

Minireferáty II

2025

- doprava
Ullrich, Sršeň, Kocián, Mateička, Madarászová
- požáry, zemětřesení, krajina
Lipový, Palkovič, Pristach, Šerbinin, Krkoš, Palúch
- neurony, mozek, psychologie
Krečmerová, Repka, Sedlák, Větrovská
- epidemie, biologie, ostatní
Jánošová, Marková, Mičulka, Mračna, Sedláčková, Slonek, Tulis

Optimal boarding method for airline passengers

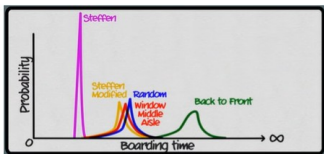
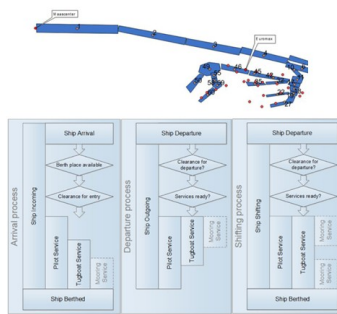
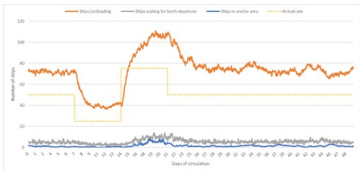
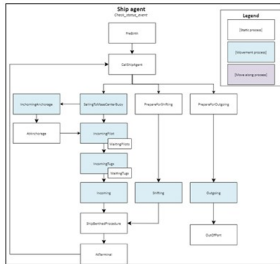


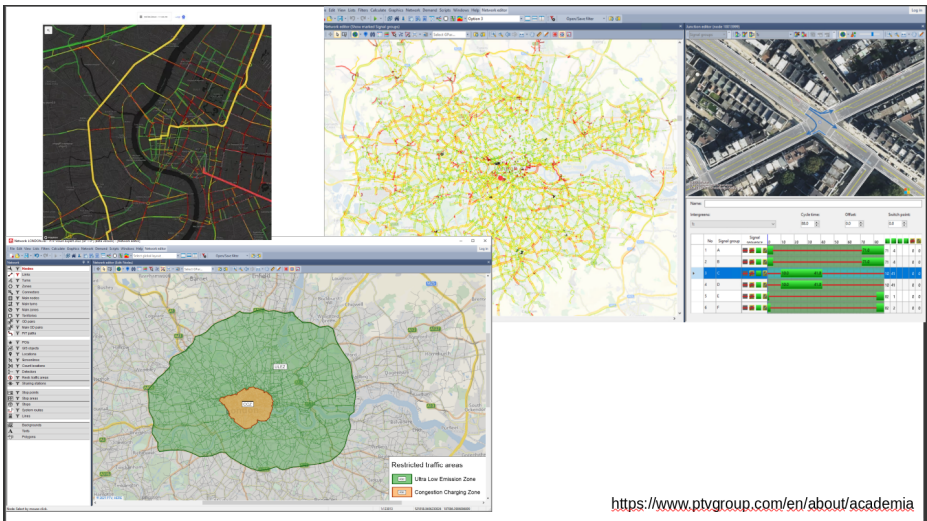
Fig. 3. Examples of the optimal passenger ordering. Note: There are other permutations that would give identical results. Seating would proceed following the patterns illustrated. The shading only indicates the passengers who would be inside the plane at the same time.

https://www.sciencedirect.com/science/article/pii/S0969699708000239?ref=pdf_download&fr=RR-2&src=93aa87b91cb15d09

https://www.youtube.com/watch?v=oAHbLRjF0vo&ab_channel=CGPGrey

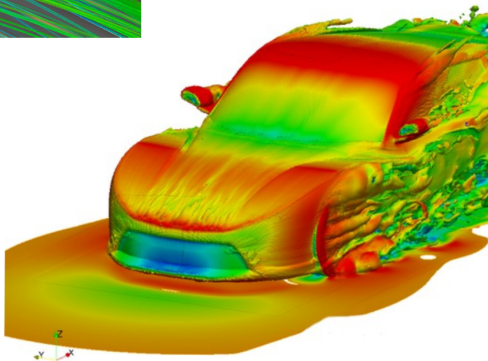
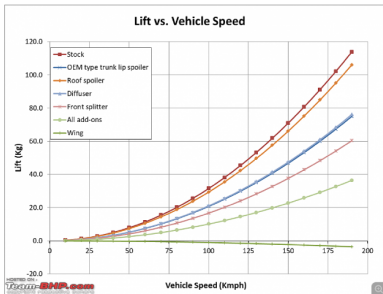
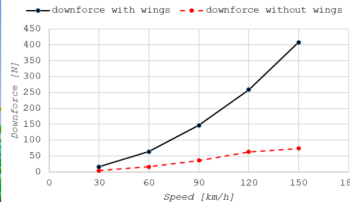
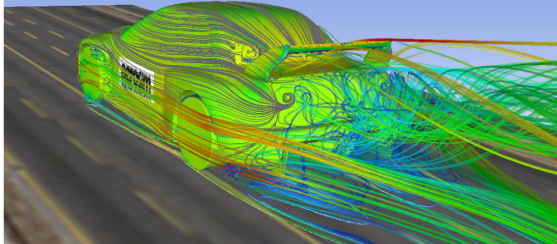
Model simulation for the Port of Rotterdam







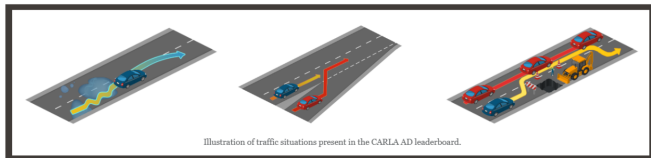
Extreme Simulation Software



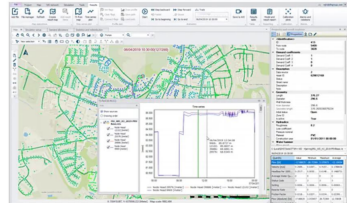
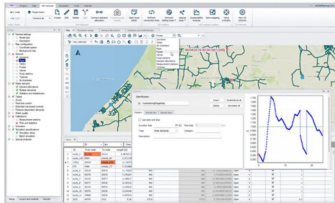
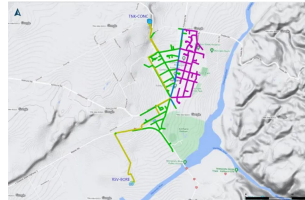
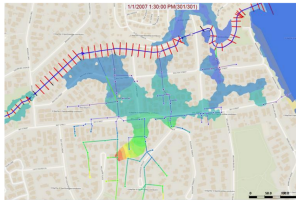
An Open Urban Driving Simulator (simulation of autonomous cars with agents)



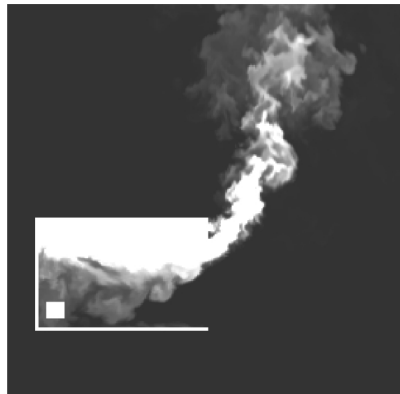
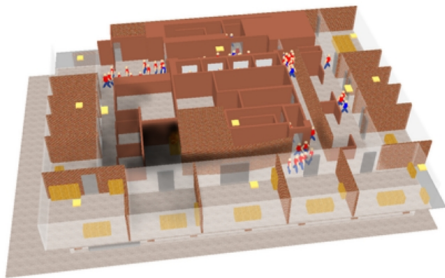
- <https://carla.org/>
- <https://leaderboard.carla.org/>
- <https://arxiv.org/pdf/1711.03938>
- <https://github.com/carla-simulator/>



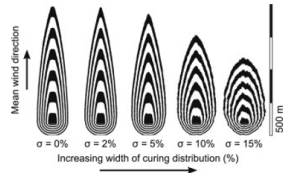
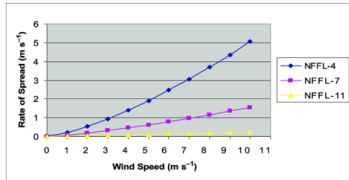
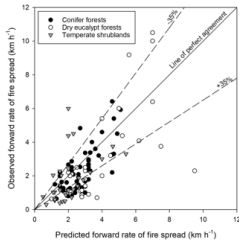
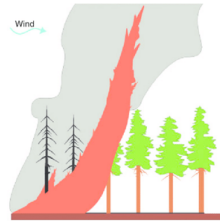
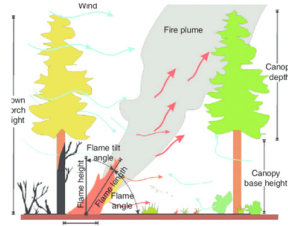
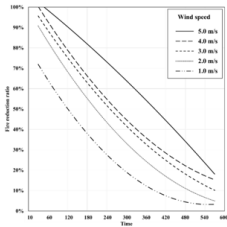
DHI - MIKE



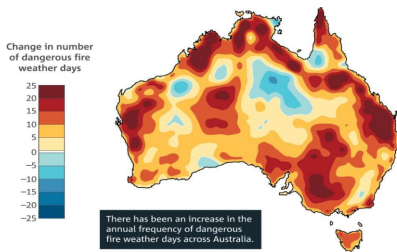
<https://www.dhigroup.com/technologies/mikepoweredbydhi/mikeplus-model-manager>



<https://www.nist.gov/el/fire-simulation-and-research-software>
<https://pages.nist.gov/fds-smv/>



https://www.researchgate.net/publication/220164977_DEVS-FIRE_Towards_an_Integrated_Simulation_Environment_for_Surface_Wildfire_Spread_and_Containment



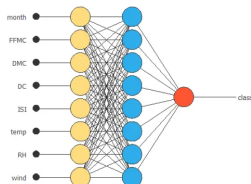
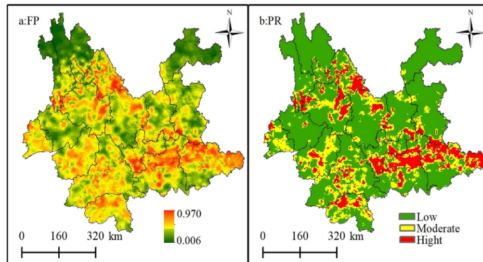
Climate change boosted Australia bushfire risk by at least 30%

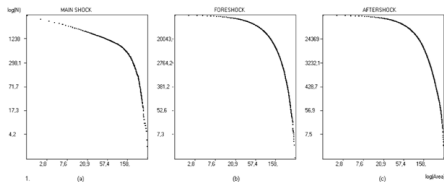
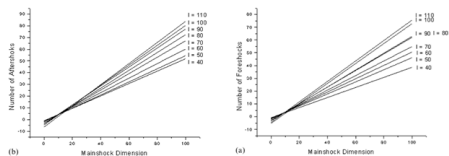
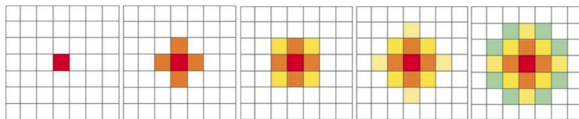
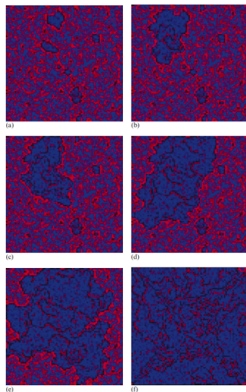
4 March 2020

Pallab Ghosh

Science Correspondent, BBC News

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Seizmický model Castellaro, Mulargia

<https://academic.oup.com/gji/article/144/3/609/614264>

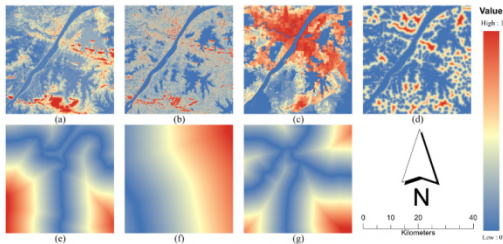
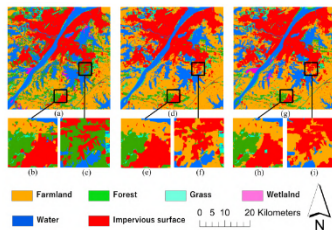
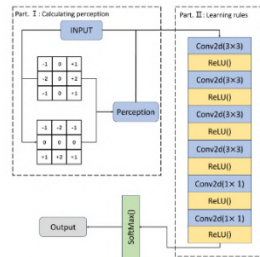


Figure 2. Collected factors of Wuhan city in this study. (a) DEM. (b) Slope. (c) Population. (d) Distance to water. (e) Distance to railway. (f) Distance to expressway. (g) Distance to national highway.

Neural Cellular Automata-based Land Use Changes Simulation

Jinian Zhang, Lanfa Liu



Matematické modelování:

Weak coupling of neurons enables very high-frequency and ultra-fast oscillations through the interplay of synchronized phase shifts

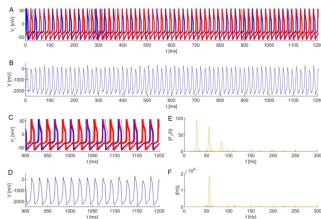
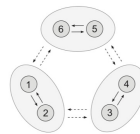
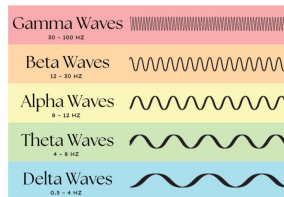


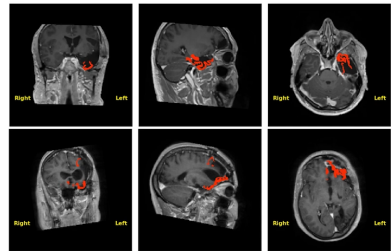
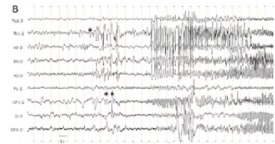
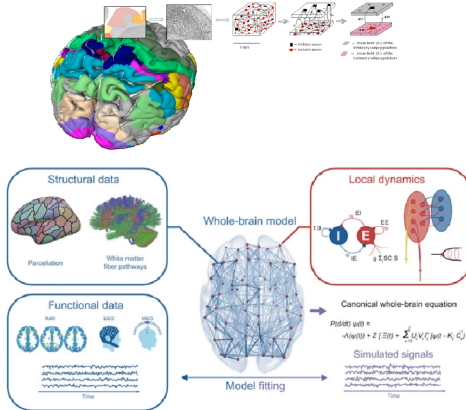
Figure 5. (A) Collective APs of two subpopulations in a neuronal network model (Equation 15) composed of 50 all-to-all coupled Morris-Lecar neurons with heterogeneous membrane capacitances $C_i \sim \text{TN}(0.90, 0.05^2, 0.75, 1.05)$ and random initial conditions in Equation 1. This setting leads to a doubled dominant frequency in (B) the composed signal $V = \sum_{i=1}^{50} V_i$. Zooming in on the dynamics of (C) all neurons, (D) composed signal, and the corresponding periodograms of (E) individual neurons and (F) the composed signal. The robustness of the anti-phase behavior is demonstrated by a noisy applied current $I_{\text{ext}} \sim \text{N}(43, 1^2)$ at each simulation step $\Delta t = 0.01$. The remaining parameter values are identical (see Table 1), $\epsilon = 0.002$.



Network topology leading to apparent UFOs;

http://direct.mit.edu/netn/article-pdf/8/1/293/2351943/netn_a_0351.pdf

Whole brain models, treatment of epilepsy



<https://www.youtube.com/watch?v=FBWIPwL2zKE>

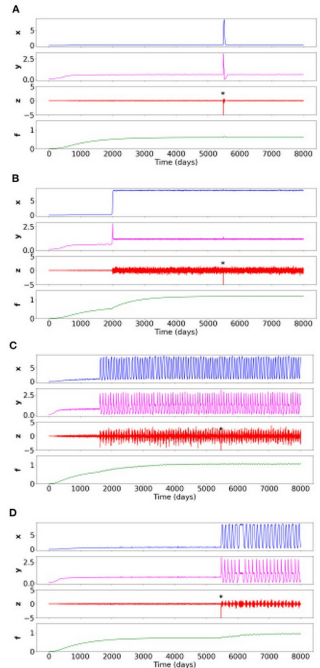
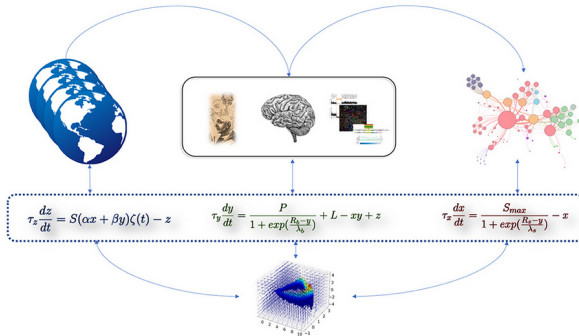
Dynamical systems in computational psychiatry: A toy-model to apprehend the dynamics of psychiatric symptoms

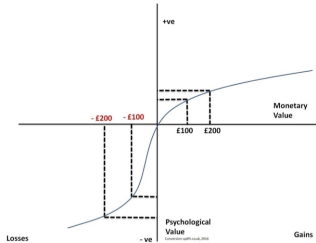


Christophe Gauld^{1,2*}



Damien Depannemaeker^{3,4**}





$$V = \sum_{i=1}^n \pi(p_i) v(x_i)$$

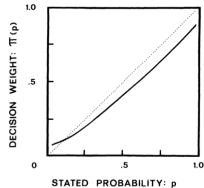
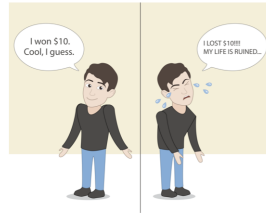


FIGURE 4.—A hypothetical weighting function.

Prospect theory, Tversky, A. & Kahneman, D. (1979). Prospect Theory: An Analysis of Decision under Risk

SIR –Covid19

SIR model



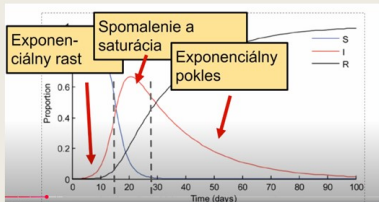
$$\frac{dS}{dt} = -\beta SI$$

$$\frac{dI}{dt} = \beta SI - \gamma I$$

$$\frac{dR}{dt} = \gamma I$$

Kontakty
zdravých a
infekčných

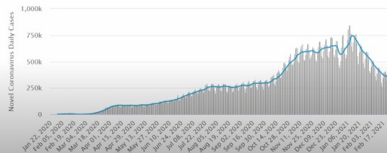
Smrť alebo
vyzdravenie



COVID-19 Data

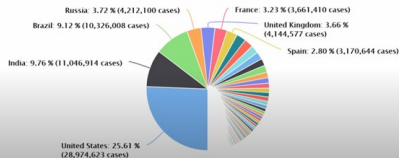
Daily New Cases

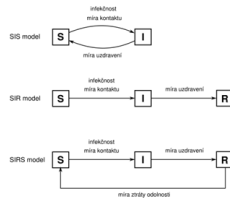
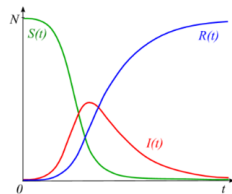
Cases per Day
Data as of 0:00 GMT+0



COVID-19 Data

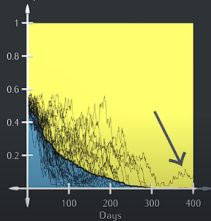
Distribution of cases





<https://www.radekpelanek.cz/dokumenty/ms-kap11.pdf>

Allele Frequencies



Gene 1: The beard itself

Allele 1a: Green Beard

Allele 1b: No beard

Gene 2: Green beard altruism

Allele 2a: GB altruism

Allele 2b: No altruism

Suckers



Cowards



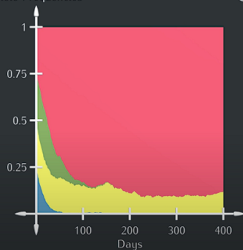
True beards



Impostors



Allele Frequencies



https://www.youtube.com/watch?v=iLX_r_WPrIw

<https://www.youtube.com/watch?v=goePYJ74Ydg&t=45s>

C-NSA: a hybrid approach based on artificial immune algorithms for anomaly detection in web traffic

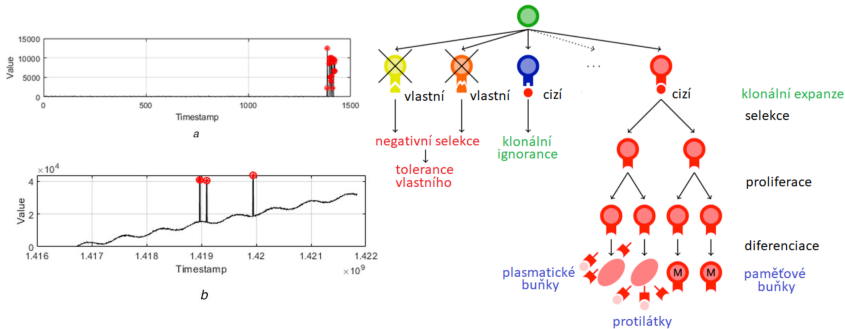


Fig. 3 Normal and abnormal web traffic data in real and synthetic data

(a) Real abnormal and normal web traffic data in time series of A1 class, (b) Synthetic abnormal and normal web traffic data in time series of A2 class

Boolean network model predicts cell cycle sequence of fission yeast

Maria I. Davidich and Stefan Bornholdt

Institute for Theoretical Physics, University of Bremen, D-28359 Bremen, Germany

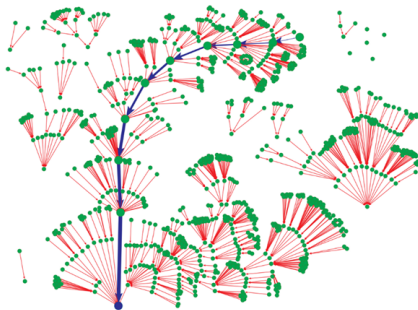


FIG. 2: State space of the 1024 possible network states (green circles) and their dynamical trajectories, all converging towards fixed point attractors. Each circle corresponds to one specific network state with each of the ten proteins being in one specific activation state (active/inactive). The largest attractor tree corresponds to all network states flowing to the G1 fixed point (blue node). Arrows between the network states indicate the direction of the dynamical flow from one network state to its subsequent state. The fission yeast cell-cycle sequence is shown with blue arrows.

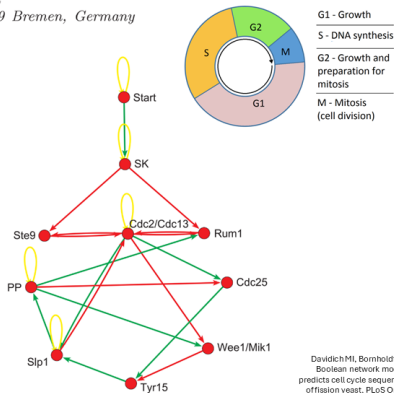


FIG. 1: Network model of the fission yeast cell-cycle regulation.

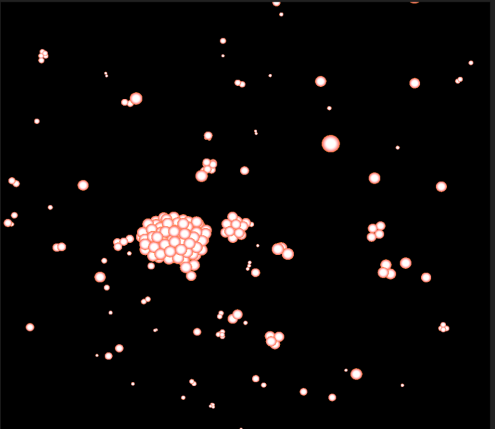
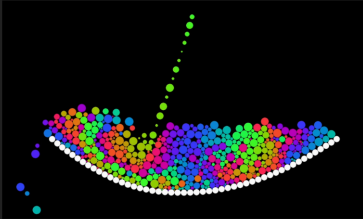
Davidich MI, Bornholdt S.
Boolean network model
predicts cell cycle sequence
of fission yeast. PLoS One.
2008 Feb 27;3(2):e1672. doi:
10.1371/journal.pone.0001672.
PMID: 18301750; PMCID:
PMC2243020.

Verlet integration

$$\vec{x}_{n+1} = 2\vec{x}_n - \vec{x}_{n-1} + \vec{a}_n \Delta t^2$$

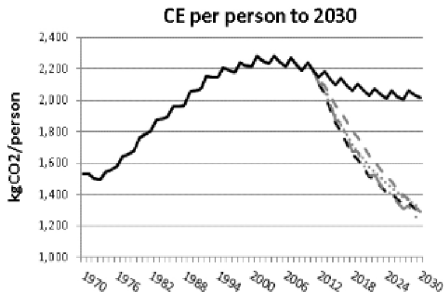
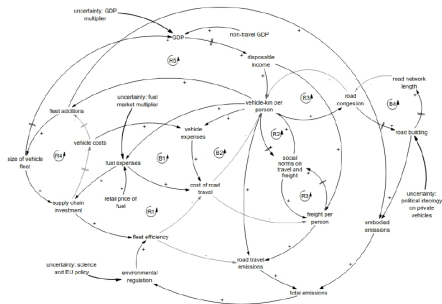
$$\vec{x}_{n+1} = \vec{x}_n + \vec{x}_n - \vec{x}_{n-1} + \vec{a}_n \Delta t^2$$

$$\vec{x}_{n+1} = \vec{x}_n + \vec{v}_{n-1} \Delta t + \vec{a}_n \Delta t^2$$



https://www.youtube.com/watch?v=IS_qeBy3aQI

Revisiting Jevons' Paradox with System Dynamics – Systemic Causes and Potential Cures



<https://doi.org/10.1111/jiec.12285>