Totentanz final

An interesting issue is discussed by Westergaard. He remarks, that mortality in the Breslau data used by Halley possibly is lowered by the fact that no plague occurred in the observation period. He then continues, analysing the Hudde data by year and eliminating plague years. After adjustment the Hudde data are more in agreement with those found by Halley.
The last plague-year in Amsterdam was 1664 [Noordegraaf Valk, 1988], however the mortality observed by Hudde occurred in the period 1587-1672, so in both plague-ridden and plagueless times
The Breslau observations used by Halley stem from 1685-1690, and all data used by other authors are even later. All certainly plagueless years [the last plague year in Breslau for instance was 1633, see Süssmilch, 1775, Tabellen p. 40].
Another relevant date is 1648, when the treaty of Münster ended 80 years of war conditions in The Netherlands.
Gompertz [1825] suggests, that mortality is the result of 2 co-existing causes:
[a] chance without previous disposition to death [the young man being liable to be killed by accident or acute disease as well as the old]
and
[b] a gradual deterioration, by which as man advances in years, he becomes more and more unable to withstand destructive forces.
Without trying to catch those causes in a Theory of Life this classification of causes [let us further call them accidents and aging] can help to explain the dramatic difference between mortality in the Middle Ages and in present day.
Presentday accidents are rare, and almost all mortality is caused by aging.
In the Middle Ages however the accident-component was so high, that it even obscured aging, resulting in the Dance of Death [Totentanz] concept. Life as a lottery, with uncertain outcome for young and old.
To quantify this Totentanz accident rate pre-1633 mortality observations are needed, especially of young adults [undiluted by aging]. Those are available from the Hudde data only.
Rather than eliminating bad years, as Westergaard did, research could be focussed on them.
As shown in the appendix those extracted Totentanz observations result in an almost flat 5-year mortality rate of around 10% for age-classes between 20 and 40, then being least diluted by aging.

This is indeed dramatically high, as shows the following summary:

	Totentanz	Halley	Recent
20	9,40%	5,18%	0,20%
25	9,54%	6,35%	0,30%
30	9,15%	7,72%	0,30%
35	10,20%	9,18%	0,41%
40	11,65%	10,79%	0,82%

The extracted early Hudde data thus give some impression of the reality of Totentanz to the daily experience of our ancestors. Presently the only one.

Earlier authors on the Hudde data reflect this to a lesser extent, as is shown in the following summary:

	van ham	iversen	lombardo	braun
20	9,40%	8,98%	9,07%	7,55%
25	9,54%	9,61%	8,94%	8,65%
30	9,15%	8,30%	9,10%	7,71%
35	10,20%	9,84%	9,70%	9,31%
40	11,65%	11,62%	11,09%	11,20%

Earlier authors used all 1495 observations, while in my new calculation only entrants under 20 are included. Further Braun [quoting the Paris calculation of Schevichaven] uses 1495 as root in all years, while at for instance 20 all 298 later entrants are not yet under observation.
The schedule confirms the suggestion of Hacking [1975] that mortality in the full set is favorably tainted by positive selection in the years directly after entrance.
The purpose of the new calculation was to eliminate this effect, which evidently was effectively done. However now looking so closely to the early years of adult mortality it seems better to also eliminate the entrants aged 19. The death rate in the first 5 years [after 20] then increases from 9,40% to 9,87%, which seems the better figure, the later 5-year rates staying unchanged.
Thus an observed pre-1633 5-year deathrate resulting from accidents of almost 10% is best reflected in the more correct new calculation. In all later tables this is reduced to around 7%.

Back to Westergaard
The Halley/Breslau and Hudde data are single observations, and thus each subject to the resulting unavoidable errors. Eliminating structural differences between the observations increases its contribution to an underlying theory.
This must have been the goal of the efforts of Westergaard.
However in his time [1902] comparison between one set of mortality data and another could only be quite crude and clumsy. In the meantime some statistical tests have been developed, that could possibly help.
What about using the Chi-squared test [Pearson, 1914]? Trevor Sibbett [Institute of Actuaries, London] remembers that in the past application of this test on actuarial problems has been considered, but turned out to be unsuitable in the end. However he was not too sure on the subject and he advised me to consult Wolthuis in Amsterdam.