

ADJUSTING THE INITIAL “BALLPARK” DISTRIBUTION WITH NEW INFORMATION

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JUDGMENTS ADDITIONAL TO THE PAIRWISE RANGES

In this note, further procedures are outlined that achieve alterations to an initial “ballpark” distribution by using decision-maker (DM) judgments apart from the initial “more likely” ranges that led to the “ballpark” distribution.

Suppose that the DM feels event C is around 5% (in absolute terms) more likely than event B. Note that this judgment may only follow after consideration of the “ballpark” distribution. This means the initial C/B pairwise range may have been 1 – 1.1 but the resulting probabilities in the “ballpark” distribution (dependent on all pairwise ranges) may be say 7% and 8%. The DM could adjust this to say 5% and 10% reflecting the absolute judgment of “5% more likely”. This implies that the original 1 – 1.1 range should have been more like 1.75 – 2.

The initial pairwise range judgments relate to adjacent events in the likelihood ranking. Suppose, however, that the DM believes event D to be around twice as likely as event B. Although the pairwise ranges for C/B and D/C should reflect this out-of-order belief, the “ballpark” probabilities resulting may not be in complete accordance. Slight alterations to P(B) and P(D) down and up may align with any of the DM’s out-of-order judgments. Example calculations are shown below.

PROBABILITIES FOR THE INITIAL “BALLPARK” ASSESSMENT

Events/ Scenarios	Likelihood Ratios	Pairwise Range		Compound Likelihood		PROBABILITIES				More Likely #	
		Low	High	Low	High	P(Low)	P(High)	Average	%	Average	%
A	Base ⇒ 1	1.00	1.00	1.00	1.00	0.195	0.124	0.160	16	Base	Base
B	B/A	1.25	1.75	1.25	1.75	0.244	0.217	0.230	23	1.44	1.44
C	C/B	1.15	1.35	1.44	2.36	0.280	0.293	0.287	29	1.25	1.26
D	D/C	1.00	1.25	1.44	2.95	0.280	0.366	0.323	32	1.13	1.10
				5.13	8.07	0.999	1.000	1.000	100		

Note that the D/B “more likely” value here is 0.323/0.230 or 1.4. Alternatively, 1.25 x 1.13. Using the P(High) values the value is 1.69 which is closer to the DM’s judgment but still too low. Lowering the B/A range and increasing the D/C range accommodates the D/B judgment. Example calculations are illustrated below.

PROBABILITIES AFTER THE RE-ASSESSMENT

Events/ Scenarios	Likelihood Ratios	Pairwise Range		Compound Likelihood		PROBABILITIES				More Likely #	
		Low	High	Low	High	P(Low)	P(High)	Average	%	Average	%
A	Base ⇒ 1	1.00	1.00	1.00	1.00	0.202	0.117	0.160	16	Base	Base
B	B/A	1.10	1.60	1.10	1.60	0.222	0.187	0.205	20	1.28	1.25
C	C/B	1.15	1.35	1.27	2.16	0.256	0.253	0.254	26	1.24	1.30
D	D/C	1.25	1.75	1.58	3.78	0.320	0.443	0.381	38	1.50	1.46
				4.95	8.54	1.000	1.000	1.000	100		

The “more likely” D/B value at 1.24 x 1.5 or 1.86 (1.3 x 1.46 or 1.9) is now closer to the DM’s out-of-order judgment of 2.

CONCLUSIONS

Judgments other than the initial pairwise “more likely” ranges may result in changes to the resulting “ballpark” distribution directly or to a re-thinking of the pairwise ranges themselves. The calculations required of the methodology are so simple that no real difficulties result.