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Advances in frailty models

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**Stellingen behorend bij het proefschrift
“Advances in Frailty Models”**

1. It is dangerous to interpret the shared frailty variance in a proportional hazards model as evidence for unobserved heterogeneity, especially so when the cluster size is small. [*This thesis*]
2. Identifying the “true” frailty distributions is not a realistic goal. [*This thesis*]
3. Observational studies that involve a time to event outcome are highly susceptible to selection bias, which in turn leads to underestimating the degree of unobserved heterogeneity. [*This thesis*]
4. Marginal time-dependent covariate effects, in addition to observable marginal correlation structures, contribute to the identifiability of shared frailty models. [*This thesis*]
5. When observing the shape of the hazard rate it is not easy to know whether this is due to changes within individuals, or differences between individuals. (Aalen, Borgon & Gjessing, *Survival and Event History Analysis*, 2008)
6. The continued very extensive use of significance tests is on the one hand alarming and on the other evidence that they are aimed, even if imperfectly, at some widely felt need. (Cox & Hinkley, *Theoretical Statistics*, 1974)
7. The increasing popularity and accessibility of black-box prediction methods will lead to an abundance of poor prediction models. It is our duty, as statisticians, to be the referees of the data science field, and to critically judge these modes.
8. By training, medical doctors tend to be overly confident in their judgment, while statisticians tend to be overly doubtful. Both attitudes are essential ingredients for good biomedical research.
9. There are no gods in the universe, no nations, no money, no human rights, no laws, and no justice outside the common imagination of human being. (Harari, *Sapiens: A Brief History of Humankind*, 2014)
Society, as a whole, is a construct of humankind. As a consequence, it can be changed by people, both for good and for worse.
10. You can plan a pretty picnic but you can’t predict the weather (OutKast, *Ms. Jackson*, 2000)
The choices we make and their outcomes are half chance - only the other half is worth worrying about.
11. In the Netherlands, no matter in which direction you cycle, the wind will blow in your face.
12. The accession of Romania to the European Union has been beneficial for both sides. However, in the medium and long term, the brain drain from Eastern European countries will further increase the socio-economical divide between East and West.

*Theodor Adrian Bălan
Leiden, September 26, 2018*