

Thorvald Thiele's father was Just Mathias Thiele who was 43 years old when Thorvald was born. Thorvald Thiele's name requires an explanation. He was named after Bertel Thorvaldsen, a sculptor who was the first internationally acclaimed Danish artist. Thorvaldsen was born in around 1770 so was 68 years old when Thiele was born. As a friend of the family, Thorvaldsen became one of Thiele's godfathers and his parents gave their son the name Thorvald after his famous godfather.

From this account we already see that Thorvald's father had friends among the leading artists in Denmark. In fact he was a highly educated man who was the private librarian to King Christian VIII of Denmark and Director of the Royal College of Prints. He was also a dramatist, poet and folklorist. As Lauritzen writes in [2], Thiele:-

... grew up in a prominent family and a culturally and intellectually stimulating environment.

Thiele studied astronomy at the University of Copenhagen and from there he obtained his Master's Degree in 1860. Six years later he was awarded a doctorate for a thesis which studied double stars, in particular studying their orbits. In the year following the award of his doctorate, Thiele married Marie Martine Trolle. They had six children, of whom four survived their first year of life. Thiele's wife died in 1889 at the age of 48.

In 1875 Thiele was appointed as Director of the Astronomical Observatory at the University of Copenhagen, a post which he held until he retired in 1907. As well as teaching at the University of Copenhagen, he was the chief actuary for an insurance company. He was a founder of the Danish insurance company Hafnia and was its Mathematical Director from 1872 until his death. Together with [Zeuthen](#) and [Petersen](#), he founded the [Danish Mathematical Society](#) in 1873. This was not his only contributions to founding important Danish institutions, for in 1901 the Danish Actuarial Society was founded at his initiative.

As Director of the Astronomical Observatory Thiele had an interest in astronomy. This led to his study of orbits and he wrote one paper on the [three body problem](#). In 1895 Thiele showed that singularities in the motion of such a system could often be removed by a suitable transformation allowing the motion of bodies after a collision to be studied. In 1880 he published his first paper on least squares which is described in [2] as follows:-

It is a brilliant tour de force, but so far ahead of its time that few could appreciate the results.

However his most important contributions were made to the theory of statistics with his most fundamental book on the subject being published in 1889.

One of his most important contributions to actuarial science was a differential equation for the net premium reserve V_t at time t for a life insurance, namely

$$dV_t/dt = \pi + dV_t - m_t(1 - V_t)$$

where π is the premium per unit time, d is the force of interest, and m_t is the force of mortality. Although, as we have said, this differential equation is Thiele's most significant contribution to actuarial science, he never published the result. We know of it through [J P Gram](#) who was shown the result by Thiele.

He is remembered for having an interpolation formula named after him, the formula being used to obtain a rational function which agrees with a given function at any number of given points. He published this in 1909 in his book which made a major contribution to numerical analysis. He introduced cumulants (under the name of "half-invariants") in 1889, 1897, 1899, about 30 years before their rediscovery and exploitation by [R A Fisher](#).

Lauritzen writes in [\[2\]](#):-

As an original thinker, Thiele and his ideas were often far reaching and ahead of his time, so much so that he was rarely understood by his students and contemporaries. ... he himself may not have grasped the full generality and scope of his own ideas.

His ideas were not confined to mathematical aspects of his subjects, however, and we quote again from [\[2\]](#):-

Besides his professional interests, Thiele was engaged in aspects of social policy ... [he suggested] consideration of the results of a vote as an outcome of a repeated experiment with fixed probability of distribution, and taking into account the uncertainty due to the sampling when evaluating whether the vote is decisive or not. He was interested in issues of insurance and old-age pensions from a social point of view. ... Thiele emphasised that old age is the destiny of us all, as opposed to disability or premature death, which is a random phenomenon. therefore a pension system should be seen as a social contract between generations with the State as mediator rather than as an insurance.

[Gram](#) sums up Thiele's contributions in [\[4\]](#) and like Lauritzen stresses how far ahead of his time he was:-

[Thiele] thought profoundly and thoroughly on any matter which occupied him and he had a wonderful perseverance and faculty of combination. But he liked more to construct his own methods than to study the methods of other people. therefore his reading was not very extensive and he often took a one-sided view which had a restrictive influence on his results and his own speculations ... Thiele's importance as a theoretician lies therefore more in the original ideas he stated than his formulations, and his ideas were in many respects not only original but far ahead of his time. therefore he did not get the recognition he deserved ...

As a final comment, we note that Thiele was an excellent chess player and an active member of the first Danish chess club founded in 1865.

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