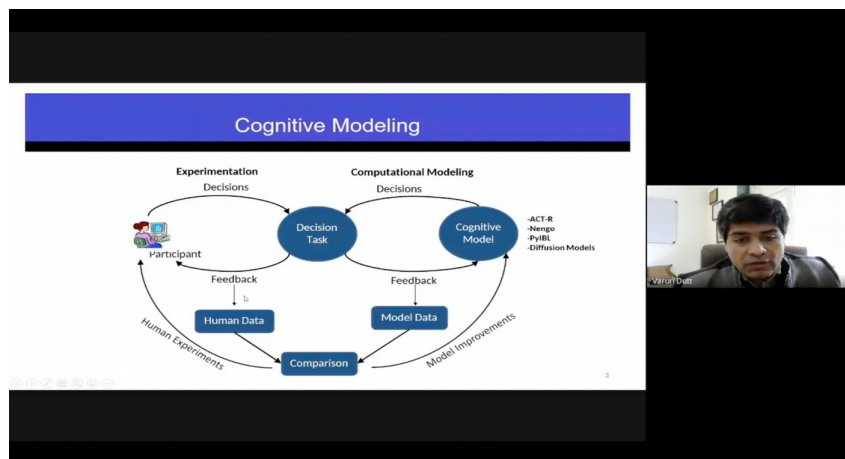


# IIT Mandi Hosts 2nd Virtual Winter School On Cognitive Modeling

Indian Institute of Technology Mandi virtually hosted the 2nd Winter School on Cognitive Modeling (WSCM) from 15th to 17th December 2020. This initiative was hosted by IIT Mandi in collaboration with Himachal Pradesh Technical University (HPTU), University of Groningen, University of Waterloo, and Indian Institute of Technology Roorkee. The event included key sessions from various national and international researchers and professionals to train students on the best practices in the area of cognitive modeling.



## Dr. Varun Dutt explaining the importance of Cognitive Modeling and its different approaches

Cognitive Models are essentially theories of how people think and make decisions, implemented through computer simulations. Integrating Artificial Intelligence (AI) and Machine Learning, cognitive modeling studies human cognition by creating behavior models in both primary and applied domains.

The second edition of winter school on cognitive modeling began with Prof. S. P. Bansal, Vice-Chancellor, Himachal Pradesh Technical University, delivering the inaugural address virtually on 15th December 2020. Other dignitaries during the inaugural address included Dr. Dharendra Sharma, Dean of Engineering, Himachal Pradesh Technical University, Prof. Satish Chandra Jain, Dean of Infrastructure and Services, Indian Institute of Technology Mandi, and Prof. Venkata Krishnan, Dean of Sponsored Research, Industrial Consultancy, and International Relations. The inaugural event also included participants, speakers, and students from various countries across the globe.

The slide, titled "What are accumulator models?", is part of a PowerPoint presentation. It features a sub-point: "Explanation of two-alternative forced choices". Below the text is a graph labeled "(A)" showing two probability density functions (one blue, one green) and a decision process diagram with axes labeled 'a', 'z', and '0'. At the bottom, there are logos for "rijksuniversiteit groningen", "artificial intelligence", and "cognitive modeling". A small video inset on the right shows Prof. Marieke van Vugt.

## Prof. Marieke van Vugt delivering lecture on Introduction to Accumulator Models

This year's Winter School featured many national and international speakers. These included:

- Dr. Marieke van Vugt from the University of Groningen, Netherlands
- Dr. Terrence C. Stewart from the University of Waterloo, Canada
- Dr. Partha Pratim Roy from Indian Institute of Technology Roorkee, India
- Dr. Varun Dutt from Indian Institute of Technology Mandi, India
- Dr. Arnav Bhavsar from Indian Institute of Technology Mandi, India
- Dr. Shubhajit Roy Chowdhury from Indian Institute of Technology Mandi, India
- Dr. Shruti Kaushik from Indian Institute of Technology Mandi, India
- Mr. Abhinav Choudhury from Indian Institute of Technology Mandi, India

During the three day event, Dr. Marieke van Vugt discussed how accumulator models allow us to draw meaningful insights about an individual's decision-making strategy (such as whether the individual tends to be slow-and-accurate or fast-and-often-wrong) out of data from simple cognitive tasks. She also gave insight into how mental models can be applied to understand how depression works and the effects of meditation on the mind and brain.

Along with this, Dr. Terrence Stewart shared his knowledge on using tools like Nengo, which could be used to define different neuron types, learning rules, optimization methods, and reusable subnetworks to build large-scale brain models. He also covered how interdisciplinary researchers from diverse fields could answer questions about human cognition and the brain in his session.

Speaking about the impact of conducting a virtual winter school on cognitive modeling during these challenging times, Prof. Varun Dutt, Associate Professor, School of Computing and Electrical Engineering, IIT Mandi, said, "The School provided participants from diverse backgrounds an exposure to different models and tools including instance-based learning theory), accumulator models, Spiking neural network architectures (like Nengo) and EEG pattern classification, which could be used to model people's decisions in a wide variety of basic and applied domains." Dr. Dutt also emphasized using tools like PyIBL to model people's thinking and decision making in different real-world problems involving complex dynamics, time-delays, and uncertainties."

This year's Winter School featured engaging sessions to understand different tools for creating cognitive models, which included Nengo (neural simulator), PyIBL (used to model human decisions from experience), and Accumulator models (to model human decisions based upon accumulations to thresholds). Additional sessions elucidating cognitive models' industry applications discussed models for EEG-based image classification, stroke diagnosis, machine learning applications in healthcare, and social network analysis.

The three-day event concluded with the valedictory address of Dr. Samar Agnihotri, Chairperson, School of computing and electrical engineering, Indian Institute of Technology Mandi, Prof. Marieke van Vugt,

University of Groningen (The Netherlands), Dr. Terrence Sttewart, University of Waterloo, Canada, and Prof. Varun Dutt, School of Computing and Electrical Engineering, Indian Institute of Technology Mandi.