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September 2023



CONTENTS

CHAIR: ABDUL RAWOOF PINJARI

MESSAGE FROM THE CHAIR OF IATBR 4

EDITOR: TAHA RASHIDI

TRAVEL BEHAVIOUR AND GENERATIVE PRE-TRAINED TRANSFORMER METHODS 6

CHIARA CALASTRI

THE SPREADING OF GENERATIVE AI CONTENT ON SOCIAL MEDIA AND ITS IMPACT ON TRAVEL BEHAVIOUR..... 10

SEBASTIÁN RAVEAU

USING AI TO IMPROVE PUBLIC TRANSPORT 13

KONSTADINOS GOULIAS & CHATGPT

The emotions and the limitations of generative AI machines..... 15

YUSAK SUSILO

WHEN OUR DAILY LIFE WOULD BE AS EXCITING AS WHAT ONE CAN SCRIPT. 20

TAHA RASHIDI

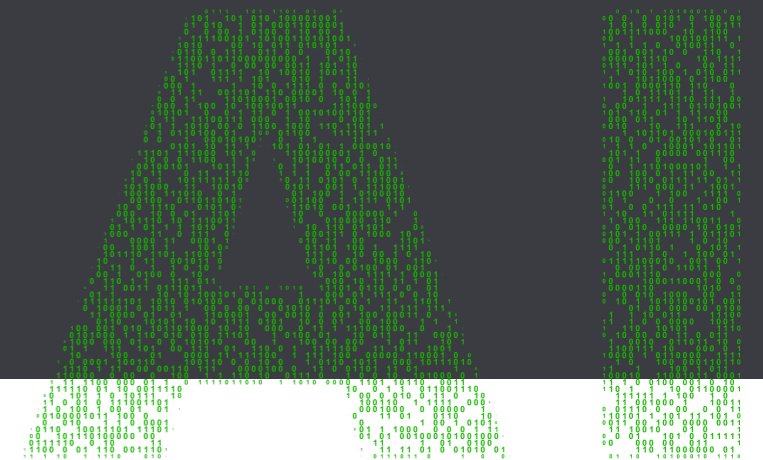
ORAL HISTORY OF IATBR: AN INTERVIEW WITH DAVID HENSHER 23

DAVID HENSHER

HOW VALUE ADDING IS AI FOR STRATEGIC TRANSPORT PLANNING?
IS AI INTELLIGENT OR SIMPLY A DESCRIPTIVE INFORMATION DUMP? 28

MARYAM BOSTANARA

THE FUTURE IS VIVID: HOW IMAGE GENERATIVE AI IS REVOLUTIONIZING TRAVEL BEHAVIOUR MODELLING..... 30



**CHAIR:
ABDUL RAWOOF PINJARI**

Abdul Rawoof Pinjari is an Associate Professor in Civil Engineering and the Centre for Infrastructure, Sustainable Transportation and Urban Planning (CiSTUP) at the Indian Institute of Science (IISc). He is currently the Chairperson of IATBR. Abdul's research interests include travel behaviour, travel demand analysis, and choice modelling. His current research is on: (a) understanding travel behaviour in complex travel environments characterized by multimodal travel options, different levels of uncertainty and varied information availability for different travel options; and (b) the use of disparate data sources for analysis and planning of new mobility systems in emerging economies. He is also interested in the systematic biases and variabilities people exhibit in perceiving physical quantities (time, distance, etc.) and how these might influence their travel behaviour.



Message from the Chair of IATBR

Greetings!

I welcome the readers to yet another exciting issue of IATBR NEWS conceptualized and edited by Taha Rashidi. This issue includes a collection of articles on the role of generative artificial intelligence (AI) in the field of travel behaviour. As a researcher, practitioner, or student of travel behaviour (and as a traveller), perhaps each one of us has thought about how emerging AI technologies can be used to improve transportation systems and urban planning. Generative methods are among the AI techniques that learn from existing data to generate new patterns, content, contexts, images, videos, and so on. Technically speaking, at the core of generative AI are methods that can be used to infer, and generate from, multivariate distributions. From this standpoint, travel behaviour researchers have already employed generative AI models for several applications involving multivariate distributions. Taking generative AI to broader contexts, several opportunities emerge, and a variety of questions arise. Some are listed below:

- Can we (humans) use them (generative AI methods) to generate realistic synthetic data – synthetic populations, neighbourhoods, cities, etc.?
- Can we use them for virtual-reality experimental designs that are otherwise not easy to generate?
- Can we use them to suggest modifications to our activity-travel environments that are implementable, more sustainable and offer a better quality of life?
- Can they assist us in preparing teaching material that is interactive, allows multisensory learning, and comprises varied examples we cannot generate in a limited time? How can we use them to enhance learning-assessment in our courses?
- What are the limitations of these tools, and what lies ahead?
- Can they come up with new hypotheses (travel behaviour theories) and gather relevant (real)evidence? Or can they only serve as an excellent assistant if we drive hypothesis-based thinking?
- What are the environmental (water and energy) costs of the large amount of computation needed for these tools vis-à-vis the benefits?

I look forward to reading the articles in this issue as they offer various perspectives on some of the above and other relevant questions. In addition to the exciting articles in this issue, I wish to draw the readers' attention to other IATBR activities, particularly the IATBR Online Seminars focused on travel behaviour issues in different parts of the world. Thanks to Yusak Susilo, we have completed two such events – one focused on South Asia and the other on Southeast Asia. These events help one understand travel behaviour issues unique to different parts of the world. Importantly,

the next flagship activity of IATBR, the 17th International Conference on Travel Behavior Research, will be organized in Vienna, Austria, from July 14-18, 2024. On behalf of our Organizing Chair, Yusak Susilo, the organizing team, and the IATBR Board, I invite everyone to make plans to attend the conference.

Warm Regards,

Abdul Rawoof Pinjari



EDITOR: TAHA RASHIDI

Taha Rashidi is an Associate Professor in Transport Engineering at the School of Civil and Environmental Engineering at UNSW and a Research Centre for Integrated Transport Innovation (rCITI) member. Dr 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. Dr Rashidi 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.



Figure 1 Midjourney; Prompt = Taha Rashidi, transport planner, circle icon, city circle background, illustration

Travel behaviour and generative pre-trained transformer methods

With the success of the first two issues of IATBR NEWS, we attempted to keep the expectations high with another exciting issue. Keeping the original mission of this newsletter, the third issue focuses on generative AI, an emerging topic that is expected to be fully realised in the future. In addition to articles on generative AI and travel behaviour, the 3rd issue features an interview with the most cited scholar in the field of transport and travel behaviour and one of the founders of the initial format of IATBR, Prof David Hensher. The 3rd issue also provides a guideline on how to use generative AI for producing high-quality pictures to escalate the quality of your articles and presentations. All photos used in this issue are generated using generative AI. This issue could not come together without the artistic talent of Maryam Bostanara, PhD candidate at UNSW, who provided instruction on how she generated the art works of this issue.

In this issue, we invited researchers, scientists, and practitioners to describe, criticise, support, or challenge ideas around the travel behaviour of an era when AI dominantly influences and shapes the decisions of travellers. Borrowing concepts from the first¹ issue on metaverses and the virtual world and the second issue on travelling to space, AI appears to be responsible for changes pictured by the authors of our articles. I asked ChatGPT how it can change the travel behaviour of people and here are its suggestions:

Providing Information: ChatGPT can provide users with information on various sustainable transportation options such as public transit, biking, and walking. It can also provide information on the environmental impact of different travel options, helping users make more informed decisions. I think here ChatGPT is over-assessing its capacity to play a positive role.

Personalized Recommendations: By analyzing user data, ChatGPT can provide personalized recommendations for transportation options based on a user's location, travel needs, and personal preferences. This can encourage users to try new and sustainable transportation options. This suggestion can be overwhelming with privacy and ethical concern.

Real-time Traffic Updates: ChatGPT can provide real-time updates on traffic conditions, helping users avoid congested routes and save time. This can encourage users to use public transit or other sustainable modes of transportation that may be faster and more reliable. Once again, I believe ChatpGPT overestimated its capacity to act within ethics limits.

¹ <https://iatbr.weebly.com/august-2022.html>



Figure 2 On left: Prompt = Futuristic Sydney, beautiful city, moon, scientist working, isometric design - On right: Prompt = A female scientist is planning a beautiful city in front of her, isometric design, green and lively

I then asked ChatGPT how it can negatively affect the future of travel behaviour, where four areas were suggested.

Biased Recommendations: If the data used to train ChatGPT is biased, it could potentially provide biased recommendations for transportation options, leading to disparities in travel behaviour and limiting the potential for behaviour change.

Lack of Accessibility: If ChatGPT is only accessible to certain communities or demographics, it could limit the potential for behaviour change among those who do not have access to the technology.

Privacy Concerns: If ChatGPT collects and stores user data without appropriate privacy safeguards, it could lead to privacy violations and undermine trust in the technology.



Figure 3 Prompt = An illustration showing the bias of generative AI, travel behaviour, transport

Dependence on Technology: If people become too reliant on ChatGPT or other AI systems for travel recommendations and decision-making, it could limit their ability to make independent and informed choices about their travel behaviour.



Figure 4 On left: Prompt = An illustration of some people being disconnected from the human network - On right: Prompt = accessibility of AI, Technology not being accessible for all, illustration, bus, train



Figure 5 Prompt = Privacy concerns with generative AI, privacy, illustration, city



Figure 6 Prompt = An illustration showing a few confused people in a street, they don't know where to go, public transport and cars, nice city, confusion



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.



The spreading of generative AI content on social media and its impact on travel behaviour

The debate around AI as a friend or potential foe has divided the public for years, but the recent and rapid advancements of generative AI and its spread via social media have generated a mix of amazement at the capabilities of the tool as well as reheated the debate. Pictures, video and audio content showing places, novel objects and people in an extremely realistic way are spreading, often as innocuously as the pictures of the [pope wearing a bomber jacket or riding a motorcycle](#)¹.



Figure 7 Prompt = Conceptual design of a driver less car, passenger, city background, illustration, ad

The ability to produce and, via social media, spread widely, immersive travel content of e.g. new destinations or travel modes of the future, such as AV, urban air mobility or hyperloop could shift people's attitudes and initial resistance towards new modes and provide them with key insights into their

comfort and safety. Images showing role models using such modes could have an even greater effect on acceptability and status.



Figure 8 Prompt = Travel behaviour, city, public transport, social media

While the examples above could be seen as desirable, the issue remains that the quality of the contents is such that the billions of users accessing them are unable to assess their veracity if not by judging how likely what they are seeing is to exist or of actually having happened.

In an [Atlantic article](#)², Jonathan Haidt and Eric Schmidt highlight that the growing spread of these contents will result in such an amount of deep fakes that the public will be less prone to trust anything they see and more likely to simply believe what they want to believe. Personalised content will aim to confirm and reinforce such beliefs as well as biases, potentially increasing distrust and division.

Even before the age of generative AI, social media has been a source of information about travel for many. From users

² <https://www.theatlantic.com/technology/archive/2023/05/generative-ai-social-media-integration-dangers-disinformation-addiction/673940/>



Figure 9 Prompt = Travel behaviour, city, public transport, social media

sharing their holiday pictures, travel and traffic updates to local groups, politicians and charities pitching their ideas about (or sharing their opposition to) proposed schemes, the discussion of social media and travel behaviour is not new.

But especially since the pandemic, social media have taken a new role in spreading and reinforcing views around the role of governments in people's lives. In England, a large movement against limited traffic neighbourhoods (LTN) and 15-minute cities has developed, largely thanks to on-line content explaining how these would, in reality, be attempts to increase the government's control of citizens and limit their individual freedoms. Similar interpretations have been provided for issues around parking or road tax based on emissions. It is easy to imagine how generative AI could impact such phenomena. Customised deep fake videos of celebrities supporting these arguments, or of government officials admitting to the conspiracy, as well as, on the other side, equally influential people supporting the schemes, could make public opinion even more divisive and result in social unrest and instability as well as delaying the urgently needed behavioural shifts to address the climate emergency.



Figure 10 (Left) Prompt = An illustration showing different vehicles on a road, cars, trucks, buses, electric cars, smoke coming out of exhaust pipes, pollution

Figure 11 (Right) Prompt = Travel behaviour, legislation in generative AI

While some are proposing that legislation should regulate the spread of generative AI content on social media, e.g. by imposing the use of a watermark, the advancement and spread of the technology moves fast, and it is to be seen whether we will be able as a society to ensure that the technology produces more benefits than damage, especially when the damage could be more harmful to vulnerable segments of the population who are already disadvantaged with limited mobility options and accessible opportunities.



AUTHOR:

SEBASTIÁN RAVEAU

Sebastián Raveau is an assistant professor at the Department of Transport Engineering and Logistics at Pontificia Universidad Católica de Chile (PUC), where he teaches courses on transport planning and demand, behavioural modelling, network equilibrium and data analysis. He is a researcher at the Center for Sustainable Urban Development (CEDEUS) and the BRT+ Centre of Excellence. His research interests include travel behaviour, travel demand analysis, data science and public transport systems.



Using AI to improve public transport

Undoubtedly, AI is a tool that can be used in many fields. As Andrew Ng, professor at Stanford, co-founder of Google Brain and one of the most renowned researchers in machine learning said: *"As electricity transformed almost everything 100 years ago, today I actually have a hard time thinking of an industry that I don't think AI will transform in the next several years"*.

Public transport is no exception, as it has the potential to improve and incentivise its use at a crucial time when climate change and car usage are serious matters to be tackled. At its core, AI applications are large-scale computer science models and algorithms working with large datasets. And we, as transport modellers, are very familiar with using models for travel behaviour purposes.

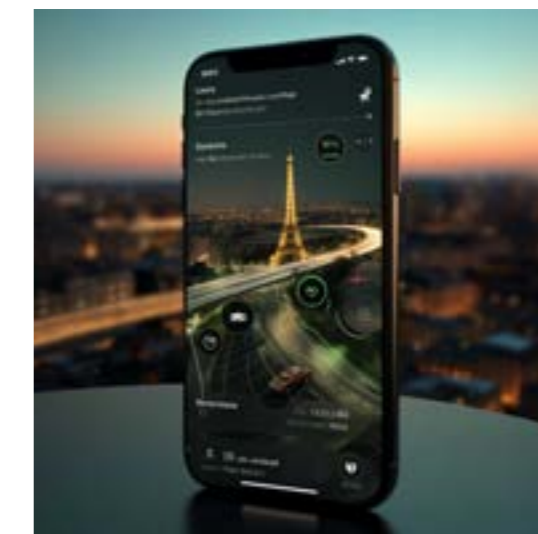


Figure 12 Prompt = An application providing pre trip and on route recommendations to travelers, innovative application design

AI can provide pre-trip and on-route recommendations to travellers, learning from their preferences over time to tailor individual-specific suggestions for mode, route, destination, or time choices. These recommendations can adapt to traffic congestion information, public transport AFC and

AVL data, historical data, and other data sources in real-time. Additionally, communication between different AIs can help efficiently use road space. These tailor-made recommendations can be particularly valuable for travellers with special needs, such as elders, people with reduced mobility, and pregnant women, ensuring that public transport meets the community's diverse needs.

Integrating AI and other mobility services, such as bike-sharing platforms (which can serve as feeders to access and egress public transport), is important to provide sustainable and attractive multi-modal travel recommendations. Providing a complete and convenient travel experience can encourage travellers to choose public transport over other less sustainable modes.

Figure 13 On left: Prompt = A conceptual design of a sustainable city with attractive multi



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modal travel alternatives, bike sharing - **On right:** Prompt = A conceptual design of a city with multi - modal options and bike sharing

Using object recognition and image processing methods, AI can help enhance public transport safety. In this sense, AI can be a valuable tool for public transport drivers. It can also monitor public transport stations to identify potential security issues and detect suspicious behaviour, alerting security personnel.

AI algorithms can monitor real-time public transport and road traffic data, such as congestion, disruptions, and accidents, to provide personalised notifications to travellers. An integrated AI can even re-route travellers and facilitate communication and management of such incidents. Efficient and timely information is a critical factor in those kinds of situations.

Figure 14 On left: Prompt = An AI based routing application guiding drivers after an accident in a road - **On right:** Prompt = An AI based routing application guiding riders after an accident in a road



Demand-based services are another case where AI can help analyse historical and real-time data to optimise transit services and provide an information platform for travellers. This can help reduce wait times and manage crowding levels, improving the overall experience of public transport travellers. Complementary, it can help improve the operational efficiency of providing the service.

Access to information is fundamental for all these possible uses of AI in public transport and many others. AIs can only be helpful if their models and algorithms are trained with sufficient and adequate information. Public transport authorities and operators are responsible for providing access to the information needed if they want to use AI's full potential.

**AUTHORS:
KONSTADINOS GOULIAS
& CHATGPT**

Konstadinos (Kostas) G. Goulias is a Distinguished Professor in the Department of Geography at the University of California – Santa Barbara (UCSB). His specialties include Transportation Planning and Modeling, Travel Demand Analysis, Economic and Behavioral Geography, Geographic Information Science, Applied Statistics and Econometrics, Microsimulation in Activity-based Analysis and Forecasting, Travel Behavior, Activity and Travel Survey Design, Transportation and Air Quality, Travel Demand Management, Congestion Management Systems, Traffic Analysis and Site Impacts, Telecommunications and Travel Behavior/Demand, Optimal Resource Allocation, and Road Transport Informatics/Intelligent Transportation Systems. He is the co-founder and co-Editor-in-Chief of the journal Transportation Letters published by Taylor and Francis and served as Chair of the International Association for Travel Behavior Research (2020-2021).



The emotions and the limitations of generative AI machines

This is an annotated dialogue with ChatGPT. In this way you can draw your own conclusions. At the end you will find my summary.

I ask: Do you feel empathy?

ChatGPT says: No, I do not feel empathy or any emotions. I am a machine learning model created by OpenAI, and I lack personal experiences, consciousness, emotions, and subjective awareness. While I can understand and provide information about empathy and emotions, I don't possess these qualities myself. My responses are based on patterns and information in the text that I've been trained on. If you have any questions or need information, feel free to ask!

I ask: Do you love me?

ChatGPT says: I don't have emotions or feelings, so I don't experience love or any other emotions like humans do. However, I'm here to provide information, answer your questions, and assist you to the best of my abilities. If you have any questions or topics you'd like to discuss, feel free to let me know!

Good thing! Being loved by a machine would create major existential problems and question your very essence. So after establishing that generative AI does not have feelings let's see if it can describe human nature asking exactly this.

ChatGPT says: "Human nature" refers to the inherent characteristics, qualities, and behaviors that are commonly found in human beings across cultures and societies. It encompasses the fundamental aspects of what it means to be human, including psychological, emotional, cognitive, and social traits. However, it's important to note that human nature is a complex and debated concept, and there are varying perspectives on its definition and implications. Here are some key points to consider:

Then the machine continues by giving a list of aspects and their description including: *Biological and Evolutionary Basis; Cultural Influence; Cooperation and Sociality; Cognitive Abilities; Emotional Range; Altruism and Self-Interest; Moral and Ethical Considerations; Adaptability; Complexity and Individual Differences; and Nature vs. Nurture Debate.*

I then asked ChatGPT to regenerate the answer to my "Human Nature" question and it simply reordered the above paraphrasing. Unfortunately for

me I got carried away by the temptation of asking questions from my own research and ChatGPT to my surprise not only gave the right answers but produced a lot of information.

But let's see what ChatGPT thinks of itself.

I ask: Are you creative and innovative?

ChatGPT says: Yes, I am designed to exhibit creativity and innovation to a certain extent based on the text data I've been trained on. I can generate original ideas, concepts, stories, and solutions by combining patterns and information from the data I've learned from. However, my creativity and innovation are limited by the data I've been exposed to and the algorithms that govern my responses.

While I can certainly assist with brainstorming, generating ideas, and providing creative input, it's important to note that my creativity is fundamentally different from human creativity. Human creativity is often deeply rooted in emotions, experiences, and a nuanced understanding of the world, which I do not possess.

Does this machine claim that we did not feed it with the right ingredients? Hmm...I don't think so! One can be creative and innovative using IMAGINATION a uniquely distinct trait of human beings!!

But I wanted to get something that I can use in class from ChatGPT.

I ask: What are the best new travel behavior analysis ideas?

ChatGPT says: As of my last update in September 2021, the field of travel behavior analysis is constantly evolving with new ideas and approaches. Here are some emerging concepts and ideas in travel behavior analysis that researchers and practitioners are exploring:

1. Big Data and Advanced Analytics: Utilizing big data sources, such as GPS traces, social media, and smartphone apps, to gain insights into travel patterns and behavior at a more granular level.



Figure 15 Prompt = Brainstorming and generative AI, literature



Figure 16 Prompt = Travel behaviour, Big Data and Advanced Analytics



Figure 17 Prompt = Travel behaviour, Personalized Travel Information



Figure 18 Prompt = An illustration of three people commuting, one by bus, one by car, one by bike, travel behaviour, travel demand

2. Machine Learning and Predictive Modeling: Using machine learning algorithms to predict travel behavior, mode choice, and route selection based on historical data and contextual factors.
3. Microsimulation and Agent-Based Modeling: Developing detailed simulation models that replicate individual travel behaviors, interactions, and decision-making processes within a virtual environment.
4. Personalized Travel Information: Providing travelers with personalized travel recommendations and information using real-time data and user preferences.
5. Multimodal Travel Analysis: Focusing on the integration of different modes of transportation, understanding how individuals switch between modes, and promoting seamless multimodal travel experiences.
6. Behavioral Insights and Nudging: Applying behavioral economics principles to encourage sustainable travel choices through subtle interventions and nudges.
7. Accessibility and Equity: Analyzing travel behavior with a focus on accessibility to essential services, amenities, and opportunities, while considering equity and social justice.
8. Activity-Based Travel Analysis: Moving beyond traditional trip-based models to consider individuals' daily activities and how they influence travel behavior.
9. Mobility as a Service (MaaS): Examining the impacts of emerging mobility services and platforms that offer integrated and on-demand transportation options.
10. Telecommuting and Remote Work: Investigating changes in travel behavior due to the rise of remote work and flexible scheduling.
11. Sustainable Travel Incentives: Studying the effectiveness of incentives and policies that encourage sustainable travel choices, such as rewards for walking, cycling, or using public transit.



Figure 19 Prompt = Travel behaviour, Mobility as a Service(MaaS) , illustration



Figure 20 Prompt = Travel behaviour, Telecommuting and Remote Work impact on city



Figure 21 Prompt = An illustration of Sustainable Travel Incentives, studying the effectiveness of incentives and policies that encourage sustainable travel choices

- 12. Smart Cities and Urban Mobility: Analyzing travel behavior in the context of smart city initiatives, including the integration of data-driven solutions for urban mobility.
- 13. Dynamic Traffic Management: Studying the effects of real-time traffic management systems on travel behavior and congestion reduction.
- 14. Virtual Reality and Simulation: Using virtual reality and simulation tools to study how individuals perceive and make decisions in different transportation environments.
- 15. Environmental and Climate Concerns: Analyzing the impact of environmental attitudes and climate change awareness on travel behavior choices.

Remember that the landscape of research is always evolving, and new ideas may have emerged since my last update. To stay current with the latest developments in travel behavior analysis, consider reviewing recent academic literature, attending conferences, and following research trends in transportation and urban planning.



Figure 22 On left: Prompt = Using generative AI in classroom - On right: Prompt = Using generative AI in classroom, travel behaviour modelling course



Like you, IATBR members, I realized all these ideas are in the most recent IATBR conferences. ChatGPT is using the right words and it provides a good basic vocabulary for the uninitiated in our craft. But, is this really creative and innovative? Absolutely not! But, it provides us with a great list of topics for our students to use as a baseline and explore in more depth.

Bottom line: Generative AI machines do not have their own emotions but can describe details about our emotions; Generative AI does not show imagination but presumably can be trained to generate some new ideas; Generative AI can be used as a portal to an area that you know well and check if you missed something or a new field that you just started exploring and need a compass to navigate through unknown territory. These are some of the reasons I use ChatGPT in my classes and generate discussion. You can design fun exercises of discovery activity among students and works very well in interactive classrooms.

In closing, I would like to remind all of us about the three laws governing robots based on Science Fiction writer Isaac Asimov (you can check this on your own). I asked ChatGPT about these laws. The machine quoted all three correctly and claimed they form the framework for AI systems – any harm from ChatGPT will be from our misuse of the information provided – be judicious using these machines but don't be afraid!



AUTHOR: YUSAK SUSILO

Yusak O. Susilo is the Chair and the Austrian Federal Ministry (BMK) Endowed Professor in Digitalisation and Automation in Transport and Mobility Systems. His main research interest lies in the intersection between transport and urban planning, transport policy, decision making processes and behavioural interactions modelling. Users' adaptation and learning processes towards changes in travel options have been the focus of his research in recent years.

**When our daily life would be as exciting as what one can script.**

Understanding, measuring and predicting individual day-to-day variability have been very important elements of travel behaviour analysis. Back in 1990s, a wise colleague of mine, Phil Goodwin, argued that such longitudinal variability and changes are inherently part of individual daily travel behaviours, thus also provide windows of possibilities to initiate behavioural change, should we wish to introduce one (Godwin et al. 2004). Two decades later, Professor Kay Axhausen and colleagues, through their famous Mobidrive six-week travel diary data (Axhausen et al., 2002), demonstrated that whilst our activities are consistently dominated by only 4-5 select activities, those represents about 70% of the variance of our activity engagements. In parallel, works by Huff, Hanson, Koppelman, Pas, Kitamura, Gärling, Ortuzar, Timmermans, Recker, Fujii, Joh, Cherchi et al have shown that some people are more repetitive than others, depends on the opportunities and constraints that one is subject to on the given day. Such consistency is also one of the reasons why our standard strategic planning models tend to have a comparable accuracy level, regardless the complexity level of the model is.

What really interesting for me as a researcher is the rest of 30%-ish, which varies from day-to-day, and, some argue that these are what makes our life exciting. Huff and Hanson (1990) noted, "... happiness is the longing for repetition as well as for variety and change" and this is why our daily activity travel patterns is a mixed between 'repetitions' and 'variation'. One of statements from Huff and Hanson (1990) that made me, as a new PhD student at that time, excited about travel behaviour research is:

"If Karenin had been a person instead of a dog, he would surely have long since said to Tereza, 'Look, I'm sick and tired of carrying that roll in my mouth every day. Can't you come up with something different? 'And therein lies the whole of man's plight'" (Kundera, 1984; cit. from Huff and Hanson, 1990) – and many of this longing of changes were made base on curiosity and spontaneous initiatives, the key of human's well-being and performance advancements.

Now, with dawn of ChatGPT, with its Artificial Intelligent, and open large mobility datasets, it is expected that it would be much easier for one to provide information and optimize the choices and systems based on the observed/recorded/reported needs of the population of the given large datasets. Given such large information, it is also very tempting to believe that one would be able personalized recommendation for each traveller, based on a user's location, travel needs, and personal preferences (let's put our concerns on our ability to analyse and predict personal attitudes and preference overtime aside at the moment). Given that the traffic

information may be available for ChatGPT and alike, such platform is then expected to be able to provide real-time updates on traffic conditions, helping users avoid congested routes and save time. With the same approach, we can also use ChatGPT driven system to encourage users to use public transit or other sustainable modes of transportation that may be faster and more reliable, in term of operational point of view.



Figure 23 Prompt = An illustration of travel behaviour in a city, public transport, big data impact on travel behaviour modelling

At the same time, having working with different "big data" collections in the past, I am very well aware that our algorithm outputs' quality would be as good as, or as biased as, the quality of our datasets. Thus, if the data used to train ChatGPT is biased and/or only cover a particular part of population, it will provide biased recommendations for transportation options, leading to disparities in travel behaviour and limiting the potential for behaviour change and any possible transformative policy designs. In this sense, in many ways, ChatGPT is neither superior or inferior compared to any of our beloved models that we generated via the same (biased) datasets. The fallacy is when one really believes everything that AI/ChatGPT produce will be superior than our existing

transport analysis outputs, whilst in traditional/more manual approach we may still acknowledge the importance of qualitative knowledge and design thinking in our long-term strategic planning processes.

With the rise of the technology dependency, it is normal to expect that people will become too reliant on ChatGPT or other AI systems for travel recommendations and decision-making. Given the nature of computation approach to be efficient and effective, this will limit people ability to make independent and informed choices about their travel behaviour. Once everything is limited and optimised, then the 'curiosity' and 'spontaneous' options may not exist anymore, so as human creativity that may lead to one's happiness.

Perhaps it is good to remind us what Sam Altman, the OpenAI CEO, creator of ChatGPT said, that we should not put AI as the pilot (in our analyses/planning/decision making processes), or even as a 'fact-database', but as a co-pilot and, for our case perhaps, as a complementary reasoning-engine. I believe that any technology developments, like ChatGPT, should not discourage our curiosities to understand the real science underlie human's decision-making process, nor it should limit our choices of actions in the future. But it can serve as our co-pilot or helper, in particular in working with scale and depth of number crunching that cannot be addressed with the existing methods.

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Figure 24 On left: Prompt = A contrasting illustration of airplane travelers, inside airplane, business trips and leisure trips - On right: Prompt = An illustration of transport planning, and policy analysis, commute to work, behaviour change, transformative policy designs, detailed, nice



AUTHOR: TAHA RASHIDI
DAVID HENSHER'S
SHORT BIO:

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 around 70,000 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. David ranked #1 in REPEC in discrete choice modelling. In 2020 David's latest book was 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.



Oral history of IATBR: An interview with David Hensher

On a cloudy winter morning in Sydney, I was privileged to sit down with Professor David Hensher and learn about his personal life and professional journey. If I had attempted to use the advanced modelling techniques he developed, I would still be unable to predict his glorious professional achievements had I only observed his life before his Ph.D. graduation. Believing in data-driven bibliometric analysis or not, David is at the very top of most rankings based on the number of publications, citations and impact on the field of transport economics. This made this interview even more enjoyable to see if I could develop a roadmap for academic success by observing David's journey. Being adventurous, intellectually talented, technology-receptive and above all, socially adept are factors contributing to David's superb academic standing, all strengthened by his persistent attitude.

To name two of David's outstanding contributions to the field, I must start with Hensher's Equation. This equation resulted from research he began at the University of New South Wales (UNSW Sydney) during his PhD and continued in Oxford, a way of valuing travel time for business. In plain language, the critical point brought forward by Hensher's equation was to highlight the significance of understanding that lots of business trips trade leisure with travel rather than business. The equation, though complicated, offers a behavioural solution to account for the value of trading leisure, work and travel. The equation suggests a lower value of travel time saving than the cost saving based on the average wage rate. This finding caused problems



for people looking to justify the feasibility of transport infrastructure projects. Having an equation named after a scholar is quite an achievement, a rare and unique appreciation of the scholarly contribution to the field.

Figure 25 Prompt = A contrasting illustration of airplane travelers, inside airplane, business trips and leisure trips

The second contribution pertains to studies on stated preference survey design and modelling in collaboration with the late Jordan Louviere. Their collaboration started on a project analysing Qantas data, a conjoint analysis on people travelling between Sydney and Los Angeles. Later, Jordan and David designed the first instance of choice experiments where each individual had 16 choice sets. They had an extensive journey introducing concepts, methods and benefits of SP surveys, which are now greatly appreciated in many fields.

of researchers who got to know each other when fax was an advanced technology. The core included Stein Hansen, Peter Stopher, Andrew Daly, Paul Shuldiner, Antti Talvitie, Reuben Gronau, Tom Golob, Dave Hartgen, Marty Wachs, Michael Beesley, Shalom Reichman, Dan Brand, and Frank Koppelman, who gave a talk on behalf of Moshe Ben-Akiva, who was drafting his PhD thesis. Frank was still doing his PhD at the time under the supervision of the late Marvin L. Manheim. There were 80 of them there who knew closely each other's work. The next event in 1975 became David's honeymoon when David married Johanna in January of the same year before starting his postdoc at Oxford.



Figure 26 Prompt = David Hensher, transport planner, circle icon, detailed, city circle background

We started the conversation on the birth of IATBR, an initiative of Peter Stopher and Arnim Meyburg, with David an active participant. They decided to start a by-invitation-only event in South Berwick in Maine in 1972-3 to discuss travel time saving (not value of time yet). The aim of the event workshop was to develop a series of commissioned resource papers at the centre of workshop discussion and debate. The venue was intentionally chosen to be remote to have attendees concentrate on the topic. David, 26 years old at the time, had just finished his PhD at UNSW (the first in economics we are told), arrived a day early to this event and ended up sleeping on the patio of the venue before others arrived. This was the beginning of something, later called IATBR, that has survived and flourished for 50 years. By design, it was a workshop by a young group



Figure 27 Prompt = An illustration of a conference in 1970s, youth, workshop, transport elements, conceptual, 1970s

The second event was in Ashfield, NC, where Dan McFadden first joined the team. The concept of disaggregate behavioural choice modelling was born in that period to move away from zone-based modelling with contributions from Steven Lerman and Moshe Ben-Akiva. David suggested that it was that conference where ideas like logsum and inclusive value were born. At about the same time, the Federal Department of Transportation gave a project to Cambridge Systematics (Charles River Associates), in which

Dan McFadden was involved. They also brought in a young Ph.D. student, Charles Manski, who wrote a program called XLOGIT. After the second conference, David while still at Oxford, was invited to join Macquarie University in Sydney as an urban economist lecturer. He went up the ladder of promotions very quickly and became a professor there before joining the University of Sydney. It was in 1977 to have a conference in Australia, and where better than Tanunda in Barossa Valley (!) in South Australia? Massive sponsorship secured by David fully supported all participants to pay registration, accommodation, and airfare, allowing some major European players to join the American schools. Stan Zachary and Andrew Daly joined the conference and discussed their Expected Maximum Utility and GEV models. Dan McFadden wrote a summary paper introducing his GEV model, which later contributed to his Nobel Prize in 2000. The next series happened in 1979 in Graneu, Germany. Soon after that, a casual conversation started proposing a change to the series format into a standard conference due to the challenges of the size of the conference and the fact that academics had to write a paper to secure funds to attend the conference. The workshop structure had to change, given the growth and reputation of the conference. The rest of the story is already narrated in the history article by David, available on the IATBR website⁴.

I then asked David about the ingredients of a successful conference, and he suggested three: 1) passionate young advocates, 2) an emerging topic, 3) and a proper structure (not simply the standard structure). He then named two other successful events, in his opinion. Jordan J. Louviere initiated the first one, called the Invitational Choice Symposium, with ten themes and ten workshops with 10-15 by-invitation participants each. The other conference series started, based on this recipe, was the International Conference Series on Competition and Ownership in Land Passenger Transport (The Thredbo Series), with the first in 1989 at Thredbo, Australia. It was out of this conference that articles on the reform of the bus sector in the UK and subsequently around the world were produced. David believes the workshop formula linked to the top leaders on the topic is crucial to moving the field forward. Others not fitting into the small group of leading scholars should not be invited to such events as the structure of David's favourite conferences includes



Figure 28 Prompt = Daniel McFadden, nobel prize, economics, illustration, circle icon with economics elements, detailed

workshops and plenaries where debate outcomes source the content of resource papers. Many people might be upset if they are not invited, but David has been very strict on maintaining this structure, as other attempts failed as soon as they deviated from it. The idea of publishing or perishing has also contributed to the taste change of researchers not being interested in events producing resource papers that are not indexed or cited. Sponsorship of the standard model of conferences is David's primary concern, which might affect IATBR. IATBR might be further struggling as the community of travel behaviour has significantly grown, which leaves the standard conference structure the only feasible option.

When I asked David about his family, he said, "I was born in Kent, in Bromley, so I'm a pom." in the same nursing home as notables such as Mick Jagger. He lived there until the age of eight, when his dad moved to Kenya as a telecommunication engineer. David, his mum, and his twin brother travelled to Kenya via Gibraltar, the Suez Canal down to Mombasa on an dutch freighter boat (The BoschFontein) where his dad met them, and they went up to Nairobi and stayed there for eight years. His mum worked at the tax office. The Kenya

4. <https://iatbr.weebly.com/history.html>



Figure 29 On left: Prompt = A mother and two boys from back, travelling on a dutch freighter boat in the Suez Canal, water, nice, illustration, detailed - On right: Prompt = A female and two boys from back, travelling on a dutch freighter boat in the Suez Canal, water, nice, illustration, detailed

experience was exceptional living in a country where everybody was treated equally. David learned the local language, which stays with him to date, though a bit rusty. He said a few sentences in Swahili, but I could not comment on the accuracy of them! They started high school in Kenya and went through the Mau Mau uprising when they decided to return to the UK. Parents stayed in Kenya while David and his brother flew back to the UK on the Britannia jet prop BOAC plane to a school in Sussex, a boarding school that was quite old (circa 11th century) near Arundel. The school structure was quite strict, with six days per week of classes where they were allowed to go out to the local village once a month. Any misbehaviour resulted in being whipped. Still, the education was terrific, where David learned four languages. Once again, David's talented dad accepted a job offer in Australia, and the family landed in Sydney after a couple of weeks of travelling on a boat. The first few days of living in old army barracks in Lindfield were not what they pictured of Sydney. Dad's car arrived damaged on a boat. After a year in a public School in Sydney, David started his higher education at the University of New South Wales with a passion for economics and banking, yet no idea about transport. He received his

degree with first-class honours. David received two scholarships upon finishing his degree, one from UNSW on a Commonwealth Scholarship and another from Oxford. Obviously, UNSW was selected (with my bias here), and David became the first Ph.D. graduate of UNSW in economics. David did most of his PhD travelling around the world in the USA and UK, meeting others and researching the value of time. Finding the right people around the world, reaching out to them, and creating a massive network of scholars without social media was a great talent of David, in my opinion. Then I asked David, whether he thinks his adventures with his family could help him become adventurous, chasing his ambitions around the world. He agreed with my hypothesis as he was the only cohort going worldwide, creating a network of VoT experts for everyone. David was the Facebook of the value of time experts in the 70s. Soon after graduation, he got another offer from Oxford, which was a perfect location as he had just married Johanna, who came from Holland. David and Johanna's marriage has two successful offspring, Andrew (43) and Danielle (40). Andrew is a lawyer, and Danielle did industrial design and planning. Andrew coincidentally got involved in working in the gambling industry



Figure 30 On left: Prompt = A nice iconic illustration of oxford university, cartoonic, buildings and students, circle icon, highly detailed - On right: Prompt = A nice iconic illustration of UNSW university in Sydney, buildings and students, library building, circle icon, highly detailed

as a senior lawyer and the general secretary of a reputable company in the gambling industry. David is lucky to be the grandfather of four, two for each child.

David has a strong passion for music, and started playing drums in England and used it to manage his stress during PhD (This is a message to PhD students that even David Hensher got stressed during his PhD). He formed a pop rock band at UNSW. David shared with me his memories of the first time he played the song Wild Thing with others like Sergio Jara Diaz and Juan de Dios Ortuzar in Chile (with John Bates on Piano: more stories on this in the 2nd issue).

I then asked David about the topic of this issue, generative AI. David sees ChatGP as a knowledge-synthesising tool that you hope picks up the useful parts, not the rubbish. This approach can be used by lazy academics who do not think and simply rely on the bundle of ideas produced by generative AI. Still, David waits for the right time to use ChatGP, but he is sure that he will not use it for idea generation in his work, where he prefers sitting down with his colleagues to brainstorm and extract knowledge from the literature using classical and other ideation methods with a behavioural framework methods. In our field, David believes generative AI risks making Python Biogeme, NLogit and Appollo redundant, but still, it has a long way to go to make the researcher behind these codes redundant.

In David's opinion, another angle not being threatened by generative AI is what ITLS focuses on, which is the ability to conduct impactful research and influence others rather than just work on a good research topic. When I asked David to name some of his best PhD students out of many, he named (in an unbiased order) Truong Truong, Alejandro Tirachini, Camila Balbontin, Sean Puckett, John Rose, and Zheng Li.

When asked David who is at the top of his list contributing to the travel behaviour field, he started with Dan McFadden, followed by Kenneth Train, the two no-brainers on David's list. Then he nominated Kay Axhasuen as he helped IATBR settle and encouraged many to do impactful research. Tommy Gärling, as a psychologist, was an active person contributing to the field of travel behaviour. By looking at people who got the Lifetime Award, David considers Andrew Daly a notable figure in the field. David also mentioned Moshe Ben-Akiva as a significant transport engineering and travel behaviour modelling contributor. Switching from past to future, David sees Chandra Bhat on the horizon of becoming the notable outstanding scholar of the future.

Regarding whom to be interviewed next as someone who has significantly contributed to the field and IATBR, David named Kay Axhausen and Hani Mahmassani. So please wait until January 2024 to read my oral history of IATBR in Hani and Kay's words.

How value adding is AI for strategic transport planning? Is AI Intelligent or simply a descriptive information dump?¹

DAVID A HENSHER

Twenty-five years ago, I wrote a paper (Hensher and Ton (2000)) to compare machine learning algorithms associated with neural networks with the behaviourally more appealing (less black boxy) discrete choice models. At the time, the curiosity was with how much better or worse machine learning with its training algorithms could improve on the predictive performance of a simple multinomial logit choice model. At that time, we were unaware of the pending explosion of interest in machine learning as megabytes of data became available, and what is now known as artificial intelligence (AI) and generative-AI (G-AI). G-AI models use neural networks to identify the patterns and structures within existing data to generate new and original content, something we did for many years under the name of classification and regression trees (CARTS; Breiman et al. 1984)¹, albeit with smaller data sets. One of the innovations with G-AI models is the ability to leverage different learning approaches, including unsupervised or semi-supervised learning for training.

I thought I would revisit the meaning of 'artificial' and of 'intelligence' and see if we are describing this new tool appropriately. According to the Cambridge dictionary², the word artificial refers to something that is 'made by people, often as a copy of something natural!'. The word intelligence refers to the ability to think, to learn from experience, to solve problems, and to adapt to new situations; although in recent times it has been interpreted as involving mental abilities such as logic, reasoning, problem-solving, and planning.

While AI can claim to be aligned quite well with these meanings, there is one thematic that remains concerning, namely 'to adapt to new situations.' One wonders whether this is

only possible where the new situation is a small variation around current or past behaviour, given that G-AI models learn the patterns and structure of their input training data and then generate new data that has *similar characteristics* (my emphasis) and possibly repetitive in nature. Take a future where, for example, we have 100% electric cars, and active travel and micro-mobility are a dominant transport mode, which is a non-marginal variation on the past and today. How well can AI or G-AI predict this circumstance (in contrast to a human-devised scenario unless this is already in the available data, and which might also be questionable) based on trolling the existing data bases and rules on offer? One appealing ingredient could be the many studies that have undertaken a form of stated preference study to explore behavioural intentions under future scenarios that test for 100% electric cars, and active travel and micro-mobility. One doubts, however, whether this is enough to give us confidence in the future circumstance? Indeed, a great deal of potentially very useful data (e.g., unit records on individuals' travel behaviour) is never released into the public domain³. Such 'hidden from AI captured' data is indeed what transport planners should be using in informing now, the near future, and possibly the distant future.

We have, I believe, a real dilemma, described brilliantly by Anable and Goodwin (2021) in the context of de-carbonising transport where they see it like shot silk. The warp (blue) relates to still being able to use our cars, 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 potential for 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. This behavioural positioning seems to me to be a problem for G-AI since the data in place and training tools may be challenged beyond the ability to take on board this situation and do anything materially useful with it.

So, the real question becomes – 'how much can we depend on the outputs of AI and G-AI to guide us in making decisions on our future' and replace traditional sources of data such as household surveys? There has been a lot of scope creep, particularly with AI attempting to get into more behavioural areas of research, when it works best more in the automation and perhaps non-behavioural aspects of performance⁴.

It appears to me that this is equivalent to the view of experienced transport modellers that 'models are a useful guide to contribute to the debate that ultimately will be dependent on many other soft as well as political factors.' Time will tell, but I suspect we (or at least many) are at the 'love affair' phase with AI, and in time, it will be placed in context as a useful but not so dominant part of the puzzle on life. Could G-AI then become nothing more than a source of information ambiguity and/or an intelligent agnostic for strategic transport planning and policy decision making?

Anable, J and Goodwin, P (2021) *Two Futures: Transport Policy, Planning and Appraisal for the New Climate Reality*. (Forthcoming). <https://www.transportxtra.com/publications/local-transport-today/comment/69570/we-are-now-facing-two-alternative-futures-plus-an-untenable-one/>

Breiman, L., Friedman, J.H., Olshen, R.H. and Stone, C.H. (1984) *Classification and Regression Trees*, Chapman and Hall/CRC, imprint of Taylor and Francis Group, Baton and Roca.

Hensher, D.A. and Ton, T. (2000) A predictive assessment of neural networks and discrete choice methods. (Presented at 8th WCTR, Antwerp, July 1998) *Transportation Research Part E*, 36 (3), September, 155-172.

¹ Use of trees in regression dates back to the AID (Automatic Interaction Detection) program developed at the Institute for Social Research, University of Michigan, by Morgan and Sonquist in the early 1960s. The ancestor classification program is THAID, developed at the institute in the early 1970s by Morgan and Messenger.

² <https://dictionary.cambridge.org/dictionary/english/artificial>

³ Unlike traffic data which is rich with data, and typically repetitive in nature.

⁴ I thank John Rose for this insight.



AUTHOR:

MARYAM BOSTANARA

Maryam Bostanara is a final-year Ph.D. candidate at the Research Centre for Integrated Transport Innovation (rCITI) at the University of New South Wales (UNSW) in Sydney, Australia. She's developing a framework to model household behaviors, including residential and workplace relocations, while factoring in environmental influences. Passionate about urban sustainability, she explores the effects of affordability and policies on city futures. Besides her academic endeavors, Maryam brings a creative flair to her research using innovative presentation methods and Image Generative AI to create engaging educational materials.



THE FUTURE IS VIVID:

How Image Generative AI is Revolutionizing Travel Behaviour Modelling

Close your eyes and envision this: you're an urban planner tasked with reducing city traffic. You could slog through rows of numbers and daunting equations—or you could step into the future where Image Generative AI instantly paints a thousand scenarios in ultra-realistic, dynamic visuals. Now, open your eyes because this is not the stuff of sci-fi movies. The future is here, and it's transforming how we comprehend, teach, and present the intricate field of travel behaviour modelling.

In a traditional classroom or seminar setting, discussing travel behavior models often relies on static graphs, equations, and perhaps an occasional video clip. While these methods have their merits, they fall short in capturing the dynamism and complexity inherent in human travel behaviour. Enter generative AI: these game-changing tools can create ultra-realistic images and videos that depict various travel scenarios, breathing life into abstract models, theories, and create lively and engaging presentations.



Figure 31 On left: Prompt = Watercolor style background moving home (By Midjourney) – On right: Prompt = People moving in a city with their homes on their back (By Midjourney)

Unleashing Imagination: From Thought to Visual Reality

Picture this: you dream up a world—say, a bustling eco-friendly city—and an AI tool instantly turns your vision into a customizable image, in any style you fancy. No longer confined to the limits of traditional tools or even your own artistic skills, the only boundary now is your imagination. In teaching and presenting, this means not just theorizing change but literally seeing it, making the future as tangible as your creativity allows.



Figure 32 On left: Prompt = A picture contrasting the two different views of Sydney city, the underdeveloped parts and urban suburbs, watercolour illustration style (By Midjourney) - On right: Prompt = A person carrying his house on his back (By Midjourney)



Figure 33 Designed presentations using images generated by Midjourney On left green: Prompt = A mesmerizing illustration of a sustainable city with mixed land use, light colors, presentation style, highly detailed, sustainability, circle flat icon - On left orange: Prompt = A mesmerizing illustration of an old city with lots of cars and lots of buildings, red and yellow colors, presentation style, highly detailed, circle flat icon - On right: Prompt = A mesmerizing illustration of a sustainable city, light yellow and blue colors, bright moon, presentation style, highly detailed, sustainability, futuristic

To Create Engaging and Informative Presentations

Inject energy into your lectures and stakeholder meetings by utilizing Image Generative AI to create presentations that are not just informative but utterly engaging. For instance, Midjourney can churn out mesmerizing images that visualize different built environments, transportation options, and individual behaviors. Your PowerPoint slides will become an immersive experience, not a sleep aid. An example of a presentation prepared using the Midjourney AI image generator can be found [here](#).

To Generate Hypothetical Scenarios

Planning a new bus rapid transit system? Use Midjourney to generate hypothetical scenarios that bring your plans to life. Explore the impact of such interventions on travel times and costs without actually altering city infrastructure—yet.



Figure 34 Prompt = A new bus rapid transit system in Sydney (By Midjourney)

Bridging the Gap Between Experts and Stakeholders

Generative AI not only enhances the educational experience but also serves as a powerful tool for decision-makers. Urban planners, for example, can use AI-generated models to present prospective changes to a city's infrastructure. A picture is worth a thousand words, but a video could be worth millions in saved costs and more efficient planning.



Figure 35 Prompt = Roundtable Discussion Between Experts and Stakeholders in a beautiful city scene with a nice city view (By Midjourney)



Figure 36 On left: Prompt = A chess board, which is actually a city, chess pieces are buildings, beautiful city, illustration style - On right: Prompt = A chess board, which is a city, chess pieces are buildings, illustration style



Meet the Power Players in the Image Generative AI Landscape

Before we embark on this exploratory odyssey, it's essential to know who the big players are in the realm of Image Generative AI.

First, we have DALL-E 2 by OpenAI, a strong player capable of translating text into high-quality images—though it comes with its own set of limitations like high computational costs. Then there's Gigapixel AI, which can magically upscale your images, albeit not without some artifacts. And who could forget DeepDream by Google, the artist's dream, which can transform ordinary images into complex pieces of art, albeit sometimes incomprehensibly so.

But if there's one tool that commands our attention, it's Midjourney. Unlike other offerings, Midjourney isn't just a tool; it's a complete ecosystem for generating a wide range of images, from hyper-realistic portrayals to creative abstractions. Where Midjourney sets itself apart is its educational adaptability. Designed with the academic environment in

mind, it's ideal for creating compelling, realistic scenarios for the study of travel behavior. Although, like its peers, it faces challenges such as computational expenses and availability, its constant upgrades indicate a tool on the brink of transformative change.

While Midjourney and other high-caliber tools dominate the stage, let's not overlook simpler yet effective alternatives like Bing, Gencraft, and imagine.art. These platforms may not offer the same extensive range of capabilities, but they bring a unique simplicity and user-friendliness that make them worth exploring, especially for quick projects or those new to the field of AI-generated imaging.

Choosing the right tool will invariably depend on your specific project needs, but as it stands, Midjourney offers a compelling package for a broad range of applications. As the realm of AI image generators continues to evolve, it's awe-inspiring to think of what tomorrow might hold. Still, as these tools gain more power, it's crucial to remain vigilant against their potential for misuse, such as generating harmful or inappropriate content.

Cracking the Midjourney Code: Pitfalls and Pro-tips

While Midjourney is revolutionary in many ways, it's essential to recognize its limitations:

Inconsistent Results: Midjourney's output can vary in quality and style depending on the prompt and its current model state. It may take some trial and error to achieve your desired results.

Limited Control Over Specifics: While it excels at generating general concepts, finer details—like a cat wearing a particular hat—may prove challenging.

Derivative Creations: The tool can occasionally produce images that lack originality, as it is trained on existing data.

Safety Concerns: Midjourney may generate images that are inappropriate or offensive, given its broad training dataset.

Bias and Inclusion: The platform can reflect societal biases present in its training data, potentially underrepresenting certain groups.

Difficulty with Abstract Concepts: Midjourney may struggle with understanding abstract descriptions filled with metaphors or similes.

As technology advances, some of these issues may be mitigated. However, being aware of these limitations can make users more critical and informed in their usage of Midjourney.

To get the most out of Midjourney, consider the following tips:

Visualize Before You Prompt: Take a moment to clearly envision what you're after, then describe it to Midjourney as accurately as possible.

Be Specific: Instead of asking for a "picture of a cat," request a "tabby cat sitting on a windowsill" to enhance the likelihood of getting what you want.

Use Keywords: Include specific keywords like "tabby," "windowsill," "fur," and "whiskers" to guide the AI.

Employ Negative Keywords: If there's something you want to exclude, mention it. For instance, use the term "no hat" if you don't want your generated cat wearing one.

Experiment: Don't hesitate to tweak your prompts; sometimes a minor change can yield a significantly different result.

Be Patient: Learning to use Midjourney effectively takes time. Keep practicing, and you'll get the hang of it.

Every image featured in this issue was created with Midjourney, and we've included the prompts to demonstrate both the tool's capabilities and its limitations.

Keeping it Real and Responsible

Before we dive headfirst into this vivid future, a reality check is essential. The capabilities of Image Generative AI are astounding but not without ethical considerations. Whether it's data integrity or the potential to produce biased visualizations, responsible use must be our watchword. Yet, with proper oversight, the sky—or shall we say the vivid, pixel-perfect sky—is the limit!

Video Generative AI: The Next Frontier

While our focus has been on Image Generative AI, let's not overlook Video Generative AI's potential to turn static visuals into interactive simulations. Think of animating a day in a commuter's life through multiple modes of transit—bringing an unparalleled depth to understanding travel behavior. And guess what? Existing tools can already make historical portraits "speak" your texts, or you can craft simple, customized animations. As exciting as this is, we anticipate even more revolutionary capabilities in the near future.

All in All: A Journey of Discovery and Anticipation

We are undeniably in the nascent stages of a technology that promises to make imagination our ultimate playground. While the tools at hand are already astonishing, they are not without their limitations. Should we hold out for more advanced versions in the future? Absolutely. But does this mean we should put off exploring and capitalizing on the capabilities of the current generation of tools? Not a chance. The breakthroughs we've already seen in Image Generative

AI are nothing short of amazing, sparking surprises and insights at every turn. So, while the road ahead is teeming with potential upgrades and innovations, there's no reason we can't begin our journey of discovery today.

The Future We Envision: Dynamic and Interactive Tools

What's on our wish list for the next frontier in Image Generative AI? Imagine a tool that goes beyond static visuals, one that allows for real-time interactivity and dynamic editing of figures and graphs right within academic manuscripts. We're talking about a tool that could revolutionize the way we present data in travel behavior modeling,

elevating our findings from mere statistics to immersive experiences. It would empower researchers, educators, and even policymakers to engage with data in ways that static graphs could never achieve. The future is not just to see, but to interact, modify, and engage on a deeper level. The sky's the limit, and we can't wait to see what's on the horizon.

So, are you ready to see travel behaviour modelling in a whole new light, quite literally? With Image Generative AI, we're not just crunching numbers or theorizing possibilities; we're visualizing the future, one dynamically generated image at a time. And that, dear friends, is worth more than a thousand static graphs. Welcome to the future; it's going to be vivid.



Figure 37 Prompt = Sydney city in the future, green, buildings, roads, trains, universities, people, in watercolor illustration style

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