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International Association for Travel Behaviour Research

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CONTENTS

STILL OR SPARKLING TRAVEL BEHAVIOUR?
Decarbonising the Carbonated Transport Industry

EDITOR: TAHA RASHIDI

Taha Rashidi is a professor of transport engineering at the School of Civil and Environmental Engineering at UNSW and the director of the Research Centre for Integrated Transport Innovation (PCI). Prof Rashidi is currently leading research into the interconnectivity between travel behaviour and time use and the potential of new mobility technologies to influence this paradigm. Taha is also examining the capacity of social media data to complement existing data resources as part of the development of an integrated multi-level modelling framework to demonstrate the relationships between land use and transport systems and the consequences this has for city planning and travel behaviour more broadly.

Source: Midjourney; Prompt = Taha Rashidi, transport planner, circle icon, city circle background, illustration

Design, artwork, and formatting: Maryam Bostanara

BACKGROUND

IATBR NEWS has proudly celebrated the 3rd issue published in September 2023 (please read the issue here if you have not1[1]). Keeping the original mission of this newsletter, it will bring discussions around another futuristic vision and mind-boggling idea to the attention of travel modellers around the world. After focusing on Metaverses, Space Mobility, and Generative AI, on the first three issues, on the 4th issue we focus on another emerging domain, ***Decarbonisation, as an Incentive.*** In addition, following the first two episodes of interviews with reputable scholars in the area of travel behaviour, this issue will cover an interview with Prof Hani Mahmassani.

1 https://iatbr.weebly.com/September-2023.html

TOPIC

In this issue, we invite researchers, scientists, and practitioners to describe, criticise, support, or challenge ideas around the travel behaviour of an era when governments will enforce strict environmental requirements, and businesses must monitor, compensate and reduce their greenhouse gas emissions. With the net-zero commitments, there will be a universal carbon credit market (unlike the current fragmented). Carbon accounting and carbon exchange rates will be critical aspects of policy appraisal tools (not just a minimum requirement). With significant monetary values attached to carbon credit savings, the ownership of saved carbon would be further scrutinised. It is yet unclear who can claim the carbon saved for electric vehicles, vehicle manufacturers, fleet owners or travellers. For example, in the case of electric buses, does the saved credit go to the vehicle manufacturer? The operator (public or private)? The traveller who uses the bus? Or shared among all? The distinction between different types of emission (Scope1-3[1]) and the associated stakeholders needs closer attention.

A significant contributor to (non)travellers' behaviour is the monetary value of carbon saved using environment-friendly modes of transport (see, for example, the first patented mobility app[2]). We might observe a paradigm shift in how people pay (collect credit) for modes they use in a multimodal and integrated mobility-as-a-service system.

1 https://www.epa.gov/climateleadership/scope-1-and-scope-2-inventory-guidance
2 https://www.greenlines.cc/

National Academy of Engineering Election

Greatest Achievements and Tips for Junior Engineers:

A Conversation With Professor Pat Mokhtarian

INTERVIEWEE: PATRICIA MOKHTARIAN

Patricia Mokhtarian is the Clifford and William Greene, Jr. Professor in the School of Civil and Environmental Engineering at Georgia Tech, as well as Professor Emerita of Civil and Environmental Engineering at the University of California, Davis (UC Davis). She has specialized in the study of travel behavior for more than 45 years, and has authored or co-authored nearly 200 peer-reviewed journal articles. According to Google Scholar her work has been cited more than 36,000 times. Dr. Mokhtarian is a past Chair of the International Association for Travel Behaviour Research, and received its Lifetime Achievement Award in 2021. She serves on the editorial boards of nine transportation journals.

AUTHOR: CHIARA CALASTRI

Dr Chiara Calastri is an expert in Choice Modelling. Her contributions have focused on the impact of social interactions and time use on travel behaviour. She is now working on travel-based multitasking, aviation and dial-a-ride systems. She's been funded by UKRI, the Department for Transport and Great British Railways.

A former President of the IATBR and a member of the USDOT National Center on the Future of Travel Behavior and Demand (TBD) as well as the USDOT Tier 1 Center on Teaching Old Models New Tricks (TOMNET), Prof Pat Mokhtarian has recently been elected to the prestigious National Academy of Engineering (NAE). I have met with her on Zoom to discuss this great achievement.

CC: Mainly for the benefit of those of us who do not work in the US, could you give me an idea of why is this appointment considered so prestigious?

I believe the organization is the equivalent of what a Royal Academy would be in a country with a monarchy, even if "National Academy" sounds less impressive! However, technically it is a non-profit and private institution. There are only 2,441 living US members of the National Academy of Engineering, plus 332 international members, and that's across 12 fields of engineering! Furthermore, somewhere around half of the members are in industry, consulting, or government, so the number of academics is even smaller.

CC: How many of these members are in Civil Engineering and how many are women?

There are 220 in Civil Engineering across the US, of which only about 25 are women. It's long been kind of an "old boys' network" because you don't apply for membership, you can only be nominated by existing members, and there's a rather rigorous process involved, including ultimately a vote of the entire membership. There's been an effort to increase diversity over the years, and the numbers of women and those in other underrepresented groups are steadily rising. But as you can tell, we are still very much a minority.

CC: What does the membership entail, and what will be your duties as a member?

The NAE, together with its two sisters – the National Academies of Science and Medicine – is expected to provide independent expertise to the federal government. The Members might be called on to participate on specific study panels, or committees of some kind over the years. I am not entirely clear on my duties just yet! They've asked us to provide our a description of our expertise, and there is a directory from which they can select appropriate members when they need somebody in, say, travel behaviour.

CC: Do you know any other member of the travel behaviour community?

Hani Mahmassani is also a member and another IATBR luminary they can draw upon! I am aware of several other transportation members, although relatively few. Besides transportation, the Civil Engineering section includes people who build skyscrapers, amazing bridges and all kinds of things in other fields of CE.

CC: Did your election come as a surprise?

I admit to being a bit envious when the announcement of new members came out each year, because universities make a big deal about being part of this! But over the years, I never really expected it to happen, considering that what I do is arguably more behavioural science than engineering. I just assumed that being interdisciplinary, I would fall between the cracks. However, not too long ago my department chair led me to think that it was not impossible. And indeed, the motto of our Civil and Environmental Engineering department is "people are our priority; the world is our responsibility". From that perspective, it is perfectly natural for someone who uses quantitative methods to understand and predict human behaviour with respect to civil infrastructure to be a Civil Engineering member of the NAE.

CC: Speaking of your work, the election to the NAE is of course a recognition of your contributions to the field of transport research over time. What would you say is the key area (or areas) of research where your work has made a difference, and could you point people who are new to your work to selected papers?

I can highlight four areas. I may be best known for my telecommuting and teleworking research, which I began early in my career in collaboration with my dear colleague Ilan Salomon. Over the years, I broadened that focus to the travel impacts of telecommunications in general[1]. A second area is the positive utility of travel, which also grew from my collaboration with Ilan[2]. Third is the subject of residential self-selection, launched from an early paper with Ryuichi Kitamura and continued with Susan Handy and our then-PhD student Xinyu (Jason) Cao, and recently (with my completed PhD students Sung Hoo Kim and Xinyi Wang) branching into in-depth treatments of sample selection modeling[3]. The fourth area is the study of

1 Mokhtarian, Patricia L. (2009) "If Telecommunication is Such a Good Substitute for Travel, Why Does Congestion Continue to Get Worse?" Transportation Letters 1(1), 1-17.

2 Mokhtarian, Patricia L. and Ilan Salomon (2001) "How Derived is the Demand for Travel? Some Conceptual and Measurement Considerations". Transportation Research A 35(8), 695-719.

3 Cao, Xinyu, Patricia L. Mokhtarian, and Susan L. Handy (2009) "Examining the Impacts of Residential Self-selection on Travel Behavior: A Focus on Empirical Findings". Transport Reviews 29(3) (May), 359-395.

activities conducted while traveling, which of course connects to both the telecommunications and the positive utility of travel themes[4]. I have this wonderful conceptual paper with Giovanni Circella and a master's student from UC Davis who had done some of the preliminary work with us. It's a conceptual exploration of multitasking, not just while travelling, but in general, with travelling as a special case, and that's still one of my favourite papers of all time.

CC: Who, or whose work, do you feel has most inspired you to pursue this career?
Starting with my parents! It took me several decades into my career to realize that I am the logical child of my mother and my father. My father was an army helicopter pilot. He therefore operated transportation vehicles for a living, and also loved to travel. When he was on active duty in the army, he flew helicopters in Korea, Vietnam, and all over Central and South America. He and my mother went all over the world on vacations. My mother went back to get a PhD when my two sisters and I were teenagers. So she was the first PhD in our immediate family, although two of her sisters and a brother (out of 11 siblings in all) also earned doctoral degrees at some point. From my teenager perspective, it was hence very natural to assume that if you were doing well in school, a PhD was achievable.

CC: So what did your mother study?
My mother's PhD is in marriage and family therapy, so I feel like I absorbed an interest in human behaviour from her, and the love of travel probably from both parents. But certainly, my father had a bit of an engineering bent, and I think it was he who suggested operations research to me as a field of study.

CC: And is that what you went on to study?
I was a math major in college. Always loved math, but wanted to apply it to something, I didn't feel like I could prove theorems for a living like my uncle does. He's a retired math professor at the University of Florida and is still proving theorems in his early 80s. Anyway, I wanted to apply math to something, so it was my father with his military background who said "what about operations research?" since it had largely originated within a military environment. And so that's what I was majoring in at Northwestern for my Master's and PhD.

CC: So how did you get into transport research?
While at Northwestern in Chicago, I realised I could get by in a big city without a car, and I got interested in public transportation. After my first year in Operations Research, which I didn't find as satisfying as I'd hoped, I thought "maybe I'll try transportation". And where to find that? In Civil Engineering! So I tiptoed with great fear and trembling over to the civil engineering department. It seemed like a huge step to me at the time because again, I had no idea that that's the turn my life would take. I took some courses first from Joe Schofer and then from Peter Stopher and then from Frank Koppelman. My third class was Frank Koppelman's fantastic Discrete Choice Modelling class, and by then I was hooked, you know? It was math and behaviour at the same time, and it just resonated as being "my thing".

Source: Midjourney; Prompt = all modes of transportation are in a big field in a reduced scale ship plane train and bus, render, gray background

> "*My third class was Frank Koppelman's fantastic Discrete Choice Modelling class, and by then I was hooked, you know? It was math and behaviour at the same time, and it just resonated as being* my thing."

CC: And how did you go from there to being a researcher?
At the time, I was on a fellowship, so I wasn't doing research per se, but eventually I ended up becoming a research assistant on Frank's projects. My beloved colleague Eric Pas was already working with Frank at the time. I looked at Eric and Frank's other students with wistfulness, seeing how much fun they had and wishing I could be part of that group. Eric was very instrumental in creating that link between Frank and me, and once I joined Frank's research group, Eric and I were officemates until he took the faculty position at Duke University. Eric was Frank's first PhD student and I was his second, and I will cherish the memory of our strong friendship for the rest of my life.

CC: So your career demonstrated that it might take a while to understand your direction, but it's worth it! What advice would you give to junior transport engineers?
First and foremost, I would say focus on being excellent at what you do.

If I feel like I've done my best and that I'm very proud of what I do, it almost doesn't matter what other people think. That's an exaggeration, of course. We all want people to think well of us, but my point is that if excellence is your goal, then other people thinking well of you will come naturally, whereas if meeting others' expectations is your goal, you may succeed at that, but not end up very happy with yourself.

> "*If a paper is meant to have my name on it, I'm gonna read it and heavily edit it and make sure I know what's happening and agree with it, and that the writing is high quality.*"

CC: If we think about the academic field, some might find this advice hard to follow in a culture that just encourages quantity over quality, making it harder to take the time to pursue excellence. How do you deal with all this?
Everyone's career trajectory is unique and of course, mine started in a different era, so to speak. And so I do increasingly wonder how relevant to students today my experience is, in terms of career trajectory or even values. I like to think that universities should foster conditions that are conducive to achieving excellence, and if they have lost sight of that objective in the interests of numbers or money, God help us. But I do feel like we have a certain amount of agency in the matter. Sometimes I have to say "OK, there isn't enough time and it is not worth doing this to perfection, I have to settle." It's an exception for me, but we all need to make those decisions from time to time. On the other hand, I'm more often making decisions in the opposite direction: I will turn down any number of appealing opportunities, because I know I will not be able to do an excellent job with them in view of the commitments I've already made, and my desire to fulfill those commitments with excellence.

CC: Does this affect the type of projects you decide to work on?
In the past, I've had big-money projects and I've gotten the fewest papers from those projects compared to my smaller-money projects, because the big-money projects involve a lot of management overhead. Big-money projects also often lead to having a lot of mouths to feed – postdocs, research engineers and students – which can become a vicious spiral, always having to chase the next big-money project to keep being able to feed the army. This doesn't work for me. I want to have an in-depth view of what's going on with my students, what they're doing on projects. If a paper is meant to have my name on it, I'm gonna read it and heavily edit it and make sure I know what's happening and agree with it, and that the writing is high quality. That takes time and I can't do that for very many students and projects, so I've consciously limited the number of projects I take on and the number of students I take on, way fewer than a number of my colleagues who seem to do it quite well. So everyone has to find their own style and adapt to it.

4 Circella, Giovanni, Patricia L. Mokhtarian, and Laura K. Poff (2012) "A Conceptual Typology of Multitasking Behavior and Polychronicity Preferences". electronic International Journal of Time Use Research 9(1), 59-107. Available at https://jtur.iatur.org/home/article/76fb57e3-84b8-43c1-966a-67d281b37e59.

Decarbonisation in the Interest of a World With Sustainable Intent May Just Well Support Continued Growth in Car Ownership and Use

AUTHOR: DAVID HENSHER

Professor David Hensher is Founding Director of the Institute of Transport and Logistics Studies at The University of Sydney; a Fellow of the Australian Academy of Social Sciences; recipient of numerous awards including the 2009 International Association of Travel Behaviour Research (IATBR) Lifetime Achievement Award and the 2019 John Shaw Medal which honours an industry champion who has made a lasting contribution to Australia's roads. In 2021 an annual prize was established and named in honour of David for best paper in transport demand modelling at the Australasian Transport Research Forum (ATRF). He has published over 700 papers in leading international transport and economics journals as well as 18 books. He has over 62,000 citations of his contributions in Google scholar. Research.com, a leading academic platform for researchers, released the 2022 Edition of the Ranking of Top 1000 Scientists in the field of Economics and Finance and David is #1 in Australia. In January 2023, David was appointed a Member (AM) of the Order of Australia (OA). In 2020 David published a book on MaaS: Hensher, D.A., Mulley, C., Ho, C., Nelson, J., Smith, G. and Wong, Y. (2020) Understanding Mobility as a Service (MaaS) - Past, Present and Future.

The decarbonisation challenge or debate may just be heading in the wrong direction. With a general condemnation of cars whose energy source is derived from fossil fuels, there is a rush to find a preferred energy solution that ticks all the right environmental boxes as well as a few others, appropriately referred to as ethical and commercial. An increasing number of countries are mandating no more cars that use petrol and diesel[1].

While we focus increasingly on ensuring clean energy cars, especially at the tailpipe[2], we often forget that the real long term broader sustainable solution is unlikely to be achieved if cleaning up the energy source to propel cars is likely to encourage even greater use of cars, be they with a driver or the hyped-up interest in moving to autonomous cars[3].

1 This ignores the opportunity to utilise renewable diesel, but that also has questions related to using vegetable oil.
2 See https://www.sydney.edu.au/business/news-and-events/news/2023/02/06/counting-the-full-costs-of-transport-choices.html
3 The amount of research funding devoted to autonomous cars is staggering given the likely benefits.

The point is that we need sustainable alternatives that drag us away from dependence on the car and which will require, in most western societies, a good dose of repricing of car use to ensure a future for public transport, and even non-ownership of cars and use of shared cars (Hensher 2020)[4]. At the same time that we are promoting the switch to sustainable transport modes[5], we are typically building long term support for the car on the basis of a single sustainability criterion[6], namely CO2 emissions at the tailpipe.

> ***At the same time that we are promoting the switch to sustainable transport modes, we are typically building long term support for the car on the basis of a single sustainability criterion, namely CO2 emissions at the tailpipe.***

4 https://www.sydney.edu.au/business/news-and-events/news/2020/03/02/more-on-electric-cars---life-cycle-emission-concerns.html and https://www.sydney.edu.au/business/news-and-events/news/2019/08/05/electric-cars---they-will-in-time-increase-car-use-without-effec.html
5 Which could include onset of car share services.
6 Sustainability as a term used in this paper refers to fulfilling the needs of current generations without compromising the needs of future generations, while ensuring a balance between economic growth, environmental care, and social wellbeing.

Source: Midjourney; Prompt = earth in hands + sustainability + future, green + city

"I joined the debate."

This results in a real dilemma, described brilliantly by Anable and Goodwin (2021) where they describe de-carbonising transport like shot silk. The warp (blue) relates to still being able to use our cars with increased traffic, because they will be electric; we will still be able to fly away on holiday, using non-carbon fuel, and technology will give us a timely transition. The weft (green) is the overall and significant traffic reduction including a substantial mode shift to walking, cycling and public transport, increasing car occupancy overall, and embedding transport de-carbonisation principles in spatial planning to ensure that new development promotes sustainable travel choices. ***The challenge, however, is that only one colour is typically seen, depending on where the viewer is standing.***

The agendas of many governments are narrowly based on an almost emotional commitment (and unconscious bias) to ensure the car remains king ('A car is a car' regardless of whether ICE, electric, hydrogen and autonomous) that we neglect to recognise that this carries so many negative externalities (and some positive ones on ease of use) regardless of the fuel source. Enhanced mobility through promoting electric private car use is unlikely to align well with a broader set of sustainability objectives, especially in metropolitan settings with growing congestion.

The agendas of many governments are narrowly based on an almost emotional commitment (and unconscious bias) to ensure the car remains king ('A car is a car' regardless of whether ICE, electric, hydrogen and autonomous) that we neglect to recognise that this carries so many negative externalities (and some positive ones on ease of use) regardless of the fuel source.

One might speculate that if the billions of dollars spent on researching fuel solutions for cars and new car designs etc. were injected into public transport and other more sustainable solutions such as better infrastructure for active travel, we would, as a society, be far better off. But one suspects that manufacturers of cars believe that the profit margin is far less attractive; indeed, government gains more revenue from car ownership and use than from heavily subsidised public transport and healthy mobility (noting the potential savings in health-related costs).

Reference:
Hensher, D.A. The greening of the passenger car might not deliver such positive sustainability news – so what do we have to do? Transportation Research Part A, accepted 5 December 2023.

Source: Midjourney; Prompt = motor vehicles from the year 2050 in a traffic congestion, convey a futuristic feel

Could Truly Understanding the Decision-making Process Be Key to Better Forecasting Travel Behaviour?

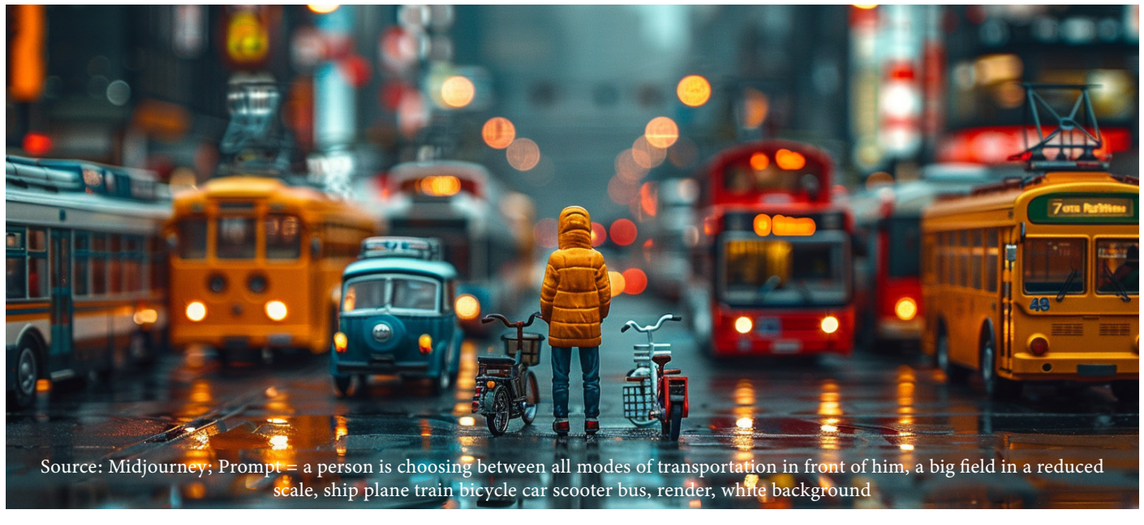
AUTHOR: THOMAS HANCOCK

Thomas Hancock is a Senior Research Fellow at the Choice Modelling Centre and Institute for Transport Studies, University of Leeds. His main research interests are understanding the decision-making process, the integration of (econometric) choice modelling and mathematical psychology, model specification and interpretation, and moral choice behaviour. His work thus far has focussed on the implementation of decision field theory and the use of physiological sensor data.

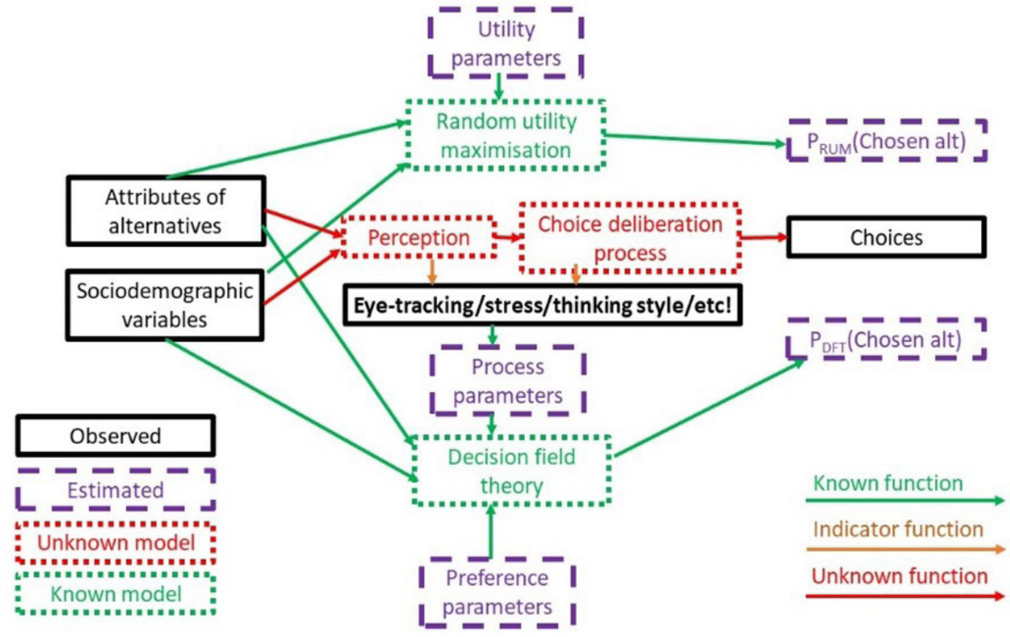
Introduction:

I like to start presentations I give on the decision-making process by talking about my own commute alternatives. I'll start with that example here too! In my own commute decision, I could travel to the University of Leeds by car, bus, a direct (fast) train or a slow train. There are positives and negatives of each travel mode in terms of the attributes of each alternative. For example, the direct train is fastest, but also the most expensive. The bus meanwhile is slowest, but cheapest. However, beyond consideration of just the attributes of the alternatives, there is a decision-making process that happens each time I make this choice. In my own commute behaviour, I am aware of some of the additional factors that shape my decision. For example, sometimes I might simply want to get to university as fast as possible, thus my decision-making process is governed by a 'non-compensatory' process (which alternative is best on one dimension) rather than a compensatory (utility maximisation type) process. The tricky part in travel behaviour modelling is that we do not just model our own decisions! We thus usually do not know if a traveller wants to get somewhere "as fast as possible." Picking apart what we do not observe is particularly complex in the case of trying to understand the decision-making process.

That being said, there has been a rich history in travel behaviour research of trying to better predict the choices travellers make by better understanding their decision-making processes. Key contributions include work on attribute non-attendance [1], consideration of choice response time [2] and the development of models that specifically explain non-compensatory choice behaviour [3]. Recent developments by myself and colleagues have demonstrated that models based on ideas originating in mathematical psychology could also prove a real asset in understanding travel behaviour [4,5]. Under these "accumulator" models, the key assumption is that preferences for different alternatives evolve over time during the choice deliberation process. The models attempt to 'mimic' a choice deliberation process and consequently have 'process' parameters such as the 'number of preference updating steps.' Ultimately, the idea here is that by better understanding and representing the choice deliberation process, we will also better predict choice outcomes. Testing this idea in various ways has thus far been at the heart of most of my research. It has driven me forwards in my 8 years in academia so far, and I anticipate that it will continue to drive me forwards for the considerable future. In this article, I am going to provide answers to some questions, which I hope will demonstrate why I think there has never been a better time to get involved in this line of work!



Source: Midjourney; Prompt = a person is choosing between all modes of transportation in front of him, a big field in a reduced scale, ship plane train bicycle car scooter bus, render, white background



Observed and not observed, the choice deliberation process. Adapted from frameworks for incorporating physiological sensor data in Hancock and Choudhury [6].

What makes models developed in mathematical psychology different?

This is best explained with a figure. Essentially, models based on ideas from mathematical psychology, such as decision field theory, do the same thing as models based on econometric theory: they calculate a probability for a decision-maker choosing a particular alternative. In the figure above, variables that we do observe are given in

black boxes. We might have various information on who, what, how, where, etc., but we do not observe the choice deliberation process itself that occurs in the decision-maker's brain (given in red).

Models that 'mimic' the decision-making process might conceptually better explain the decision-making process, but that does not necessarily mean that they will do mathematically. Mathematical psychologists, in my opinion, rarely focus on this.

Source: Midjourney; Prompt = an illustration of a person's mind thinking about the mode of transport to choose, psycology, mathematics

We thus do not truly know how a decision-maker makes choices.

Together with a set of estimated parameters, a model based on random utility maximisation will take some number of inputs and give probabilities of choosing different alternatives. Models such as decision field theory do the same thing (thus can be used for the same data!), except that they have 'process parameters.' This could be, for example, 'attention weights' for different attributes. Conceptually, these process parameters could link to proxies of the unobserved decision-making process such as eye-tracking, stress measurement or other physiological sensor data such as electroencephalogram (EEG) readings. Testing whether this is the best way to incorporate such data is an ongoing theme of my research and results will tell us whether attempting to model choices in this way is a worthwhile endeavour or not!

All model are models, aren't they?

So models that 'mimic' the decision-making process might conceptually better explain the decision-making process, but that does not necessarily mean that they will do mathematically. Mathematical psychologists, in my opinion, rarely focus on this. We as travel behaviour analysts are ultimately almost always looking for models that explain decision-making in general, not just the plethora of 'unexplainable' findings detailed in behavioural economics, such as the context effects (attraction, similarity and compromise). I'm not sure the search for a golden 'one model that fits all data' approach is particularly helpful here. Real-world data is complex and messy, and thus models will at the very least always need their own distinct tailored model specifications to best explain choice data in any case. However, if we are interested in more than just predicting choice behaviour, we might find that some models provide a clearer account of behaviour that is more meaningful and explainable to stakeholders. If you find yourself explaining decision field theory to a group of non-academics any time soon, let me know how it goes!

By capturing physiological sensor data where possible, we may actually start to capture individual differences that drive choice behaviour, and step away from the black box that is the use of random parameters, that don't actually tell us anything about who has what preferences.

Can't I just use machine learning methods to better predict travel behaviour?

If data gets really messy, then developing reasonable unbiased econometric choice models may be challenging enough, yet alone moving towards the use of accumulator models. There are many great examples both in transportation research and beyond where there is little argument not to use machine learning methods. For example, in face recognition research, hundreds of distinct 'points' in the face are used to characterise each face. Thus, it is little wonder that AI is now better than humans at recognising and matching faces. Yet, recent work has shown that AI makes comical errors, such as finding 'matches' between faces of different gender or different race [7]. Clearly, AI fails to capture the human 'choice deliberation process' behind whether faces match or not. Thus, if we actually want to understand human behaviour, we're going to need to look at data where we can apply more theoretically grounded models. Importantly, however, considerable work now looks at bringing ideas together [8]. For example, machine learning can help us understand messy data that can still feed into a behavioural choice model to generate insights on the behaviour whilst also giving a good prediction of what is actually chosen [9]. To me, it is clear that an interdisciplinary approach here will yield the best results. My work with Stephane Hess on his 'SYNERGY' project aims to do precisely this: bringing together machine learning, choice modelling and mathematical psychology. Please do speak to us if you would like to learn more about this.

Willingness-to-pay estimates are key for my work, does that make these models useless?

To be honest, yes, it probably does! All models that step away from econometric foundations

are always going to have this shortcoming. The question here really is how important are WTP measures, and are you happy to accept other benefits? For example, will my elasticities and forecasts benefit by having an underlying model that better predicts choice behaviour? There are positives and negatives in any choice model. An advantage in academic work is that we're allowed to be a little more on the fence here!

We can't see what is happening in the brain in any case, so why bother?

The uptake and use of physiological sensor data is another emerging trend in transportation research. A lot of it may provide very intuitive results (e.g. being stressed when driving causes us to make worse decisions [10]), but without it, how could we really tell what a decision-maker is actually going through when making choices? This is a key line of work Charisma Choudhury and I are doing as part of her 'NEXUS' project. Stress measurement data and even EEG data might only be proxies of the underlying state-of-mind, but we have perfect tools for accounting for this in any case (latent variables within ICLV models for a start!) By capturing physiological sensor data where possible, we may actually start to capture individual differences that drive choice behaviour, and step away from the black box that is the use of random parameters, that don't actually tell us anything about who has what preferences. This also may help us move towards actual individual-level choice models (see Timothy Braithwaite's seminar [11] on this topic in the CMC online seminar series[1] to see just how important this could be! You can hear just how inspired I was in the Q&A afterwards!)

There is so much preference heterogeneity in decision-making. Isn't that what a move towards different model structures actually captures?

Even an average laptop is extremely powerful, so we're not computationally limited here anymore. So why not build a model that can specifically capture multiple types of heterogeneity? Hopefully you will see my presentation on this at the next IATBR!

Could truly understanding the decision-making process be key to properly forecasting travel behaviour?

If done correctly, then I think we will see many more fascinating and varied insights from the use of 'accumulator' choice models based on psychological theory. I hope you will be inspired to learn more about these models and to use them too (DFT is in Apollo!). Please do reach out if you are interested or want to integrate these techniques in your research (T.O.Hancock@leeds.ac.uk) or come talk to me at the upcoming IATBR in Vienna in July!

1 https://cmc.leeds.ac.uk/cmc-online-seminar-series/

Source: Midjourney; Prompt = an engineer is wearing futuristic VR headsets, he is seeing complex data infographics and a big city, car bicycle and train, the engineeris using his hands to control VR

References:

[1] Hensher, D. A. (2010). Attribute processing, heuristics and preference construction in choice analysis. In Hess, S. and Daly, A. J., editors, State-of Art and State-of Practice in Choice Modelling: Proceedings from the Inaugural International Choice Modelling Conference, chapter 3, pages 35–70. Emerald, Bingley, UK.

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(** I couldn't resist referencing my father's research here too).

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Evolving Electric Vehicle Charging Behaviours

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In the transition towards low carbon transport, the coupling of electric mobility with renewable electricity generation will play a big role. We have witnessed growth in electric vehicles (EVs) adoption which might persist in the years to come. How will travel behaviour evolve as a result? For drivers, the shift to EVs will require additional pre-trip planning to account for charging sessions. There may be a preference for trip destinations with charging opportunities. New trips may be created or detours made to charging locations. Stop durations may be extended to allow for on-route charging.

In the field of travel behavioural studies, most models of EV usage have accounted for charging behaviours. These models are often intended to examine impacts on the electricity grid, predicting charging demand by location and duration. They inform charging infrastructure planning decisions and help to assess overall energy and emission impacts of electrification.

To consider where, when, and how long private EV drivers charge their vehicles, the following key factors are known to matter:

- ***Context related*** – the locations and availability of charging facilities, kind of charger (charging speed, shared or private), charging cost and any usage policies. Weather and special events can also influence charging demand, e.g., before holidays.
- ***Trip related*** – mobility patterns (trip distances, regularity), distance/time to next charging opportunity.
- ***Vehicle related*** - battery size, information on battery state of charge (SOC) or available range.
- ***User related*** – driver personality traits, including impulsivity, and familiarity with EVs have been identified to influence how much charge drivers would like to maintain.

As more mainstream EV drivers enter the market, charging behaviours are likely to evolve. While early adopters of EVs drive fewer miles , mainstream drivers may differ. Early adopters tend to live near cities and be environmentally inclined. Mainstream EV drivers are more cost-conscious and might have different motivations. Coupled with rising popularity of longer-range EV models , EV mileage and charging needs per driver might grow over time. In addition, user-battery interactions will change with growing awareness on EV performance. There may be greater tolerance for low battery SOC. More knowledge on ways to preserve battery state of health (SOH) can also influence the way drivers charge their EVs.

With more EV drivers within communities, one expects another set of factors to influence charging behaviours:

Social factors - interactions with other EV drivers will influence charging experiences in several ways. Some public charging locations might be more attractive if there are opportunities to socialise with other drivers. However, popular locations may witness queues for chargers. In this circumstance, whether drivers consider etiquette surrounding the use of shared chargers, e.g., avoiding “charger hogging” or only charging as needed, will matter.

As electric driving becomes more mainstream, monitoring and encouraging positive behaviours as they evolve can help us plan infrastructure investments and charger usage policies. A nuanced understanding of driver motivations and behaviours in each context can help when charting the path towards an electric mobility future.

Image source: © Walter Baxter (cc-by-sa/2.0)

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Thanks Mrs. Smith: On Transportation Production

Gary Becker begins his "A Theory of the Allocation of Time" [1] with a discussion of time spent at work relative to other activities, highlighting the need for more robust analyses of uncompensated time use in economics. Little did he know that his theory and model structure would strongly influence travel behaviour and economic analysis over subsequent decades. In the 1970s, DeSerpa [2] and Evans [3] provided among the first connections to transportation analysis. Building from DeSerpa and Evans, Jara-Díaz [4] completed fundamental work on the value of time in transportation economics. However, there is a wealth of other insights relevant to transportation analysis to be gained from Becker's theory. I look forward to discussing extensions to location choice behaviour at the IABTR conference this July in Vienna. For the moment, I will focus on the topic of transportation service provision.

Being a founder of the neoclassical "Chicago School of Economics", Becker would certainly have strong opinions on the extension of his theory to include other non-market means of production. Nonetheless, one can consider four basic forms of production: market, home, government, and commons. Market production is the exchange of a good or service for money. Home production, as defined by Becker, is uncompensated production by the household (e.g., making dinner, cleaning the bathroom, etc.). The latter two forms of production were not discussed by Becker in his 1965 paper. In the first form, government produces a good or service for use by the public, financed by tax revenue or similar sources. For example, most healthcare services in the United States are privatized and subject to market forces, whereas many other nations provide healthcare as a public service. The final form of production is in the commons. Neoclassical economic theory suggests that common resources will be exploited if not managed by state intervention or market forces via monetization. However, both Mariana Mazzucato [5] and Elinor Ostrom [6] provide compelling arguments for the efficient use of common production. As one example, Wikipedia is managed in the commons as most contributors provide their services at no cost.

Source: Midjourney; Prompt = abstract clock image of men, women and children working in the morning, in the style of white and grey, roads buildings cars buses bicycles, vray tracing, playful shapes, geometric shapes & patterns, editorial illustrations, diorama

I argue that the above economic production framework can be mapped onto the transportation mode choice problem and provides valuable insights for behavioural theory and modelling methods.

The reader may wonder: what does any of this have to do with travel behaviour? I argue that the above economic production framework can be mapped onto the transportation mode choice problem and provides valuable insights for behavioural theory and modelling methods. Home production of transportation takes the form of walking, cycling, or using one's own vehicle. The vehicle and fuel must be purchased on the market, but the transportation service is provided by the household using personal time as the only input to production. In contrast, taxi or ridehail modes are purchased in the market from private firms (e.g., Uber, Lyft, Didi, etc.). Government provides transportation as a public service through transit. Transportation provided in the commons is less common (a nice little pun) but takes the form of carsharing and other systems wherein the service cost is shared among a pool of otherwise unaffiliated households. Each of the above transportation alternatives could manifest as the same physical mode – i.e., a small passenger vehicle. However, the behavioural and operational models differ. For example, a person may be unable to afford market production (ridehail). They may not use public production (transit) to avoid sharing a vehicle with strangers. They may be unwilling to participate in the commons (carshare) because they don't want someone's muddy boots in their car.

Being trained as a civil engineer, I am always keen to find concrete (two puns in one article is the limit) applications for theory. The modelling of autonomous vehicles (AVs) provides an application of the above theory to transportation. Many scholars make the distinction between personal AVs, shared AVs (or SAVs) provided as a public service, and SAVs provided in the market. However, in my reading, there is minimal thought given to how these operating models would function from an economic production theory perspective. Let us first focus on the first alternative. It is unclear whether to classify a personal AV as home production or market consumption – Is sitting comfortably in a vehicle while it performs the driving task pure leisure? Are you purchasing driving services in the market as a software package? The latter two alternatives provide an interesting contrast. In both cases, SAVs are provided to the household as a service. However, if we consaider transportation as a public service, another economic concept may be brought to bear, termed private provision of a public good by Bergstrom et al [7]. Public transit provides a subsidized travel option for low-income households and those who choose not to own a personal vehicle. The widescale deployment of

Source: Midjourney; Prompt = 3D isometric trafficjam on a computerprocessor, soft smooth lighting, dark blue and yellow orange colors, 100mm lens, 3d render, white background, physically based rendering, centered, electric and autonomous vehicles and buses, people walking

SAV fleets would therefore require ridehailing operators to take on this role. The risk is that each operator may rely on other operators to serve low-income households, with the result being a Nash equilibrium that does not maximize total social utility. Government intervention is necessary to ensure an equitable distribution of mobility through incentives or regulations [8]. Existing simulations often ignore the profit-seeking motives of private operators, assuming they match trips to minimize detour time and are agnostic to traveller income and profit maximization motives on the part of operators.

As a final thought on the historical distinction between private and public travel modes. The marginal private automobile trip tends to add travel time for existing travellers through congestion that slows travel speed and increases its variability. In contrast, the marginal transit trip tends to improve service for existing travellers through reduced vehicle headways and the use of higher-order transit (i.e., trains rather than buses). The latter outcome is termed as an anti-congestion effect [9]. The trend in SAV research is toward small, automobile-style, vehicles that may be shared or used alone. This shift adds shades of gray to the public-private dichotomy. Will shared mobility exhibit the congestion effect of the private automobile or the anti-congestion effect of transit? Importantly, in which contexts do these new forms of mobility tend to exhibit each of these effects (i.e., there is likely a spectrum of possible impacts depending on the application of technology, local built form, and transportation infrastructure conditions)?

I thank the IATBR board for this opportunity to share a few thoughts on theory and their potential implications for travel behaviour research.

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An Interview With Professor Hani Mahmassani:
Personal and Professional Life

AUTHOR: TAHA RASHIDI

INTERVIEWEE:
Hani Mahmassani

Known for mastering major domains of transport engineering, Hani Mahmassani is a unique scholar in the field who is known for his deep knowledge of network design, demand modelling and traffic flow. Please help me find another scholar who masters all three major disciplines; I will later add to the list freight modelling. There are very few scholars whose work can be compared to Carlos Daganzo, Moshe Ben-Akiva and Yosef Sheffi, all at the same time.

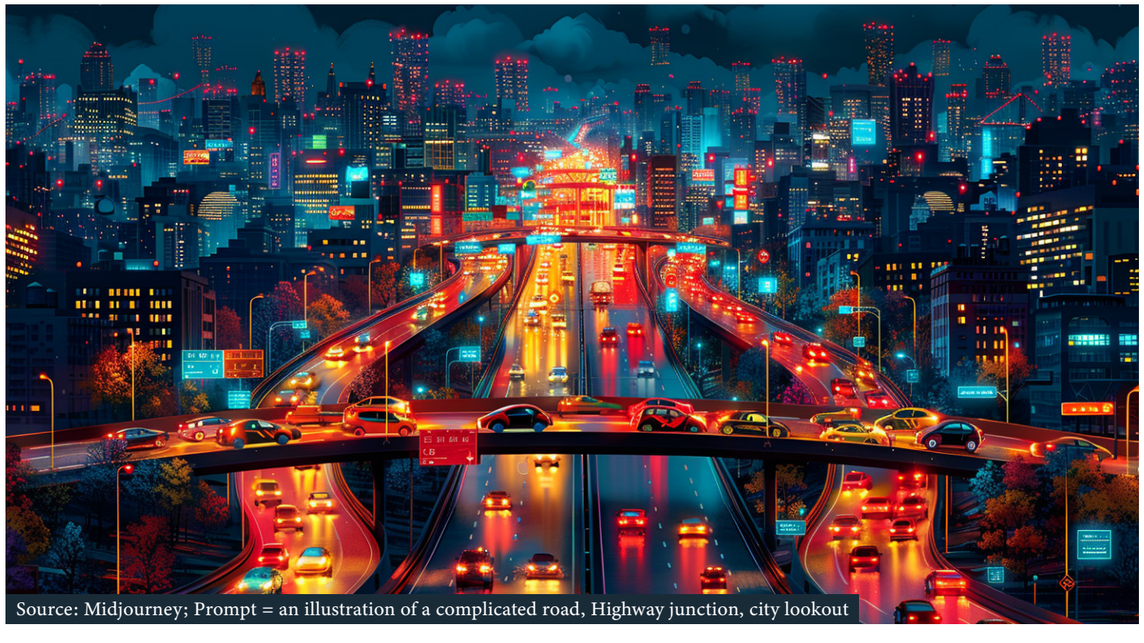
Still, I found Hani a humble and approachable person who acknowledged luck as a major contributor to his mind-blowing achievements. The way he ended up going to the USA due to the civil war in Lebanon, how he moved from Houston to Purdue and how Frank Koppelman helped him decide to go to MIT, Hani sees all of these events as signs of luck steering him toward success. Still, Hani believes in the significant role of an individual in embracing opportunities as they become available.

Born in Beirut, Lebanon, in an educated family, with his father being a judge, legal scholar and later in politics and his brothers as legal professionals who also teach at universities in an adjunct capacity, Hani could see himself as an academic in the environment he grew up in. One of Hani's brothers was an architect who inspired Hani to follow his path; lucky us, Hani pursued transport engineering. Hani started his education at the American University of Beirut. He could not finish his undergraduate education in Lebanon because of the civil war in the mid-70s. He finished his undergraduate education at the University of Houston, where he was impressed by the interchanges and highways of Houston. He got an offer from Purdue University known for its traditional highway engineering program for his graduate education, where Hani had an excellent opportunity to work under Prof Kumares Sinha, who became a lifelong mentor. Purdue had another significant life change for Hani, which was meeting his future wife, Millicent. They married later in Boston, one year before Hani's PhD graduation.

With Kumares' blessing, Hani selected MIT to pursue education in demand modelling! Especially with suggestions from Frank Koppelman, who had just started his role at Northwestern University as a fresh graduate of MIT. The guru of transport at that time was Marvin Manheim, with a glorious transport group at MIT. Hani got the chance to learn all transport domains, including demand and operations research. Traffic flow was missing at MIT, while Hani had learnt it at Purdue out of his interest. It was then at MIT that Yossi Sheffi encouraged Hani to look at the intersection of behavioural demand modelling and microscopic traffic flow. Hani was a classmate of Sergio Jara-Diaz and Warren Powell, among several others.

Hani sees all of these events as signs of luck steering him toward success. Still, Hani believes in the significant role of an individual in embracing opportunities as they become available.

To select supervisors and projects, MIT used to share a form with incoming students to indicate their interests, and Hani selected all topics, including freight, which very few others appear to have selected. Because of his choice, he got a chance to work with Paul Roberts, who pioneered the introduction of demand modelling into freight. That experience in the first year of PhD at MIT turned out to be critically useful in Hani's current position at Northwestern, which has an extensive Business Advisory Council with companies having an interest in freight-related topics. Once again, Hani appreciated the role of "luck" in developing his profile by the time he was a fresh MIT graduate by providing credit to Kumares Sinha for how he opened his eyes to the area of transport modelling and planning. Jokingly, Hani noted that had it not been for Kumares' advice, Hani would have been at Texas A&M instead of Northwestern.



Source: Midjourney; Prompt = an illustration of a complicated road, Highway junction, city lookout

Hani enjoyed his PhD experience and observed the impact of having a PhD on his career so strongly that he encouraged his sons to obtain PhDs, and they did. In Hani's view, a PhD program and education should offer what students will experience in the real world, like interacting with sponsors and clients, working on theory, understating the technology, being a good salesman, and someone with sharp eyes to identify solutions for real-world problems.

challenging field to place in for a long time in terms of positions; there was not much appetite for a pure demand modeller academic in engineering departments. Upon graduation, Hani considered returning to Lebanon, unfortunately, this did not happen due to hostilities at the time. With the option of going home being unavailable, Hani considered academia and a job at the World Bank as an international organisation as an alternative.

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Hani's PhD thesis topic surprised me as it was the last option I could think about. Multi-attribute decision-making theory under uncertainty, an unknown area to the community of demand modellers, was the core of his thesis in collaboration with a professor from water resources! Hani looked at normative and preference-oriented decision-making and found the preference-based approach dominant among individuals and businesses. Although Hani taught a course on decision-making theory for a few years, he steered away from that area. By the end of his PhD, he identified himself as a demand modeller under the influence of Steve Lerman, the best professor he has ever had. Steve had been Ben-Akiva's student, and taught discrete choice modeling to Hani while Moshe was on sabbatical. Hani has the luxury of learning econometrics from Dan McFadden as well. Hani's training in econometrics is a dream.

With his strong econometric background, Hani started using econometric tools in network and traffic flow modelling. In collaboration with Warren, Hani developed the first network evacuation model by working on a project that Sheffi had to develop a macroscopic simulation-based dynamic traffic assignment model for evacuation purposes.

This project helped Hani place himself as a network modeller because demand was the most

Eventually, he joined UT Austin to change the traditional vibe of their transport group. Bob Herman, a celebrated physicist recognized as the "father of traffic flow theory", recruited Hani after seeing a paper Hani had published in Transportation Science. Herman was the founding editor of Transportation Science. Hani called this coincident his "luck" that this most distinguished scientist had read his paper. Hani also called this paper a simple paper, but I call it his humble attitude toward his achievements. Austin's experience opened the doors of the theory and science of traffic flow to Hani at a level he did not experience at MIT. Hani and Bob conducted the first experimental economics research on the behavioural choices of people in their commute along a traffic corridor; they ran the first experiment over 21 days with simulated results being presented to respondents to reveal their choices (of departure time and route) under different information scenarios, including perceived individual and aggregated collective. This multidisciplinary project shaped Hani's career at the intersection of demand, networks, and traffic flow.

One can ask, how can I become like Hani? Is there a recipe? Hani's main suggested ingredients to becoming a visionary academic with deep knowledge in a variety of domains is to have a diverse curriculum to expose students early on to the fundamentals of transport engineering, covering econometrics, operations research and the science of transport engineering, which is not practised in many institutions where supervisors may discourage students from diversifying their focus and research, Hani asserted.

Hani's main suggested ingredients to becoming a visionary academic with deep knowledge in a variety of domains is to have a diverse curriculum to expose students early on to the fundamentals of transport engineering, covering econometrics, operations research and the science of transport engineering.

Hani also enjoys working with "orphan students" who are interested in a certain topic but do not have anybody to supervise them, as he defines it. This model interests Hani as he sees himself and the student learning, solving, and innovating together in the student's PhD journey. Hani believes he may have perfected the art of finding and coaching students on their favourite topics.

Source: Midjourney; Prompt = a PhD graduation photo, background is full of elements of transport engineering and transport planning, illustration

Hani's involvement with IATBR started at the Aix-en-Provence conference in the late 80s, followed by extensive involvement beginning at the Quebec conference (1991) in collaboration with Martin Lee Gosselin, Ryuichi Kitamura, and later with Juan de Dios Ortuzar (who organized the Chile conference in 1994) and David Hensher. Hani remained very engaged with the organization, hosting the IATBR conference in Austin in 1997, coinciding with Chandra Bhat joining UT Austin. During his term, Hani played a major role in instituting the Lifetime Achievement and the Best Dissertation Awards, similar to what the Transportation Society (INFORMS) was doing as Hani had served as an officer in that organisation as well. Hani also shaped the deal with Elsevier to publish the proceedings. Hani has been a fan of a workshop style for IATBR, and he implemented it with Peter Stopher, whom he asked to co-chair the Austin conference as Hani wanted the involvement of a more senior academic in the process. Hani believes there are obstacles to having workshop-

style conferences, like the financial aspects of having more participants, and academics needing a paper to travel to a conference. Still, he believes it is possible to adopt a novel model like a mini-workshop style to delve into the depth of some emerging topics and bring different perspectives and attitudes to a warm and inclusive environment. Hani's suggestion is to bring junior academics to do the heavy lifting and be engaged in the organisational activities of the conference. Ultimately, people will engage where they feel they are part of a community in which they are appreciated and they're making connections, and that's where he thinks IATBR has succeeded in many ways.

Hani's approach toward global warming and carbon saving approaches inclines toward more incentives and technologies to be offered to people than using restrictions to control behaviour.

Hani's approach toward global warming and carbon saving approaches inclines toward more incentives and technologies to be offered to people than using restrictions to control behaviour. Hani highlights the significance of considering the world's entire population, especially in developing countries with different aspirations from those of Europe and the USA. He believes people tend to increase their mobility, especially as the economy grows, which might imply more emissions. In Hani's view, technology can be a game changer where people see progress and prosperity in using green technologies, not just sacrificing convenience and freedom to save the world. In other words, in the Western world, you can restrict a few things and still have a lot, whereas in some other parts of the world, if you restrict more, you cannot attain what they perceive as quality of life essentially.

Hani's glorious academic life, starting from Austin to Maryland and then to Northwestern, is full of bright memories as he loved all three universities, the opportunities he embraced after each move and the collegial colleagues he named in three institutes. His adventurous attitude motivated him to embrace the challenges of moving to new universities and leaving memorable legacies everywhere he worked. Hani expressed extreme gratitude for being lucky to have had brilliant students during his career. Hani did not name any of his students as his favourite ones, and he compared them to our children. We "do not choose one over the other", and we all have different identities covering a wide range of disciplines in transport.

As in the last of my interviews, I asked Hani about the scholar he believes significantly impacted the field of travel behaviour. Hani named people under dynasties and started with a tribute to Frank Koppelman, who brought the literature of marketing to transport modelling, which effectively called travel behaviour. Chandra and Pat were named under this dynasty. He also recognized Moshe Ben-Akiva's significant role in advancing the field and educating many leaders in the field. Hani also highlighted the (largely forgotten) contributions of Antti Talvitie, who was at SUNY Buffalo then. Hani then named Susan Hanson for her contributions to activity modelling from the geography and social sciences perspective. Finally, the late Ryuichi Kitamura was named, and his students (Ram Pendyala, Kostas Goulias, Cynthia Chen) continued and celebrated his contributions and achievements.

Hani noted "certainly" Peter Jones, Juan de Dios Ortuzar, Sergio Jara-Diaz, and David Hensher outside the USA. I interviewed the other three, except Peter (soon to come), and they all share a passion for music, like Hani, a semi-professional electric guitar player interested in discovering guitarists before they become famous.

In Hani's view, technology can be a game changer where people see progress and prosperity in using green technologies, not just sacrificing convenience and freedom to save the world.

I could not summarise Hani's achievements and contributions in a few pages, but I am sure I could highlight enlightening key points from the career and life of someone who is admired by transport modellers, engineers, planners and economists.

You will hear about Prof Kay Axhausen's personal and professional life in my next interview. Stay tuned.

Source: Midjourney; Prompt = four engineers designing a 3d infrastructure of a city on a huge table

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