8th International Conference on
Neuroscience and Neurological Disorders

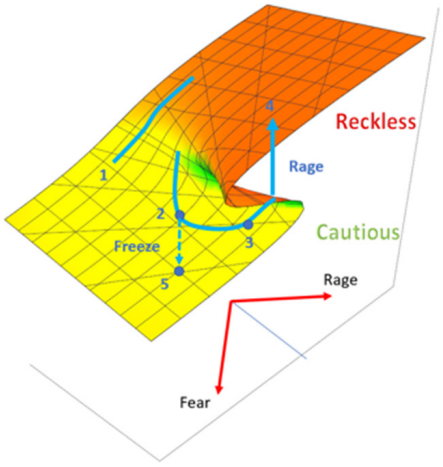
September 28, 2022 | Webinar

Received date: 03-09-2022 | Accepted date: 05-09-2022 | Published date: 10-10-2022

# Cusp catastrophe model of intermittent explosive disorder and road rage

**P J Riley**
Deakin University, Australia

Recent studies in Intermittent Explosive Disorder (IED) have addressed the aggression faciltatory role of an underlying complex neurochemistry (NC) detected by inflammatory markers. These studies confirm that there are non-personality mechanisms which drive aggression in an agonist/antagonist modulating mechanism. Whilst these models are successful in identifying NC processes, they do not address the "explosive" nature of aggressive behavior observed in both IED and average subjects. Lorentz/Zeeman successfully modeled explosive aggression with Rage and Fear as competing co-existent drivers leading to behavioral hysteresis. We previously demonstrated a cusp catastrophe model for abnormal sleep/wake cycles based upon a general principle in Logistic catastrophes where there are two competing processes, the sleep & wake NCs mediated by a scavenging function. We now propose a Lorentz/Zeeman type Logistic Cusp Catastrophe model with competing NCs and scavenging, promoting both Rage and Fear, applied to road rage behaviors. Overall, the model explains a variety of behaviours observed in road rage incidents that are not readily explicable in 2D linear models.




***Conclusion***

Several trajectories are demonstrated in the figure above:

1. A smoothe transition between states as modeled by typical 2D agonist/antagonist mechanisms.
2. Average driving requires acquisence to driving regulations so is driven by low level fear to conformity unless provoked by threatening situations.
3. Aggressive driving by IED subjects starts them closer to the catastrophe cusp and are more susceptible to abrupt changes in behaviour.
4. 'Close to the edge` subjects require only minor provocations to be driven to the cusp with a subsequent catastrophic 'explosive' jump to the reckless driving state ie. Rage.
5. Drivers who are overtaken by fear tend to exhibit a freeze in their behaviour.

**Recent Publications**

1. A Neurochemistry Cusp Catastrophe Model of Abnormal Sleep-Wake Cycles, Riley.P, EC Psychology and Psychiatry 8(1):50-52 01 Jan 2019.
2. An evaluation of the effect of tube potential on clinical image quality using direct digital detectors for pelvis and lumbar spine radiographs, Peacock, Steward, Riley.P, Journal of medical radiation sciences 67(4):260-268 Dec 2020.
3. Cusp Catastrophe Models in Neurochemistry & Behaviour, Riley.P, Neuroscience Summit 2021, virtual, 05 Oct 2021-05 Oct 2021.

## Biography

Peter Riley is a Consultant in Medical Physics teaching into the Medical Imaging course at Deakin University. He has previously undertaken non-linear modeling of tumor growth and abnormal sleep/wake cycles. He is developing Deep Neural Networks for the detection and staging of disease from medical images, including covid-19 and prostate cancer.

peter.riley@deakin.edu.au