**Decision Analysis for and Forecasting for Agricultural Development**

**Master Course Outline**

**Taught in … semester (dates: …)**

*(about 60 hours in class [15\*4 hour class] and 120 outside class [projects etc.])*

*This from the Uni-Bonn Institute of Computer Science as a model* [*https://cg.cs.uni-bonn.de/en/teaching/ss-2018/lecture-mrfs-for-vision-and-graphics/*](https://cg.cs.uni-bonn.de/en/teaching/ss-2018/lecture-mrfs-for-vision-and-graphics/)

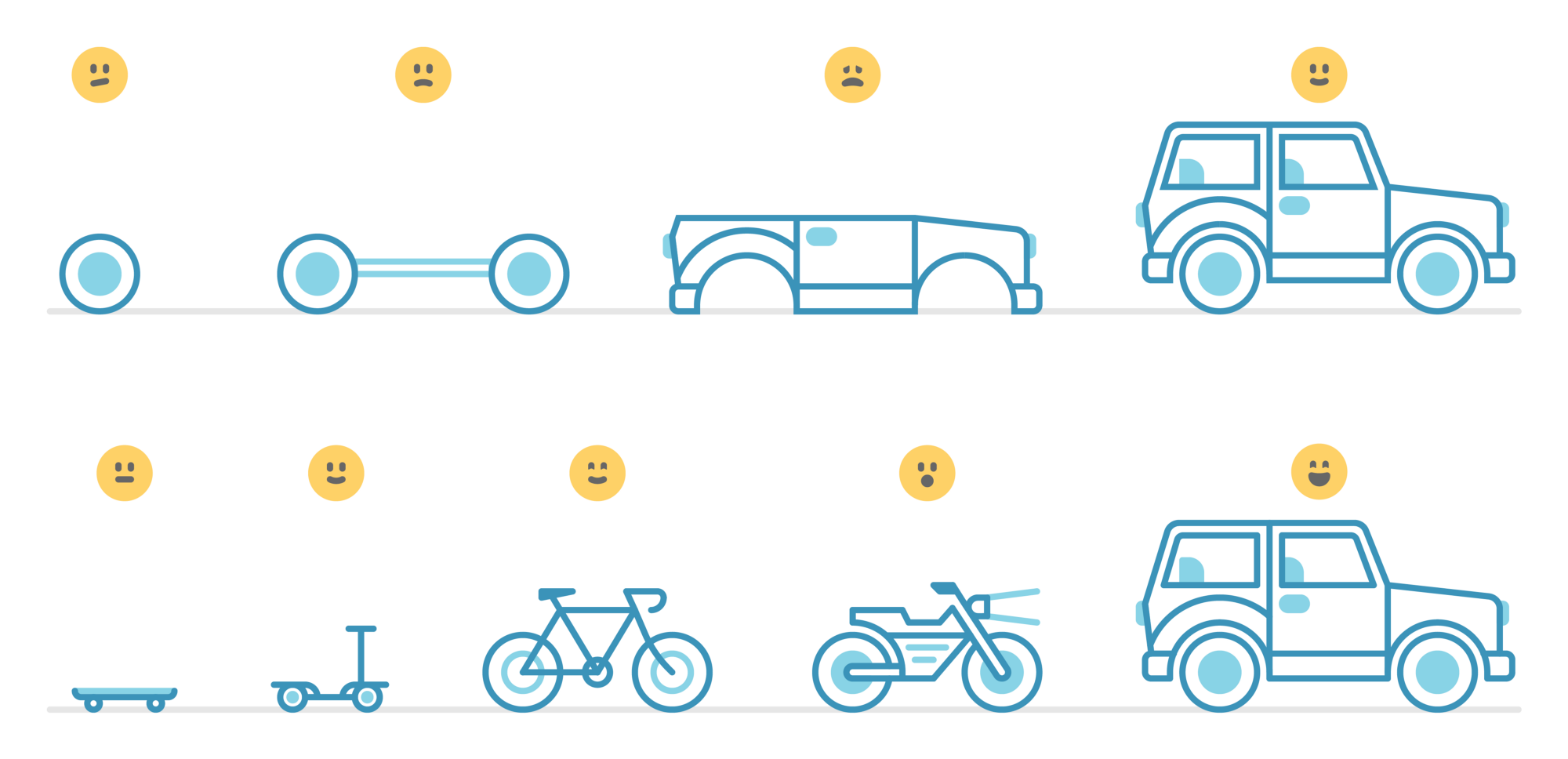
*Andrew Heiss* [*https://datavizm20.classes.andrewheiss.com/*](https://datavizm20.classes.andrewheiss.com/)

# Decision Analysis

* Overview of DA (Hubbard, Anderson, Howard)
* Brief examples (Vietnam…, Uganda, Calluna…)
* Hubbard (selected chapters from ‘How to Measure Anything’)
* Howard (selected chapters from ‘Decision Analysis’ and recorded talks)

# Decision Models (Overview)

* Making a solid business case for the model before programming
* Step1. Start with a skateboard… then move on to other steps



**Seminar:** Causal model / diagram / Impact pathway / Theory of change

# Biases (Readings and Lectures):

* Kahneman (selected work from ‘Thinking Fast and Slow’)
* Rosling (TED Talks / selected work from ‘Factfulness’)
* Ken Robinson (TED Talks / selected work from ‘Out of Our Minds’)

**Seminar:** Calibration Training (lead by team)

# Bayesian thinking

* All follow ‘Learning Bayesian Statistics’ podcast
* Selected reading from ‘The theory that would not die’
* R. McElreath (selected reading from ‘Statistical Rethinking’)
* Betancourt’s work (selected blogs, talks, git repos, Stan, HCMC)

**Assignments:**

1. Greenland, Sander, Judea Pearl, and James M. Robins. “Causal Diagrams for Epidemiologic Research.” *Epidemiology* 10, no. 1 (1999): 37–48*.*
2. *“Yesterday, I gave an easy intro to causal diagrams for some MA students […] bc it contains not a single equation to scare a student with.” – Richard McElreath*
3. NOVA: Prediction by the Numbers. 2018. With the science of forecasting flourishing, this documentary explores how predictions inform our lives and statistics and algorithms' reliability. **52m video** <https://www.dailymotion.com/video/x6fi9b3>

# Model Programming (Coding and programming in R)

* R packages decisionSupport (walk through a vignette or two)
* RSTAN, Other modeling programs - Betancourt’s work (selected blogs, talks, git repos, Stan, HCMC)
* Yihui (markdown etc.)
* **Assignments:**
* 1. “episode 3, with Colin Carroll. He mentions Tom Rainforth's thesis.” – Alex Andorra (about his interview with Colin Carol on the podcast Learning Bayesian Statistics)
* Rainforth, Tom. “Automating Inference, Learning, and Design Using Probabilistic Programming.” Doctor of Philosophy, University of Oxford, 2017.

**References**

Anderson, Jock, John Dillon, and Brian Hardaker. 1978. *Agricultural Decision Analysis*. Ames, Iowa: Iowa State University Press.

Howard, Ronald A., and Ali E. Abbas. 2015. *Foundations of Decision Analysis*. NY, NY: Prentice Hall.