



## 40+ years of the Cox model

**Friday 8th March 2013**

### Event photos available online

Photos from the meeting can now be viewed at

<http://csm.lshtm.ac.uk/previous-events/photos/>

### Overview

The British and Irish Region of the International Biometric Society, together with the Centre for Statistical Methodology at the London School of Hygiene and Tropical Medicine, announces a scientific meeting to mark 41 years of Sir David Cox's celebrated [relative risk model](#) for time-to-event data. The meeting will take place on 8 March 2013 in the John Snow (formerly Goldsmiths) Lecture Theatre at the London School of Hygiene and Tropical Medicine, where the "proportional hazards" paper was read before the Royal Statistical Society on 8 March 1972. The meeting will include presentations of novel research in event-history analysis, and a historical perspective on the impact of the paper.

### Details

Date: 8 March 2013

Venue: John Snow Lecture Theatre, LSHTM, London

### Costs

Registration costs £35 for IBS members, £20 for retired members and student members, and £50 for non-members of the society. The registration fee includes lunch, tea and coffee.

### Posters

A limited number of posters describing research in event history analysis will be displayed during tea and lunch breaks. If you would like to contribute a poster, please send a title and abstract to Daniel Farewell ([farewelld@cf.ac.uk](mailto:farewelld@cf.ac.uk)) for consideration by the meeting committee.

### Programme

#### **The Cox model: introduction and history (Bianca De Stavola)**

1100 - This talk will revisit the original 1972 paper, put the semi-parametric "Cox model" into the broader context of survival analysis as it was understood and practiced then, and how it is now. It will also discuss how partial likelihood— suggested in the 1972 paper and then formalized a few years later—addressed the inferential difficulties posed by this semi-parametric model. The enormous and continuing impact of this paper in applied research will be reviewed and the profound influence of its methodological insights celebrated.

1145 - **Questions and discussion**  
1200

1200 - **Lunch**  
1300

1300 - 1330	<p><b>Direct effects in survival analysis (Torben Martinussen)</b></p> <p>We are interested in estimating the direct effect of an exposure variable <math>X</math> on a survival outcome <math>T</math>. In case of an intermediate variable <math>K</math> and an unobserved confounder <math>U</math> for the effect of <math>K</math> on <math>T</math> standard regression techniques will render a biased estimate of the direct effect of <math>X</math> on <math>T</math>. This problem may be solved with the inclusion of additional information, <math>L</math>, that removes the effect of <math>U</math> on <math>K</math>. However, if <math>L</math> is also affected by <math>X</math> then standard methods are still not appropriate. Marginal structural models have been suggested to tackle this problem but they need estimation of specific weights that may be quite unstable. To overcome this problem, Goetgeluk et al. (JRSSB, 2009) suggested a so-called G-estimation approach in the case of an un-censored response variable. In this talk I show how to generalize their approach to the setting of survival data. I will describe the methodology in detail for the Aalen additive hazards model and also give some calculations for the Cox model where it is more difficult to derive estimators.</p>
1330 - 1345	<p><b>Questions and discussion</b></p>
1345 - 1415	<p><b>Parametric survival models (Paul Lambert)</b></p> <p>The Cox model is the most popular method for the modelling of time-to-event data. The fact that it does not directly estimate the baseline hazard function is both an advantage and a disadvantage. I will describe flexible parametric alternatives to the Cox model. The flexibility comes from the use of restricted cubic splines to model the log cumulative hazard or the log hazard function. I will discuss situations where these parametric alternatives to the Cox model may be useful including modelling non-proportional hazards, modelling excess mortality (i.e. mortality above that expected in the general population), alternative ways to quantify differences between exposure groups and (iv) extrapolation of survival.</p>
1415 - 1430	<p><b>Questions and discussion</b></p>
1430 - 1500	<p><b>Afternoon tea</b></p>
1500 - 1530	<p><b>Another Look at Prediction and Explained Variation in Event History Analysis (Robin Henderson)</b></p> <p>This talk revisits the related issues of prediction and explained variation for survival and more general event history data. There is no shortage of proposed measures of prognostic value for statistical models, especially proportional hazards, but none have been uniformly accepted and those in use in major computer packages may not be the most statistically meaningful. In this talk I review the issues and describe and illustrate use of a rank-based measure, developed in collaboration with Janez Stare and Maja Pohar, which is applicable and interpretable in discrete or continuous time, with tied data or otherwise, with time-varying, time-fixed or dynamic covariates, with time-varying or time-constant effects, with single or multiple event times, with parametric or semi-parametric models, and under general independent censoring/observation.</p>
1530 - 1545	<p><b>Questions and discussion</b></p>
1545 - 1600	<p><b>Guest discussant: David Cox</b></p>
1600 - 1630	<p><b>Wine and open discussion</b></p>