers assessed by the class at the start of this chapter?

consistency=cohérence
to set guidelines(établir des directives)
to ignore guidelines
to provide numerical translation alongside text
to improve the scale we should/can