The Non-Bayesian Running Fix
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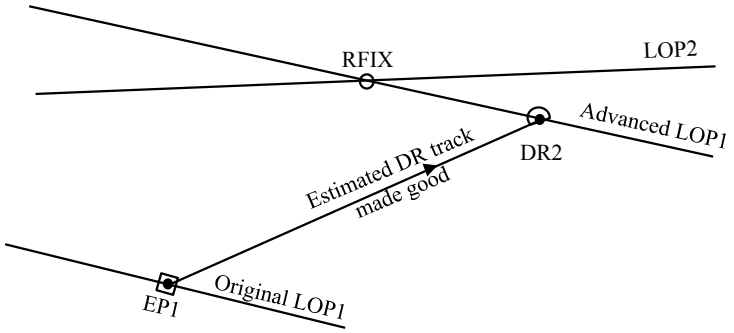
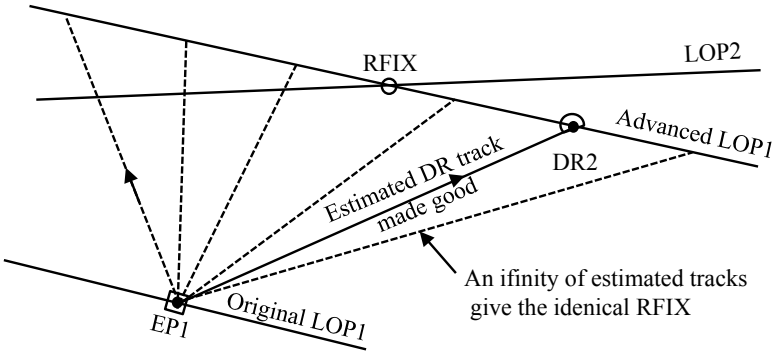
I just can't help myself. The discussion on statistics (and Bayesian concepts) related to the MPP of fixes reminds me of my pet example of poor estimation logic. And how can anyone disagree with the underlying principles in estimation theory: use all available information, make no unwarranted assumptions, and make no contradictions. Shouldn't these Bayesian guidelines lead us to the most probable position, given the available information? But that's not the logic used in the traditional running fix (call it the TRF).

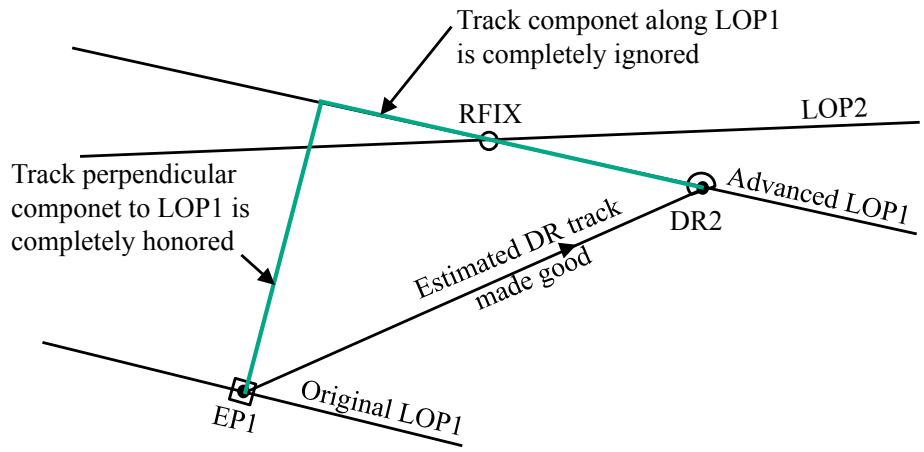


Most readers are familiar with the TRF shown in the figure above: Some time in the past we acquired LOP1 and used it to update our position estimate to EP1. After a DR run we determine a new position at DR2 by using our estimated track made good. At DR2 we acquire LOP2. As is well known, the TRF is found by advancing LOP1 parallel to itself to DR2. The intersection of the new LOP2 with the advanced LOP1 is our RFIX.

Seems all is OK, right. Seems reasonable? Well, now consider the figure below which shows that any number of very different estimated tracks, ending in completely different DR positions, would give the same RFIX.



Next the figure below shows the assumptions invoked in the traditional running fix: As shown in the figure, by advancing the earlier LOP1, we are asuming the componet of estimated track perpendicular to LOP1 is exact, while at the same time we're asumming the component of that track parallel to LOP1 is compleley inaccurate and hence irrelevant.



And these asumptions are complely dependent on the orientation of LOP1. How in the world can the orientation of the previously aquired LOP1 have anything at all to do with our estimated track from EP1 to DR2? To escape this completely unreasonable assumption, advocates of the TRF will say that we know nothing of the our location along LOP1. Hence we must ignore that component of track and honor only the perpendicular one. But this isn't rue. We always have some knowledge of our earlier position along LOP1 at EP1.

Rephrased more succinctly, the traditional RFIX assumes the estimated DR distance perpendicular to LOP1 is exact, while claiming zero positional knowledge along the direction of the LOP. Just as important, and much more so to the Bayesian spirit, is the fact that it's the *orientation* of LOP1 that limits our DR knowledge in directions that have nothing to due with the facts surrounding the reckoning itself.

Another example is the LOP2 that makes a quite small angle with LOP1. Traditionalist will say discard it, it's no good. But the estimation guru will say wait, that's new information, and the more the better. After all, even a LOP2 parallel to LOP1 does improve our knowledge of position.

So it seems the traditional running fix is at odds with every principle of estimation theory: It doesn't use all available information, it makes unwarranted assumptions, and has contradictions. This is a long way from Bayesian inference principles.