Iterated Equation for the Historicity of Jesus

In *On the Historicity of Jesus* the evidence is presented in a simplified equation that resembles the multiplication of independent probabilities, but the probabilities put in are actually all dependent, taking into account mutual impacts of each category of evidence on every other. The resulting equation just makes the math easier, and does not detract from the result because precisely tracking dependency would not change any number in the equation or its result. However, if someone wishes to run the math by precisely tracking dependency, the following equation is what you would then have to use. The rest of this guide-sheet is written for a skilled mathematical reader and will not explain the principles or annotation.

Below is a complete iterated equation using assumed chronological order of evidence (which is the reverse order used in *On the Historicity of Jesus*). It is also assumed here that chronological order is the only dependency relation, but you can employ any order of dependency you believe applicable. And either way, you can emend this equation for different ordering of evidence, even split the evidence order, or split the evidence itself. For example, if you believe $\text{Epistles}^{\text{oc}}$ should come after Gospels, then create a bracket for $\text{Epistles}^{\text{oc}}$ and place it before the bracket for Gospels, and replace $\text{Epistles}^{\text{bl.mw.ms.jd.eu.js.gp.oc}}$ with $\text{Epistles}^{\text{bl.mw.ms.jd.eu.js.gp}}$. Or if you want you may split $\text{Epistles}^{\text{oc}}$ into $\text{Epistles}^{\text{1Pet}}$ and $\text{Epistles}^{\text{Remainingcanon}}$ and give them their own brackets and order. And so on.

But as given in the original study, the base equation explicitly preserving dependency would be:

$$
\begin{aligned}
&[\, P(h \mid e.b) \,/\, P(\neg h \mid e.b.) \,] = \\
&[\, P(h \mid b) \,/\, P(\neg h \mid b) \,] \times \\
&[\, P(\text{Epistles}^{\text{bl.mw.ms.jd.eu.js.gp.oc}} \mid h.b) \,/\, P(\text{Epistles}^{\text{bl.mw.ms.jd.eu.js.gp.oc}} \mid \neg h.b) \,] \times \\
&[\, P(\text{Gospels} \mid h.b.\text{Epistles}^{\text{bl.mw.ms.jd.eu.js.gp.oc}}) \,/\, P(\text{Gospels} \mid \\
&\neg h.b.\text{Epistles}^{\text{bl.mw.ms.jd.eu.js.gp.oc}}) \,] \times [\, P(\text{Acts}^{\text{vf.op.ra}} \mid \\
&h.b.\text{Epistles}^{\text{bl.mw.ms.jd.eu.js.gp.oc}}.\text{Gospels}) \,/\, P(\text{Acts}^{\text{vf.op.ra}} \mid \\
&\neg h.b.\text{Epistles}^{\text{bl.mw.ms.jd.eu.js.gp.oc}}.\text{Gospels}) \,] \times [\, P(\text{Extra}^{\text{ds.1c.jo.pl.ta.su.ig.pa.th.he.lg.tt}} \mid \\
&h.b.\text{Epistles}^{\text{bl.mw.ms.jd.eu.js.gp.oc}}.\text{Gospels.Acts}^{\text{vf.op.ra}}) \,/\, P(\text{Extra}^{\text{ds.1c.jo.pl.ta.su.ig.pa.th.he.lg.tt}} \mid \\
&\neg h.b.\text{Epistles}^{\text{bl.mw.ms.jd.eu.js.gp.oc}}.\text{Gospels.Acts}^{\text{vf.op.ra}}) \,]
\end{aligned}
$$

The superscripts are abbreviations for the subcategories of evidence as named in *On the Historicity of Jesus*—here placed in likely chronological order of dependency or effect, but you can change this order as desired. Likewise, brackets can be removed as a subcategory and placed in the main equation as a category of their own, wherever you believe they chronologically should go. And so on.

Each category of evidence indicated above is calculated from subcategories. The iterated (chronological) dependent probability equation for each category above is as follows (as assumed in *OHJ*):

$P(Epistles^{bl.mw.ms.jd.eu.js.gp.oc} | h.b)$ =

$[P(Epistles^{bl} | h.b) / P(Epistles^{bl} | \neg h.b)] \times [P(Epistles^{mw} | h.b.Epistles^{bl}) / P(Epistles^{mw} | \neg h.b.Epistles^{bl})] \times [P(Epistles^{ms} | h.b.Epistles^{bl.mw}) / P(Epistles^{ms} | \neg h.b.Epistles^{bl.mw})] \times [P(Epistles^{jd} | h.b.Epistles^{bl.mw.ms}) / P(Epistles^{jd} | \neg h.b.Epistles^{bl.mw.ms})] \times [P(Epistles^{eu} | h.b..Epistles^{bl.mw.ms.jd}) / P(Epistles^{eu} | \neg h.b.Epistles^{bl.mw.ms.jd})] \times [P(Epistles^{js} | h.b.Epistles^{bl.mw.ms.jd.eu}) / P(Epistles^{js} | \neg h.b.Epistles^{bl.mw.ms.jd.eu})] \times [P(Epistles^{gp} | h.b) / P(Epistles^{gp} | \neg h.b.Epistles^{bl.mw.ms.jd.eu.js})] \times [P(Epistles^{oc} | h.b.Epistles^{bl.mw.ms.jd.eu.js.gp}) / P(Epistles^{oc} | \neg h.b.Epistles^{bl.mw.ms.jd.eu.js.gp})]$

$P(Gospels|h.b)$ = $P(Gospels|h.b)$

P(Gospels) has no subcategories in *OHJ* but you can create them following the above model for the Epistles. You can even create a bracket for each Gospel and insert it into the main equation as categories by themselves (in lieu of the general Gospels category) where, chronologically, you believe each was written. This may also break up $Extra^{ds.1c.jo.pl.ta.su.ig.pa.th.he.lg.tt}$ as some Gospels may have been written before and some after certain extrabiblical evidence. For example, Luke and Acts, or $Gospels^{lk}$ and $Acts^{vf.op.ra}$, post-date Josephus (i.e. $Extra^{jo}$) but not Hegesippus (i.e. $Extra^{he}$), and so a strict chronological dependency order would preserve this distinction, resulting in a more complex equation. In other words, how you date the Gospels can affect the bracket order. This was unimportant in *OHJ* because the Gospels were found to have no effect. But that conclusion could change if unusual chronologies are adopted for the Gospels or anything else.

$\mathbf{P(Acts^{vf.op.ra} \mid h.b)} =$

$[\, P(Acts^{vf} \mid h.b) \,/\, P(Acts^{vf} \mid \neg h.b) \,] \times [\, P(Acts^{op} \mid h.b.Acts^{vf}) \,/\, P(Acts^{op} \mid \neg h.b.Acts^{vf}) \,] \times [\, P(Acts^{ra} \mid h.b.Acts^{vf.op}) \,/\, P(Acts^{ra} \mid \neg h.b.Acts^{vf.op}) \,]$

$\mathbf{P(Extra^{ds.1c.jo.pl.ta.su.ig.pa.th.he.lg.tt} \mid h.b)} =$

$[\, P(Extra^{ds} \mid h.b) \,/\, P(Extra^{ds} \mid \neg h.b) \,] \times [\, P(Extra^{1c} \mid h.b.Extra^{ds}) \,/\, P(Extra^{1c} \mid \neg h.b.Extra^{ds}) \,] \times [\, P(Extra^{jo} \mid h.b.Extra^{ds.1c}) \,/\, P(Extra^{jo} \mid \neg h.b.Extra^{ds.1c}) \,] \times [\, P(Extra^{pl} \mid h.b.Extra^{ds.1c.jo}) \,/\, P(Extra^{pl} \mid \neg h.b.Extra^{ds.1c.jo}) \,] \times [\, P(Extra^{ta} \mid h.b.Extra^{ds.1c.jo.pl}) \,/\, P(Extra^{ta} \mid \neg h.b.Extra^{ds.1c.jo.pl}) \,] \times [\, P(Extra^{su} \mid h.b.Extra^{ds.1c.jo.pl.ta}) \,/\, P(Extra^{su} \mid \neg h.b.Extra^{ds.1c.jo.pl.ta}) \,] \times [\, P(Extra^{ig} \mid h.b.Extra^{ds.1c.jo.pl.ta.su}) \,/\, P(Extra^{ig} \mid \neg h.b.Extra^{ds.1c.jo.pl.ta.su}) \,] \times [\, P(Extra^{pa} \mid h.b.Extra^{ds.1c.jo.pl.ta.su.ig}) \,/\, P(Extra^{pa} \mid \neg h.b.Extra^{ds.1c.jo.pl.ta.su.ig}) \,] \times [\, P(Extra^{th} \mid h.b.Extra^{ds.1c.jo.pl.ta.su.ig.pa}) \,/\, P(Extra^{th} \mid \neg h.b.Extra^{ds.1c.jo.pl.ta.su.ig.pa}) \,] \times [\, P(Extra^{he} \mid h.b.Extra^{ds.1c.jo.pl.ta.su.ig.pa.th}) \,/\, P(Extra^{he} \mid \neg h.b.Extra^{ds.1c.jo.pl.ta.su.ig.pa.th}) \,] \times [\, P(Extra^{lg} \mid h.b.Extra^{ds.1c.jo.pl.ta.su.ig.pa.th.he}) \,/\, P(Extra^{lg} \mid \neg h.b.Extra^{ds.1c.jo.pl.ta.su.ig.pa.th.he}) \,] \times [\, P(Extra^{tt} \mid h.b.Extra^{ds.1c.jo.pl.ta.su.ig.pa.th.he.lg}) \,/\, P(Extra^{tt} \mid \neg h.b.Extra^{ds.1c.jo.pl.ta.su.ig.pa.th.he.lg}) \,]$

In each case, once one item of evidence has its likelihood ratio calculated, it becomes conjoined to *b* (or background evidence) when the next item of evidence has its likelihood ratio calculated, with the effect that the probability of the second item is now conditional on the preceding existence of the first item, and so on down the line. So to have a fully adjustable ordering of evidence, the main equation can be expanded to a complete equation as follows (hence not using categories calculated from subcategories):

Complete Dependency Equation

$[\, P(h \mid e.b) \,/\, P(\neg h \mid e.b.) \,] =$

$[\, P(h \mid b) \,/\, P(\neg h \mid b) \,] \times$

$[\, P(Epistles^{bl} \mid h.b) \,/\, P(Epistles^{bl} \mid \neg h.b) \,] \times [\, P(Epistles^{mw} \mid h.b.Epistles^{bl}) \,/\, P(Epistles^{mw} \mid \neg h.b.Epistles^{bl}) \,] \times [\, P(Epistles^{ms} \mid h.b.Epistles^{bl.mw}) \,/\, P(Epistles^{ms} \mid \neg h.b.Epistles^{bl.mw}) \,] \times [\, P(Epistles^{jd} \mid h.b.Epistles^{bl.mw.ms}) \,/\, P(Epistles^{jd} \mid \neg h.b.Epistles^{bl.mw.ms}) \,] \times [\, P(Epistles^{eu} \mid h.b..Epistles^{bl.mw.ms.jd}) \,/\, P(Epistles^{eu} \mid$

$\neg$h.b.Epistles$^{bl.mw.ms.jd}$)] × [P(Epistles^{js} | h.b.Epistles$^{bl.mw.ms.jd.eu}$) / P(Epistles^{js} | $\neg$h.b.Epistles$^{bl.mw.ms.jd.eu}$)] × [P(Epistles^{gp} | h.b) / P(Epistles^{gp} | $\neg$h.b.Epistles$^{bl.mw.ms.jd.eu.js}$)] × [P(Epistles^{oc} | h.b.Epistles$^{bl.mw.ms.jd.eu.js.gp}$) / P(Epistles^{oc} | $\neg$h.b.Epistles$^{bl.mw.ms.jd.eu.js.gp}$)] × [P(Gospels | h.b.Epistles$^{bl.mw.ms.jd.eu.js.gp.oc}$) / P(Gospels | $\neg$h.b.Epistles$^{bl.mw.ms.jd.eu.js.gp.oc}$)] × [P(Acts^{vf} | h.b) / P(Acts^{vf} | $\neg$h.b)] × [P(Acts^{op} | h.b.Acts^{vf}) / P(Acts^{op} | $\neg$h.b.Acts^{vf})] × [P(Acts^{ra} | h.b.Acts$^{vf.op}$) / P(Acts^{ra} | $\neg$h.b.Acts$^{vf.op}$)] × [P(Extra^{ds} | h.b) / P(Extra^{ds} | $\neg$h.b)] × [P(Extra^{1c} | h.b.Extra^{ds}) / P(Extra^{1c} | $\neg$h.b.Extra^{ds})] × [P(Extra^{jo} | h.b.Extra$^{ds.1c}$) / P(Extra^{jo} | $\neg$h.b.Extra$^{ds.1c}$)] × [P(Extra^{pl} | h.b.Extra$^{ds.1c.jo}$) / P(Extra^{pl} | $\neg$h.b.Extra$^{ds.1c.jo}$)] × [P(Extra^{ta} | h.b.Extra$^{ds.1c.jo.pl}$) / P(Extra^{ta} | $\neg$h.b.Extra$^{ds.1c.jo.pl}$)] × [P(Extra^{su} | h.b.Extra$^{ds.1c.jo.pl.ta}$) / P(Extra^{su} | $\neg$h.b.Extra$^{ds.1c.jo.pl.ta}$)] × [P(Extra^{ig} | h.b.Extra$^{ds.1c.jo.pl.ta.su}$) / P(Extra^{ig} | $\neg$h.b.Extra$^{ds.1c.jo.pl.ta.su}$)] × [P(Extra^{pa} | h.b.Extra$^{ds.1c.jo.pl.ta.su.ig}$) / P(Extra^{pa} | $\neg$h.b.Extra$^{ds.1c.jo.pl.ta.su.ig}$)] × [P(Extrath | h.b.Extra$^{ds.1c.jo.pl.ta.su.ig.pa}$) / P(Extrath | $\neg$h.b.Extra$^{ds.1c.jo.pl.ta.su.ig.pa}$)] × [P(Extra^{he} | h.b.Extra$^{ds.1c.jo.pl.ta.su.ig.pa.th}$) / P(Extra^{he} | $\neg$h.b.Extra$^{ds.1c.jo.pl.ta.su.ig.pa.th}$)] × [P(Extra^{lg} | h.b.Extra$^{ds.1c.jo.pl.ta.su.ig.pa.th.he}$) / P(Extra^{lg} | $\neg$h.b.Extra$^{ds.1c.jo.pl.ta.su.ig.pa.th.he}$)] × [P(Extra^{tt} | h.b.Extra$^{ds.1c.jo.pl.ta.su.ig.pa.th.he.lg}$) / P(Extra^{tt} | $\neg$h.b.Extra$^{ds.1c.jo.pl.ta.su.ig.pa.th.he.lg}$)]

And here the bracket [P(Gospels | h.b.Epistles$^{bl.mw.ms.jd.eu.js.gp.oc}$) / P(Gospels | $\neg$h.b.Epistles$^{bl.mw.ms.jd.eu.js.gp.oc}$)] can be split into [P(Gospels$^{mk.mt}$ | h.b.Epistles$^{bl.mw.ms.jd.eu.js.gp.oc}$) / P(Gospels$^{mk.mt}$ | $\neg$h.b.Epistles$^{bl.mw.ms.jd.eu.js.gp.oc}$)] and [P(Gospels$^{lk.jn}$ | h.b.Epistles$^{bl.mw.ms.jd.eu.js.gp.oc}$) / P(Gospels$^{lk.jn}$ | $\neg$h.b.Epistles$^{bl.mw.ms.jd.eu.js.gp.oc}$)] and inserted into the above equation where they separately most likely belong chronologically, e.g. Gospels$^{mk.mt}$ before Extra^{jo} and Gospels$^{lk.jn}$ after. And so on.

Of course his equation and procedure is entirely needlessly complicated and serves no point in pursuing. Simply running the math directly in its simplified resemblance to an independent probability sequence in *OHJ* gets the same result. The only reason to focus on dependency effects is if some dependency (of one item of evidence on another) would change the probabilities given in the simplified equation in *OHJ*. And that can be argued independently of this procedure, and the corrected probability simply inserted into the simplified equation in *OHJ*. The only use of the present guide-sheet is to assist mathematicians in visualizing this point.