

FINE-TUNING JUDGMENT IN PROBABILITY ASSESSMENT
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ROUTINE JUDGMENTS THAT ARE ALMOST CERTAINLY CORRECT

The decision-maker (DM) can initially derive probabilities from judgments that are almost certainly correct but possibly lacking in precision. To illustrate, take a four-event problem with the likelihoods going from least to most likely as in A, B, C and D. Suppose further that B is *moderately* more likely than A, B and C are *equally* likely and D is *moderately* more likely than B or C. Resulting pairwise ranges are 1 – 1, 1 – 2, 1 – 1, and lastly 1 – 2. Here the 1 – 2 pairwise ranges are almost certainly correct for *moderately* more likely assessments. And the *equally* likely judgment for C/B by the DM is a standard input reflecting *equally* likely events. Resulting probabilities are shown in Table 1.

TABLE 1: PROBABILITIES FOR INITIAL ASSESSMENTS

Events/ Scenarios	Likelihood Ratios	Pairwise Range		Compound Likelihoods		PROBABILITIES				More Likely Values	
		Low	High	Low	High	P(Low)	P(High)	Average	%	Average	%
A	Base $\Rightarrow$ 1	1.00	1.00	1.00	1.00	0.250	0.111	0.181	18	Base	Base
B	B/A	1.00	2.00	1.00	2.00	0.250	0.222	0.236	24	1.30	1.33
C	C/B	1.00	1.00	1.00	2.00	0.250	0.222	0.236	24	1.00	1.00
D	D/C	1.00	2.00	1.00	4.00	0.250	0.444	0.347	34	1.47	1.42
				4.00	9.00	1.000	0.999	1.000	100		

Now suppose the DM reflects on the *moderately* more likely judgments and now considers that the B/A likelihood gain is at the lower end of the range (say 1 – 1.5) and the gain for D/C is at the upper end of the range (say 1.5 – 2). Suppose further the DM considers B to be definitely more likely than A with a lower bound of 1.1, And further, the DM considers D to be definitely less than twice as likely as C (or B) with 1.9 the upper bound in this case. Resulting probabilities are shown in Table 2.

TABLE 2: PROBABILITIES AFTER THE RE-ASSESSMENTS

Events/ Scenarios	Likelihood Ratios	Pairwise Range		Compound Likelihoods		PROBABILITIES				More Likely Values	
		Low	High	Low	High	P(Low)	P(High)	Average	%	Average	%
A	Base $\Rightarrow$ 1	1.00	1.00	1.00	1.00	0.206	0.146	0.176	18	Base	Base
B	B/A	1.10	1.50	1.10	1.50	0.227	0.219	0.223	22	1.27	1.22
C	C/B	1.00	1.00	1.10	1.50	0.227	0.219	0.223	22	1.00	1.00
D	D/C	1.50	1.90	1.65	2.85	0.340	0.416	0.378	38	1.70	1.73
				4.85	6.85	1.000	1.000	1.000	100		

The increased lower bound for the D/C pairwise range has increased P(D) and reduced both P(C) and the equally likely P(B).

CONCLUSIONS

Note that using the percentage probabilities, the routine (and easy) 1 -2 range for *moderately* more likely events results in probabilities within $\pm 4\%$ of the more refined judgment probabilities. This is very encouraging given that the more refined judgments should result in “better” probabilities, assuming the judgments are correct. Of course, this illustration is only a special case, and other examples may lead to different conclusions. Furthermore, use of benchmarks such as 1.0 (equally) or twice as likely (2.0) can serve to narrow broad ranges leading to more refined probabilities using maximum judgment. The foregoing is an easy way to calculate probabilities from intuitions, judgments about relative likelihoods by a DM. Of course, the resulting probabilities are only as good as the accuracy of the DM’s pairwise assessments whether broad or fine-tuned.