Issues in growth curve modeling
Stoel, R.D.

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My doctoral thesis on issues in growth curve modeling of panel data has been finished. When I started working on the project, some four years ago, and after a few adaptations of the original research plan, the idea was to compare longitudinal multilevel regression analysis with latent growth curve analysis. At that time, both techniques had been applied in numerous studies in the social and behavioral sciences for the analysis of panel data, but it did not seem to be clear what the precise differences were, and what technique was appropriate in which situation.

Reading the corresponding literature, biased as I was through my structural equation modeling background, it soon appeared to be clear to me that latent growth curve modeling offered a much richer approach for the analysis of panel data. Almost all models that can be analyzed with multilevel regression analysis can also be analyzed using latent growth curve modeling; but the latter offers much more. Reconsidering these issues, it was impossible for me to understand that anyone would carry out a multilevel regression analysis on panel data, and therefore I had difficulties in writing the chapter that was supposed to compare the two techniques. However, articles kept on being published that either applied longitudinal multilevel regression analysis, or 'promoted' it as appropriate longitudinal data analysis technique. Although I knew that multilevel regression analysis had many advantages for cross-sectional data, I interpreted this as the multilevel software fight for a better market share in the longitudinal analysis niche.

At the moment, I realize that my view on the utility of multilevel regression analysis for panel data was too negative, but at that time it had the logical consequence that I started to focus more and more on the latent growth curve per se and issues that could pop up in its application. Consequently, the present thesis consists of three chapters that discuss complications that might occur in any latent growth curve analysis, and, if possible, solutions are presented to overcome these complications. A specific chapter deals also with the application of latent growth curve analysis to answer substantiv research questions. Finally, the actual comparison of multilevel and latent growth curve modeling was written up, and, ironically, this will be the first chapter of this thesis. Interested readers who are as
negativistic as I was concerning multilevel analysis of panel data might want to skip this chapter, and proceed directly with the chapters on latent growth curve modeling that discuss some interesting issues. My view is now not anymore as negativistic as it was. Though I keep thinking that the existing structural equation modeling software offers more extensions of the basic growth curve model, and even more alternative model possibilities, than the existing multilevel software, some advanced longitudinal multilevel models cannot be translated into structural equation models and give multilevel regression models right of existence of their own. Why, however, should the techniques be compared at their ultimate possibilities, when there is often no need for these advanced extensions in substantive questions? In many applications both techniques are sufficient, and will even provide the same parameters estimates, making it pointless to pass a judgment concerning the superiority of one above the other.

Recently, I reread Jan de Leeuw's editor's introduction to the first edition of the bestseller "Hierarchical Linear Models" (Bryk & Raudenbush, 1992) as reprinted in the second edition of the same book (Raudenbush & Bryk, 2002, p.xix - xxii). I would like to end the scientific part of this prologue with some quotes from this:"...Hierarchical linear models, or multilevel models, are certainly not a solution to all data analysis problems...Nevertheless, technically they are a big step ahead of the aggregation and disaggregation methods...In educational research, as well as in geography, sociology, and economics, these techniques will gain in importance in the next few years, until they also run into their natural limitations. To avoid the limitations they will be extended (and have been extended) to more levels, multivariate data, path-analysis models, latent variables,...,and so on...It is a good idea to keep this in the back of your mind..."