

Transport for Humans

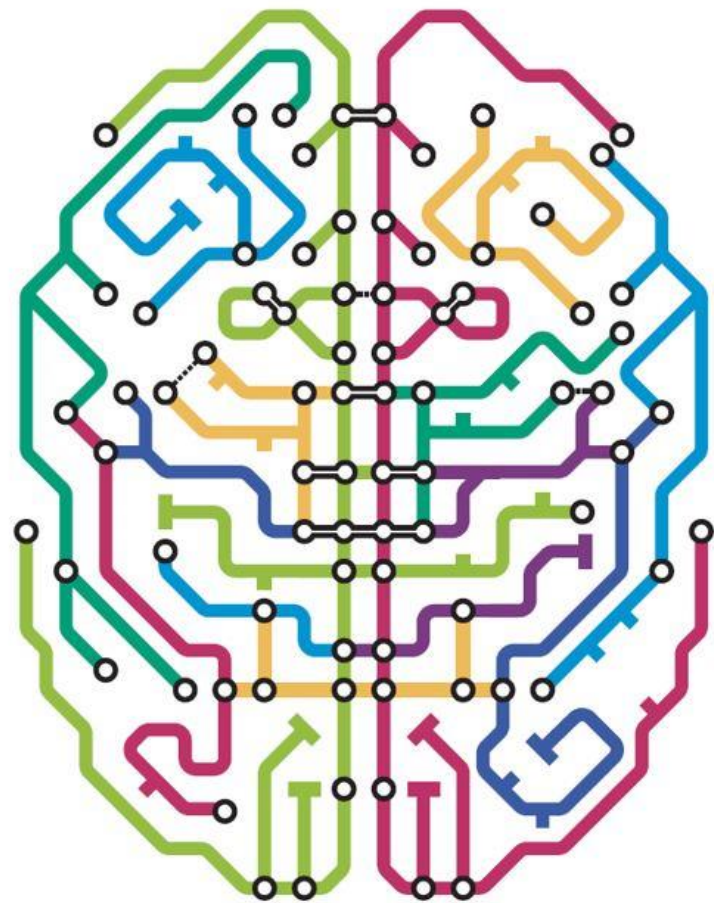
How can we electrify social change?

Pete Dyson
University of Bath

FP2025
Future Propulsion Conference

TRANSPORT FOR HUMANS

Are we nearly there yet?



Pete Dyson & Rory Sutherland

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Preface

This book started from observing simple frustrations with the way we get around. Why are there never enough ticket machines? Why are we stuck in traffic? Are we nearly there yet? The truth is, we have designed much of the way we live today using an outdated economic model of how humans think, feel and behave. This applies to pensions and political polling just as much as it does to trains, planes and automobiles. When it comes to how we get around, planners have for more than a century rigorously measured speeds and punctuality while missing the unique difference between pleasure and frustration – or downright fury. Think about your last journey. Did you choose the fastest method, or the most dependable? Did you weigh up every option, or stick to a familiar route? Were you delighted to arrive at your destination feeling fresh, or were you furious and weary? Did a hold-up leave you shuffling hastily along the train platform, hoping a table seat might still await you?

Historically, engineers and accountants have been discouraged from thinking about the human side of their creations – and sometimes with good reason. If you are putting a satellite into space or preparing a balance sheet, facts are usually better than feelings. But if you want to engage with people, improve their experience or get them to travel differently, then you'll also need insight into the messy world of how people think, feel and behave.

In this book we go far beyond simple frustrations. We make a positive case that adding insights from behavioural sciences

PREFACE

can rebalance the way we think about transport and how we forces better influencing the way we travel. There are many reasons why we are here without travel. The world is a remote work environment. Our interests: people business, more cars as the technologies and opportunities. It is a guide to transport (and more) and an economic and psychological methods to solution and economic. As we write in our lives, it is more careful and more careful technologies, such as if we really have those choices.

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Chapter 1

People are not cargo

People who travel go by many names: passengers, commuters, customers, drivers, cyclists, pedestrians. Each name carries positive and negative social signals, but we are all Homo sapiens. In 200,000 years, it is estimated there have been 117 billion Homo sapiens, with 7.8 billion of us alive in 2021. Our ancestors never worried about being stuck in traffic or missing their flight because they had other things to worry about. They needed to find food, shelter and social support, and that shaped their bodies, brains, senses and instincts. This includes the mental shortcuts (heuristics) that power decision making. The successful ones survived and were passed down to future generations. Yet in the blink of an evolutionary eye we are in the modern world, where being able to move faster than a horse, or travel more than thirty miles in a day, have been possible for only 0.01% of what we call history. We remain mentally and physically indistinguishable from the people who lived here 50,000 years ago. We use a Stone Age brain in a high-speed world, so we should design transport to harness the brilliant aspects of our nature and to manage our shortcomings. Transport should adapt to the needs of society, not the other way around. Crammed into the past 250 years are all the transport and communications technologies we now take for granted: smooth roads, cars, telephones, buses, same-day delivery, planes ...

PEOPLE ARE NOT CARGO

the south. After dozens of breaches and many fatalities, it was finally opened eighteen years later and rebranded as the 'Eighth Wonder of the World' to attract tourists to its underground marketplace; later it was taken over by the railways.



Figure 1. The Thames Tunnel: from freight shaft to world-class tourist attraction, and now a passenger railway tunnel.

Fast forward 150 years to the opening of the Channel Tunnel in 1994. The scale is bigger but the principles remain the same. Ground-breaking innovation enables the transport of 1 million tonnes of freight and 10 million people per year between England and France. The Boeing 747 became an iconic passenger airliner but was originally designed for the military and hastily repurposed for freight, which is why it has a bump at the front, for loading the freight payloads. Eventually, airlines repurposed the upper deck for first class seating and dining, offering luxurious seclusion for the most profitable passengers.

We encounter these kinds of mixed use every day, and it often seems as though the people are squeezed out by cargo. Our overcrowded motorways are shared between cars and

TRANSPORT FOR HUMANS

even the bicycle. These technologies have transformed the way we live, but not yet our bodies or brains. We design the physical world for the human body. A steering wheel accommodates the shape of our hands, taking advantage of our opposable thumbs, which were never evolved to steer cars. But we aren't yet so good at designing the way we live to accommodate the characteristics of our brains. We often endure signage, tickets and interfaces designed to suit the brains that transport planners wish we had. We frequently find ourselves confronted by a hotchpotch of competing tariffs, timings and bundles built from years of complex arrangements, which need a PhD to decipher. Maybe even that's not enough: remember seeing a gentleman baffled by the self-check minimal at an international airport and going over to help to discover that the man wrestling with the interface Nobel-winning economist!

In a world that demands never and more sustainable port technologies, we need solutions that are socially, as technically successful. But everywhere we look, we are treated like goods. Pilots describe passengers as 'self-loading freight' – while the post-Soviet states use the 'Cargo 200' to refer to military casualties who are being ported. In the UK, train doors close between thirty seconds and two minutes before the listed departure, but from a passenger perspective, once the train cannot be boarded or alighted, it might as well have departed. A system that prioritized the right as well as the courteous, closing the doors a few seconds would be more courteous, closing the doors a few seconds before the listed departure time to give passengers a moment's notice. The truth is, most transport technologies evolved to the dual purpose of transporting goods and people, but were designed in the first place for the things, not the people. The Thames Tunnel under London was the world's first river crossing. The tunnel was started in 1825 by Marc Isambard, and was designed as a freight tunnel to connect the docks at Wapping in the north to Rotherhithe in the south.

TRANSPORT FOR HUMANS

lorries, and if you get on your bike, you frequently share with takeaway delivery riders. The World Economic Forum estimates that the number of delivery vehicles in the top 100 cities will increase by 36% by 2050 to satisfy customers' eagerness to buy products online (and this prediction was before the Covid-19 pandemic, so the estimate must be higher now).³

| Table 1. Humans versus cargo: similarities and differences | |
|---|---|
| Similarities | Differences |
| <ul style="list-style-type: none">Must be handled with careMust be delivered reasonably promptly and not lost in transitMust be stored in a cool, dry placeLive tracking of progress is useful for interested partiesThe buyer values speed and price (if options are presented in such a way as to encourage this) | <ul style="list-style-type: none">If delays occur, regular reassurance is essentialWe despise being stationary, especially the absence of information, any price and movement are better than nonePosition carefully: humans interact with other humans, with mixed resultsTravelling with familiar and friendly may result in a preference for a long journey timePack closely only under exceptional cultural conditions, requiring social pressure and goodwillTime savings are not transferable: it is the same as twenty people saving 10 minutesStatus consciousness matters: a car does not experience a fit of pique if sent by DPD rather than UPS |

WE'VE BEEN HERE BEFORE

The entrepreneurs who brought us mass transit in the 250 years understood this problem very well, not least that they had to convince a sceptical public to use their remaining inventions. Aspects of travel that we take for granted – far from your work and commuting, season tickets, intercity

questions and to ensure that ideas address a wide range of possible factors. The wide number and variety of models reflects the different mental models people use at different times. Just like maps, models will always be simplifications of the real-world territory they describe.

What sort of model can account for these factors? The COM-B model is emerging as the most unified behaviour-change framework. Developed in 2011 at University College London, its aim is to identify the factors that affect our behaviour in a systematic and effective way.

No prizes for guessing that the B stands for behaviour, but what is COM?

- Capability. To change behaviour, you have to feel you are psychologically and physically capable of doing so.
- Opportunity. You need the opportunities to act: the social connections, the lifestyle and the finances.
- Motivation. You need to want to do it: some combination of conscious reflection, emotional connection and automatic thinking.

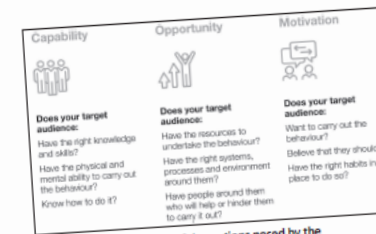


Figure 6. Useful questions posed by the COM-B model of behaviour change.⁸

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TRANSPORT FOR HUMANS

The COM-B model is especially useful for situating human factors in a wider social system. It deals with more than communication and nudges; it also accounts for the impact of policy, regulation, experience design, education and engagement.

INNERVATION, NOT INNOVATION

What came first: putting a man on the moon or wheels on a suitcase? Only in 1970 did Bernard Sadow, a Massachusetts-based luggage company executive, have the ingenuity to take casters off a wardrobe trunk and mount them on a suitcase. He filed this revolutionary idea as 'rolling luggage', with patent number 3,653,474.⁹

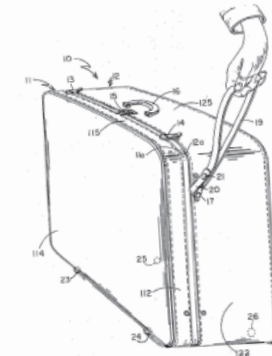


Figure 7. Original patent illustration for 'rolling luggage'.

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TRANSPORT FOR HUMANS

If we were transport planners, but we could not spend money on large infrastructure, and we did not have the power to raise taxes, how could we still improve travel and transport?

Our goal in this book is to look at the problems of our transport systems with fresh eyes informed by behavioural science, and hopefully to suggest ways to innervate our way out of the mess we're in – and encourage others to do the same. Alan Kay, one of the pioneers of the graphical user interface that revolutionized the way we think of computers, put it most succinctly when he said: 'A change of perspective is worth 80 IQ points.'¹⁰ Practically, we call for investment in applying behavioural science. We look forward to a future in which transport operators, governments, organizations and entrepreneurs use behavioural science in all manner of operations. For example, they might look to

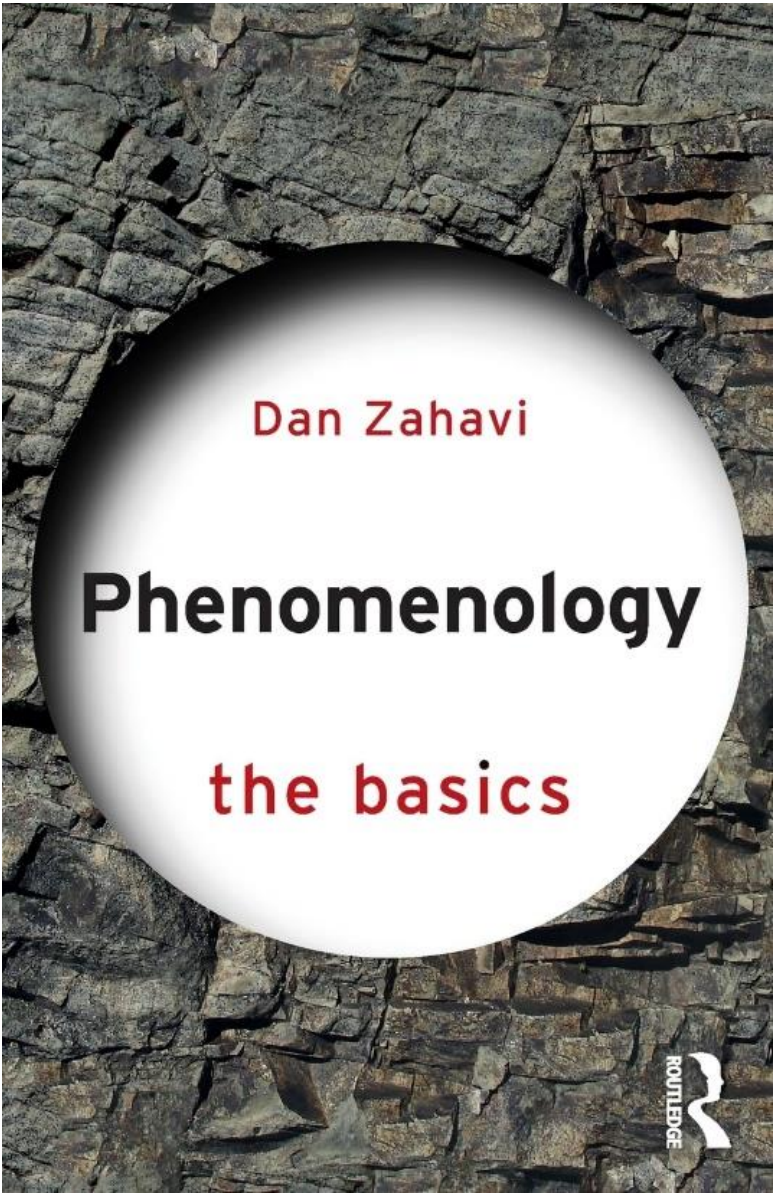
- hire applied behavioural scientists into existing teams, or as a dedicated function;
- apply behavioural models to diagnose issues;
- use frameworks to create wider sets of ideas, ideally co-designed with users and non-users;
- invest in field trials, pilots and online experiments;
- train transport planners in behavioural science basics;
- learn from the experiences of employees on the ground (drivers, conductors, service staff, cleaners – they all have valuable contributions to make); and
- establish a position on ethics, including appreciating that not applying behavioural science is itself a moral position.

PEOPLE ARE MESSY, AND THAT'S A GOOD THING

Unlike cargo, every person has messy and individual, context-sensitive needs. Some of us love a long drive, but only in good

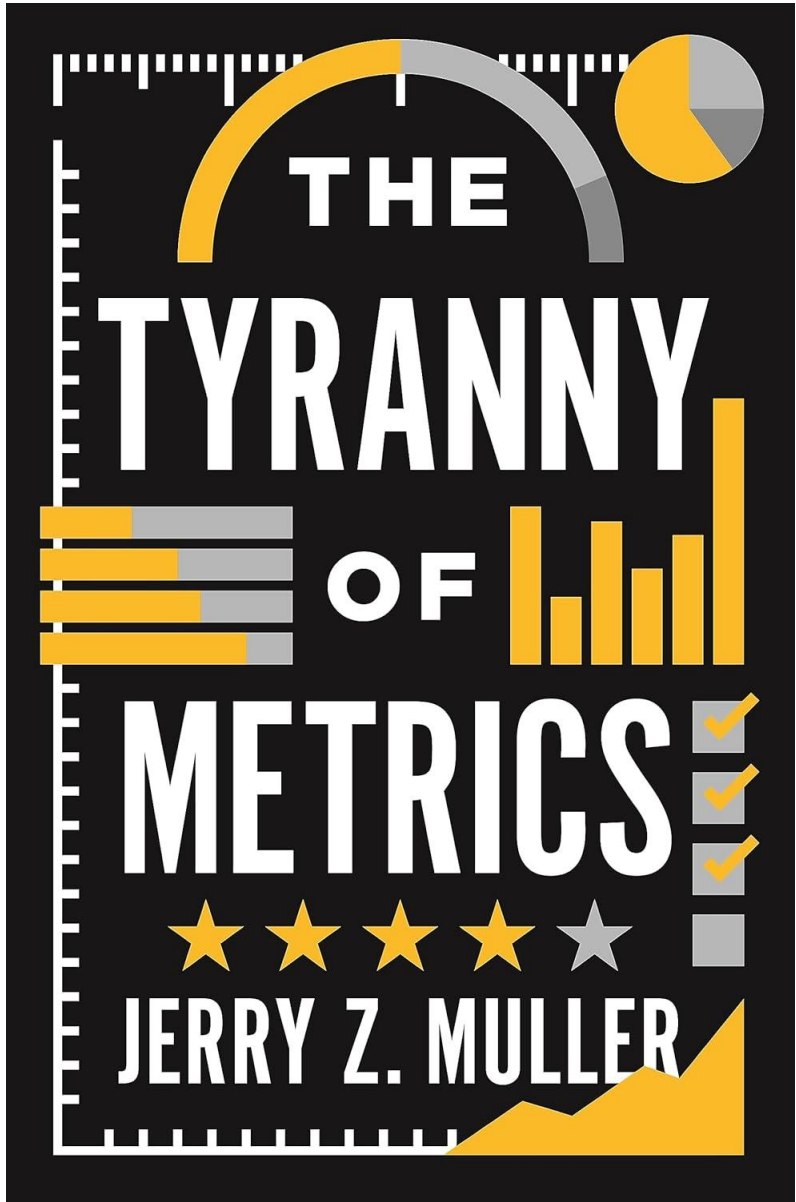
⁸ The answer to our earlier question, then, is that we first put wheels on a suitcase three years after we put a man on the moon!

Psychology & philosophy



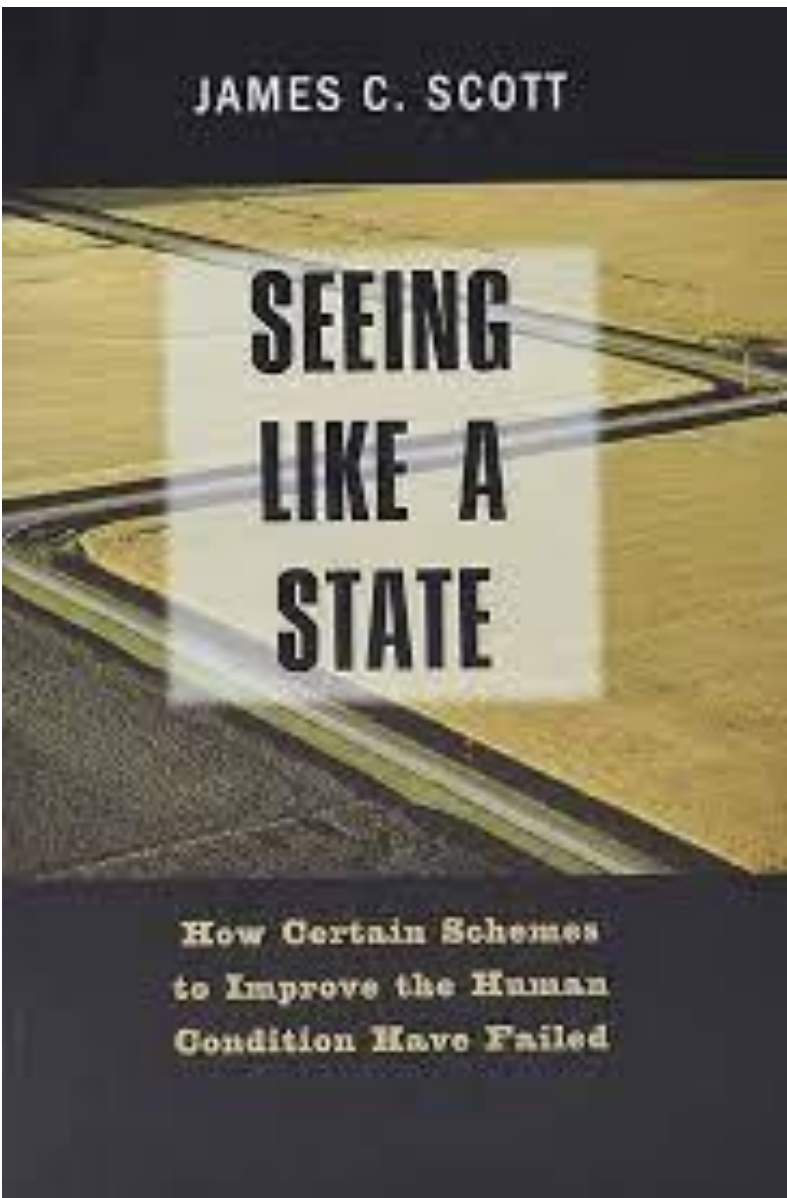
Zahavi, D. (2018). *Phenomenology: the basics*.

Business & metrics



Muller, J. (2018). *The tyranny of metrics*.

Government & society



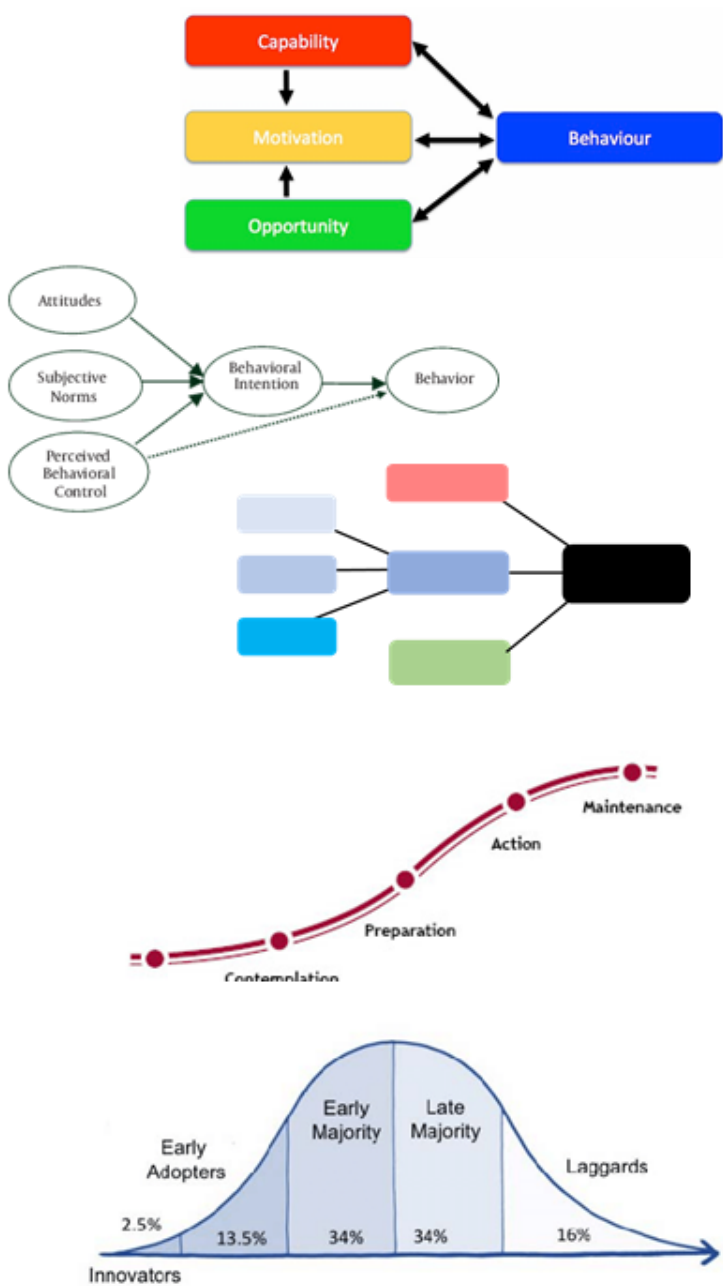
Scott, J. C. (1998). *Seeing like a state: How certain schemes to improve the human condition have failed*.

Technology & society



Centola, D., (2021) *Change: How to make big things happen*

PUTTING HUMANS INTO EQUATION: THEORY, MODELS AND EVIDENCE



Models of behaviour at the individual level

COM-B / TPB / Self-Determination /
Triandis / Health Belief

Models of behaviour at higher levels of scale

ISM / Determinants of Health / NOA /
Hofstede Culture

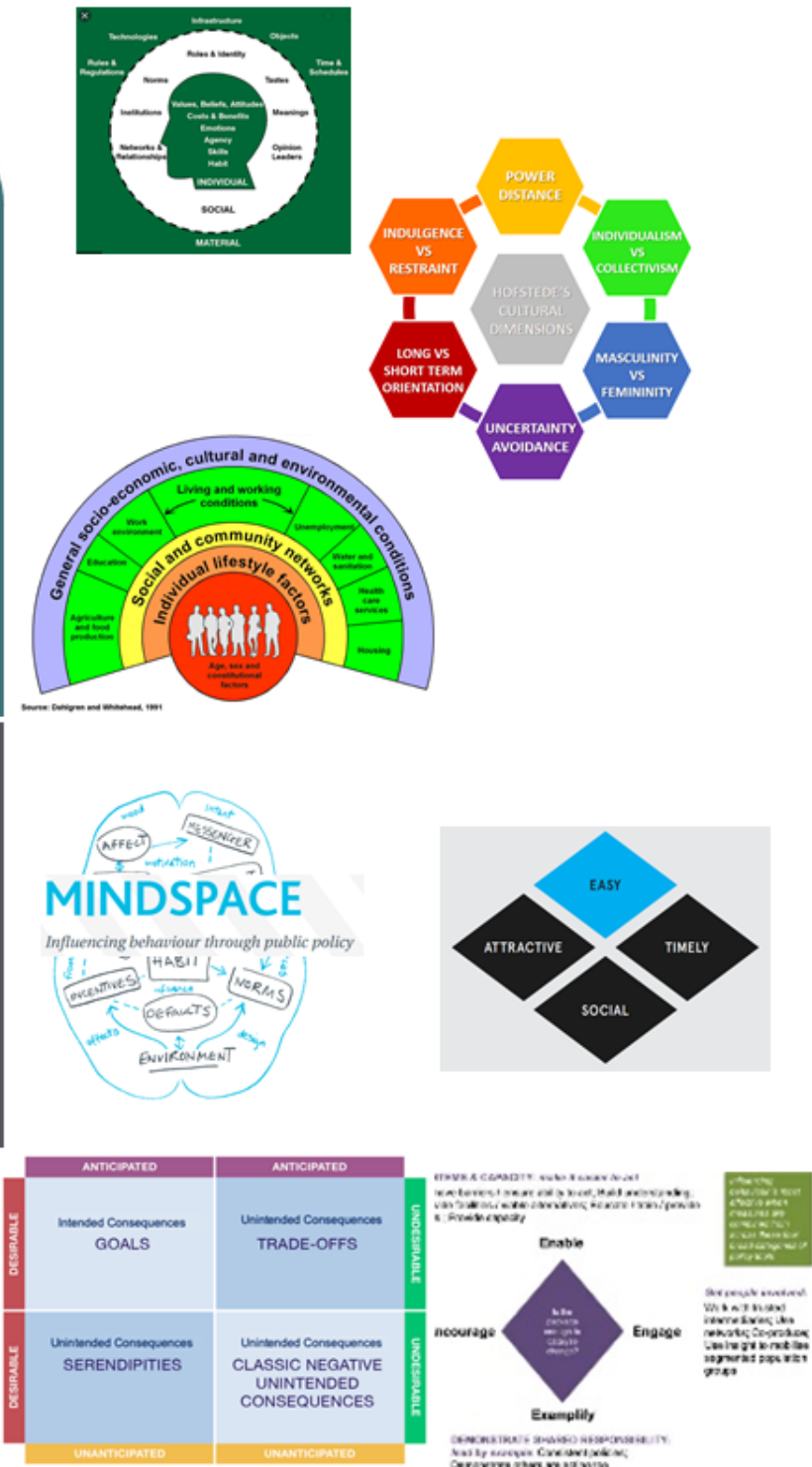
We choose the best fit for the situation

Theories of change over time

TTM (stages of change) / Rogers
Innovation Curve / Systems Thinking

Applied models and frameworks

MINDSPACE / EAST /
Defra 4Es / INCASE



TODAY WE'LL COVER



1. PEOPLE & PERCEPTION

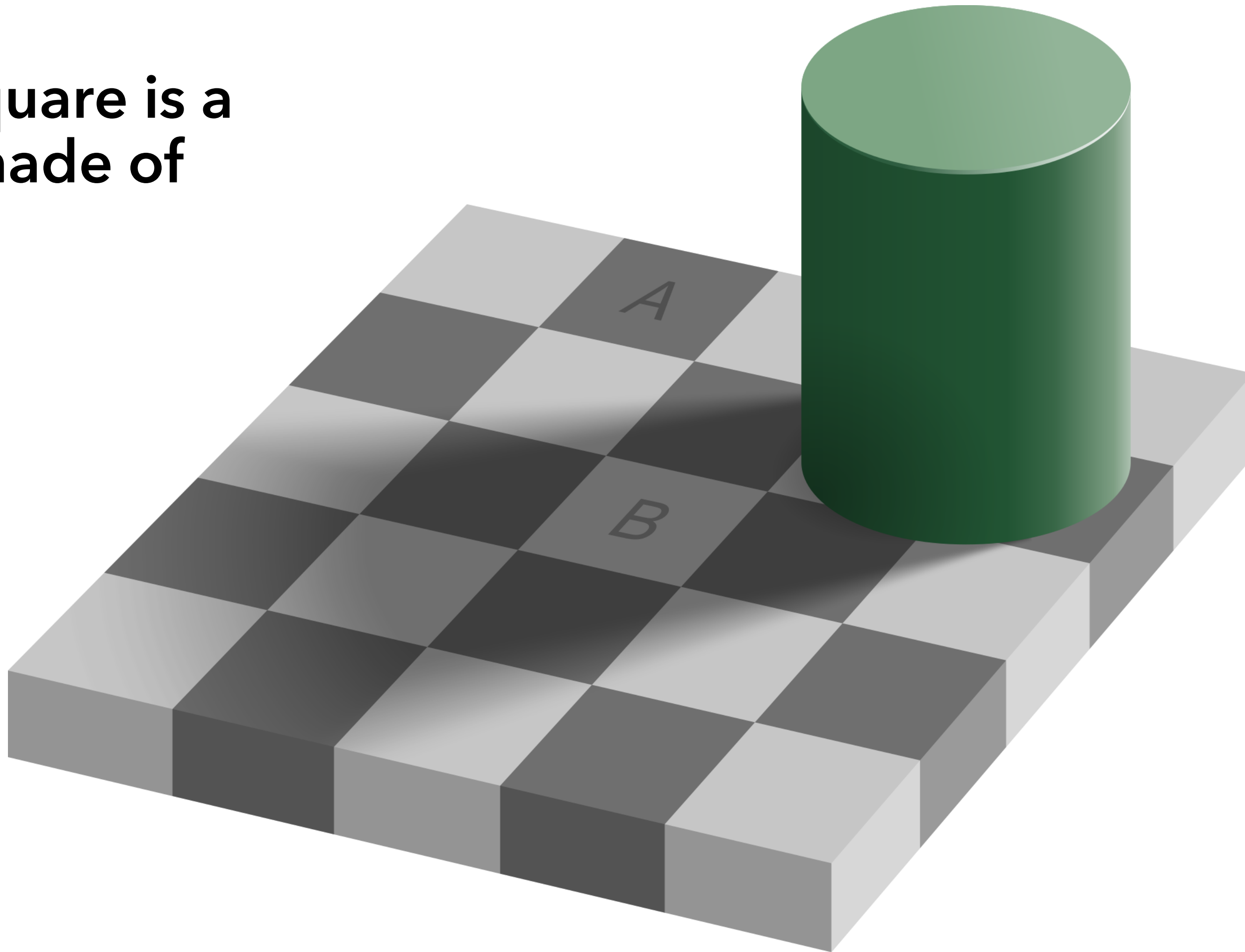


2. SOCIETY & TRANSITIONS

Question 1.

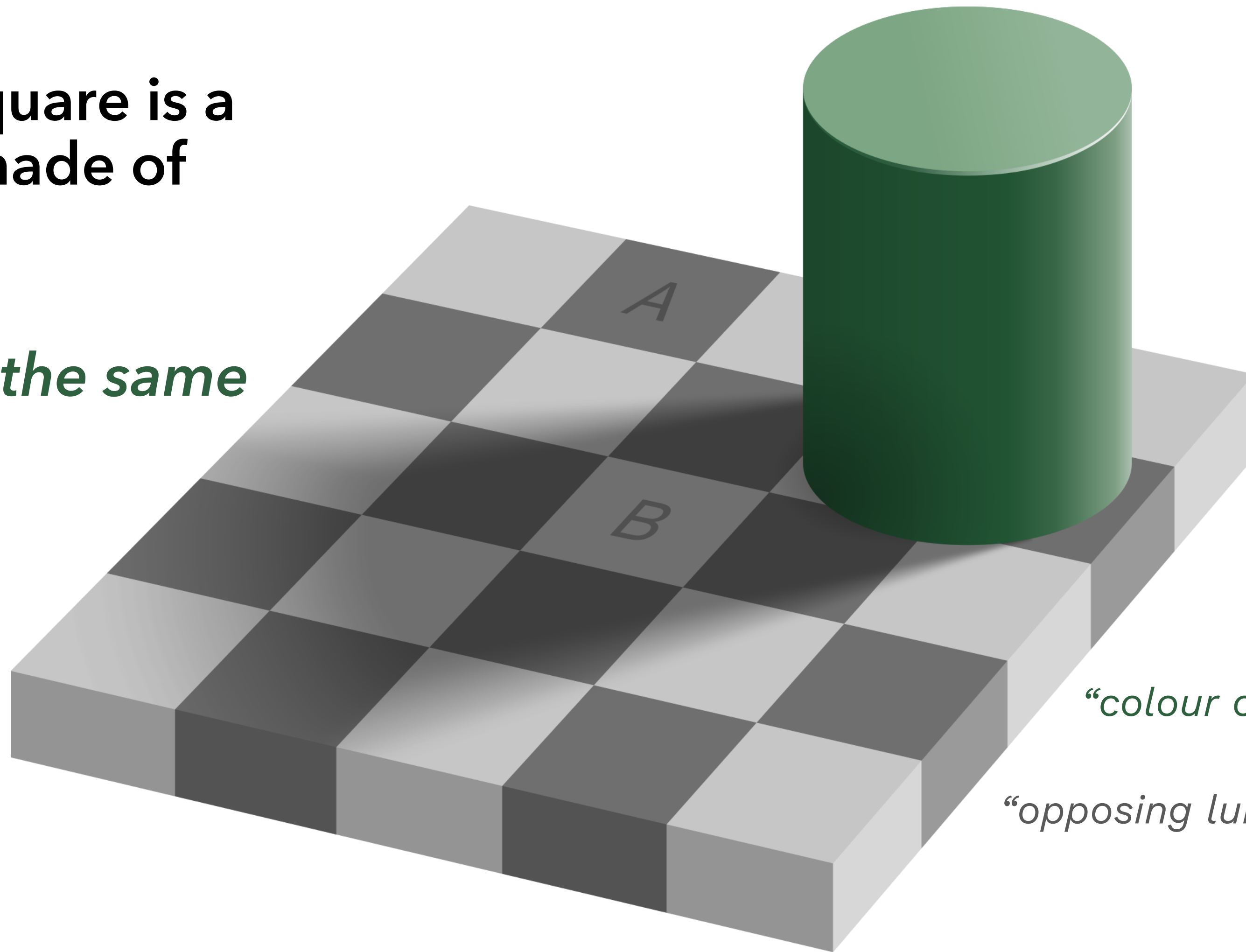
Which square is a
lighter shade of
grey....

A or B?



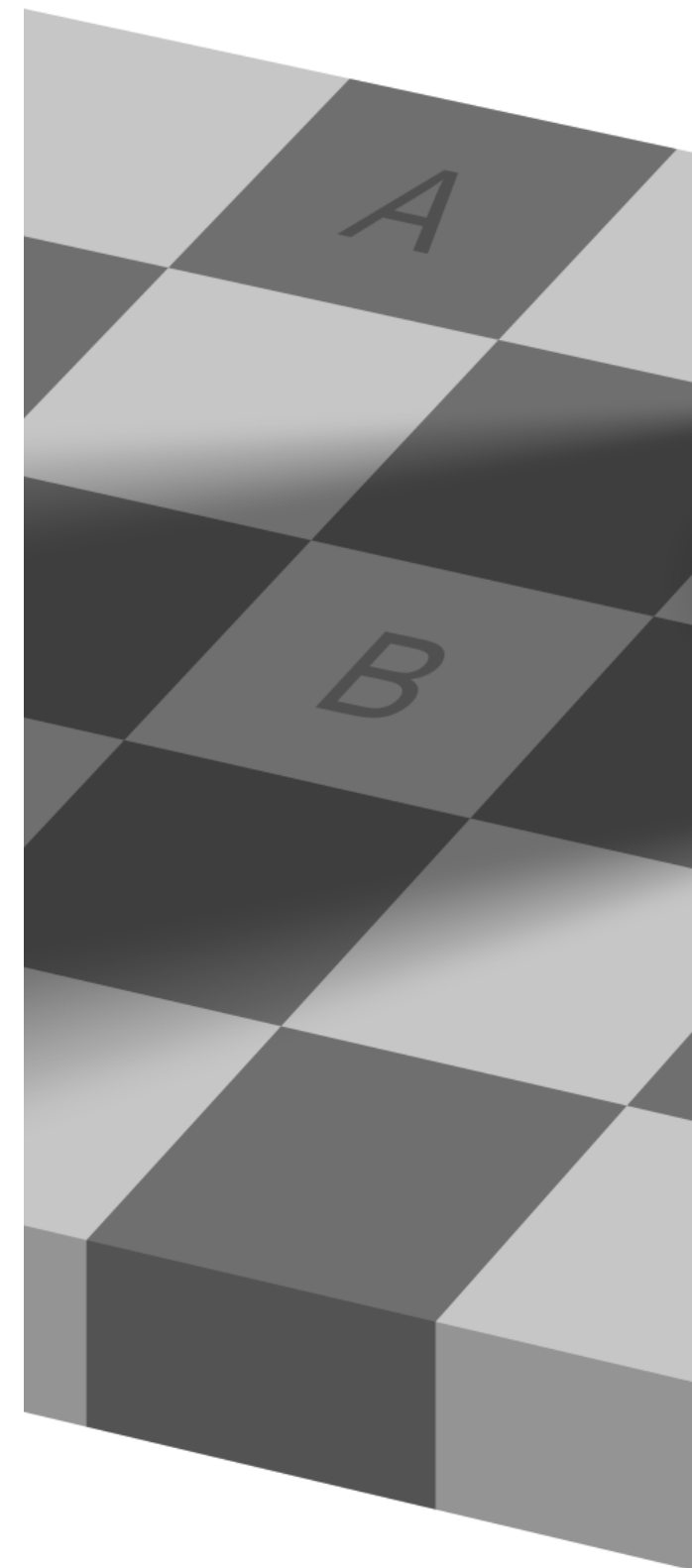
Which square is a
lighter shade of
grey....

They are the same

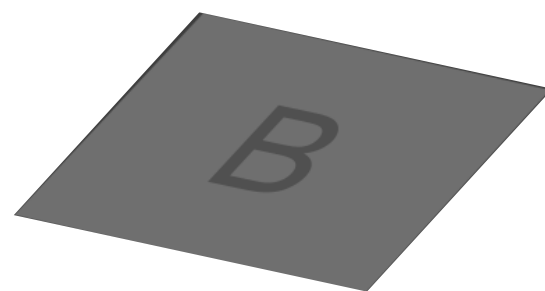
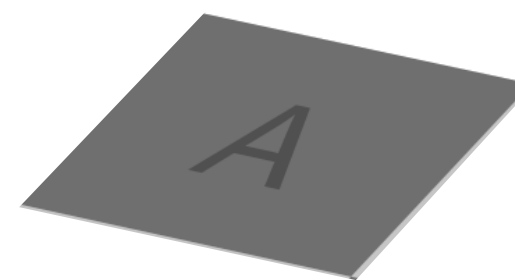


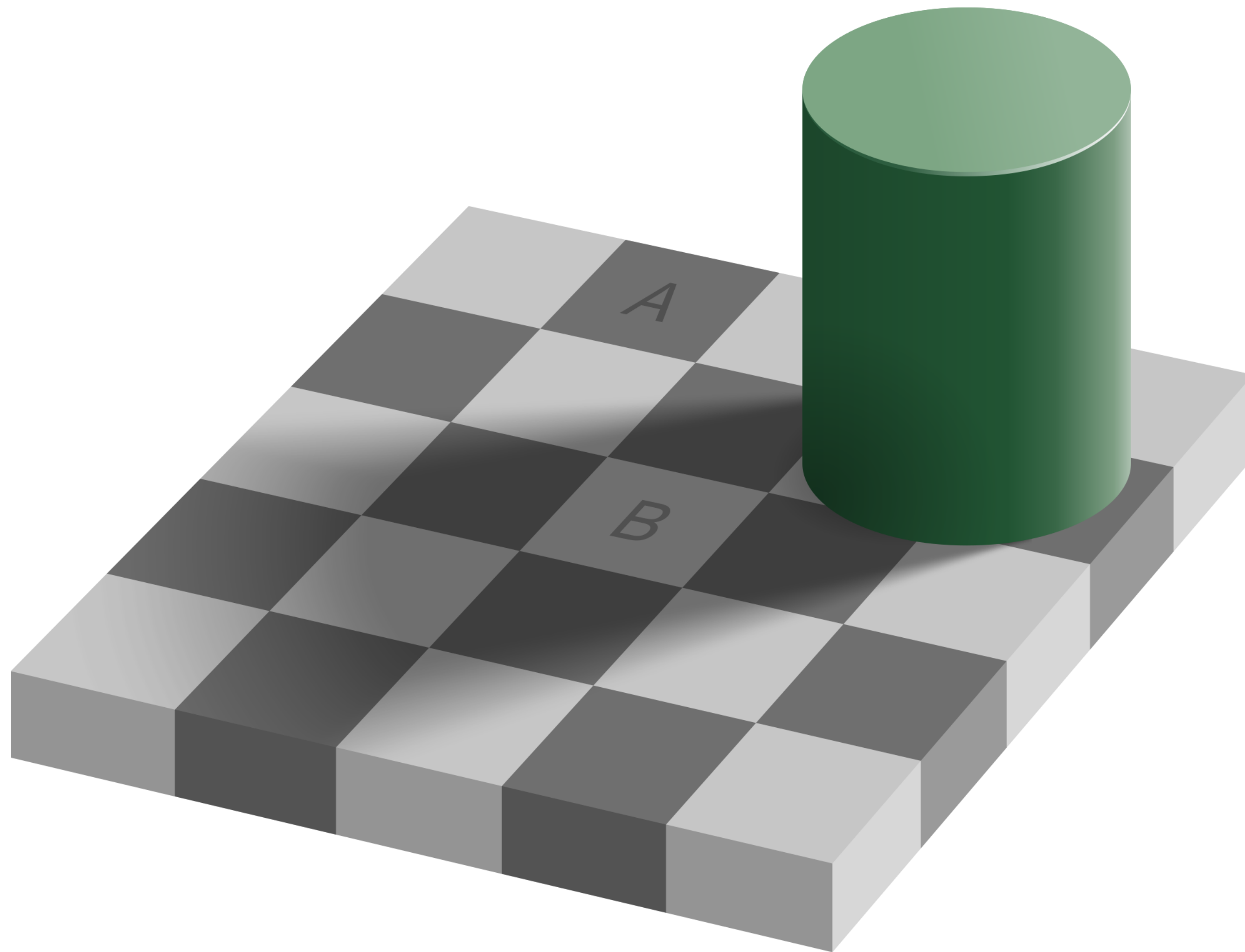
“colour constancy effect”

“opposing luminance gradient”









Adelson, Edward H. (2005). "Checkershadow Illusion". Perceptual Science Group. MIT. Retrieved 2007-04-21.

Question 2.

What is this person saying?





Question 2.

The 'McGurk Effect' - an example of our brain's cross modal processing



McGurk H., MacDonald J. (1976). "Hearing lips and seeing voices". *Nature*. 264 (5588): 746–748.

Question 3.

Which road would you choose?

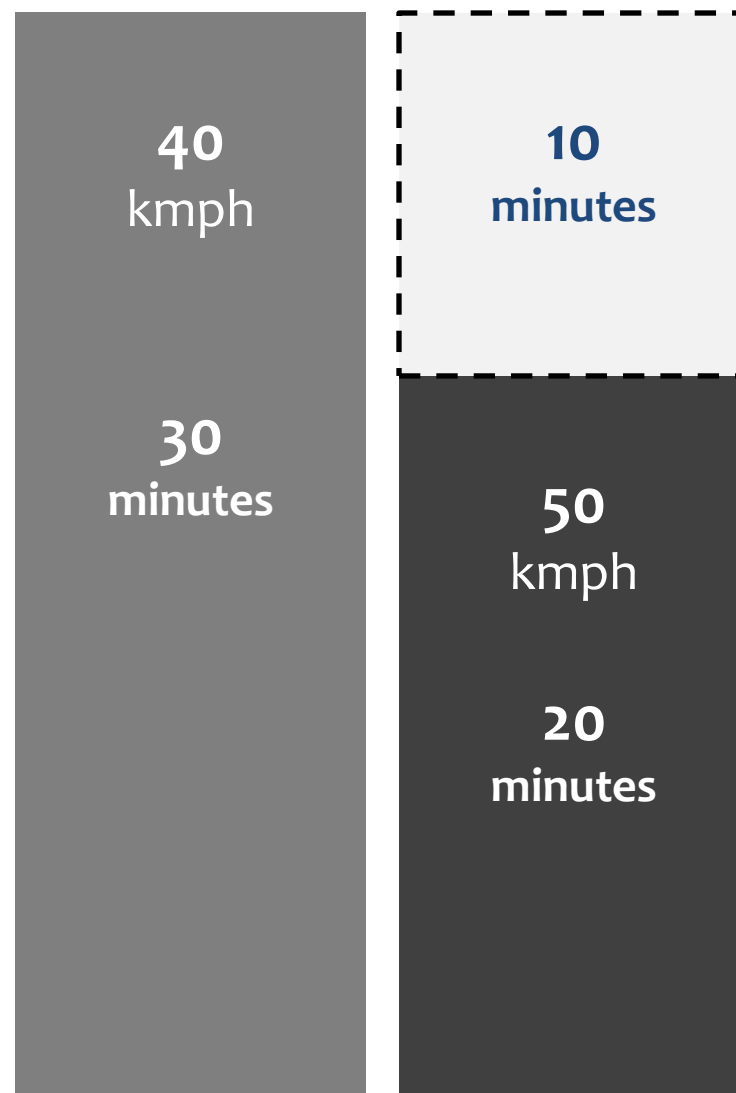
“Imagine a situation in which two road improvement plans are available but where there is only the budget to build one. Both of the proposed roads are the same length – 20 kilometres – and they are being evaluated for their potential to reduce journey times by as much as possible:

- **Road A** increases the average speed from **40kmph to 50kmph** per hour

OR

- **Road B** increases the average speed from **80kmph to 130kmph** per hour

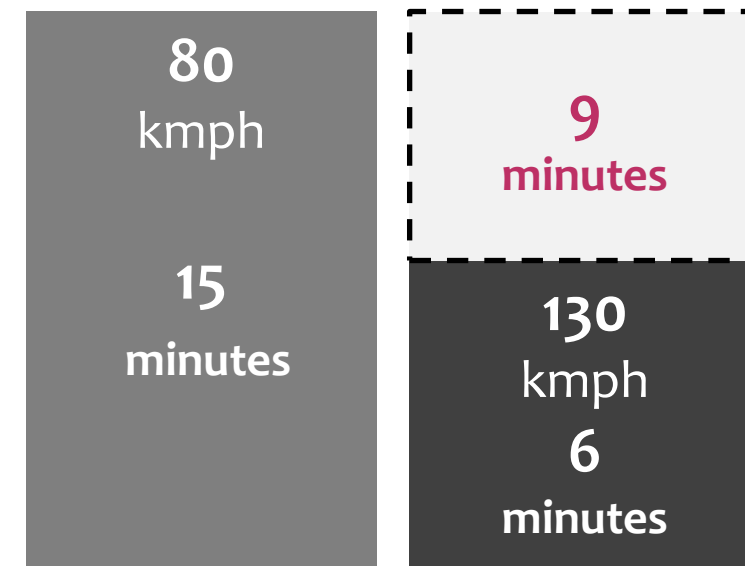
Which would you choose?



Road A

- 10 minutes

+ 50% more energy in aerodynamic drag



Road B

- 9 minutes

+200% more energy in aerodynamic drag

Research finds 80% of people choose Road B.

Road A increases speed by just 25%

Road B increases speed by 60%.

But it is Road A that saves more overall time.

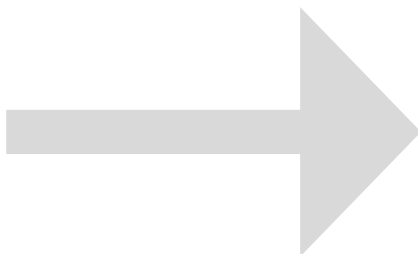
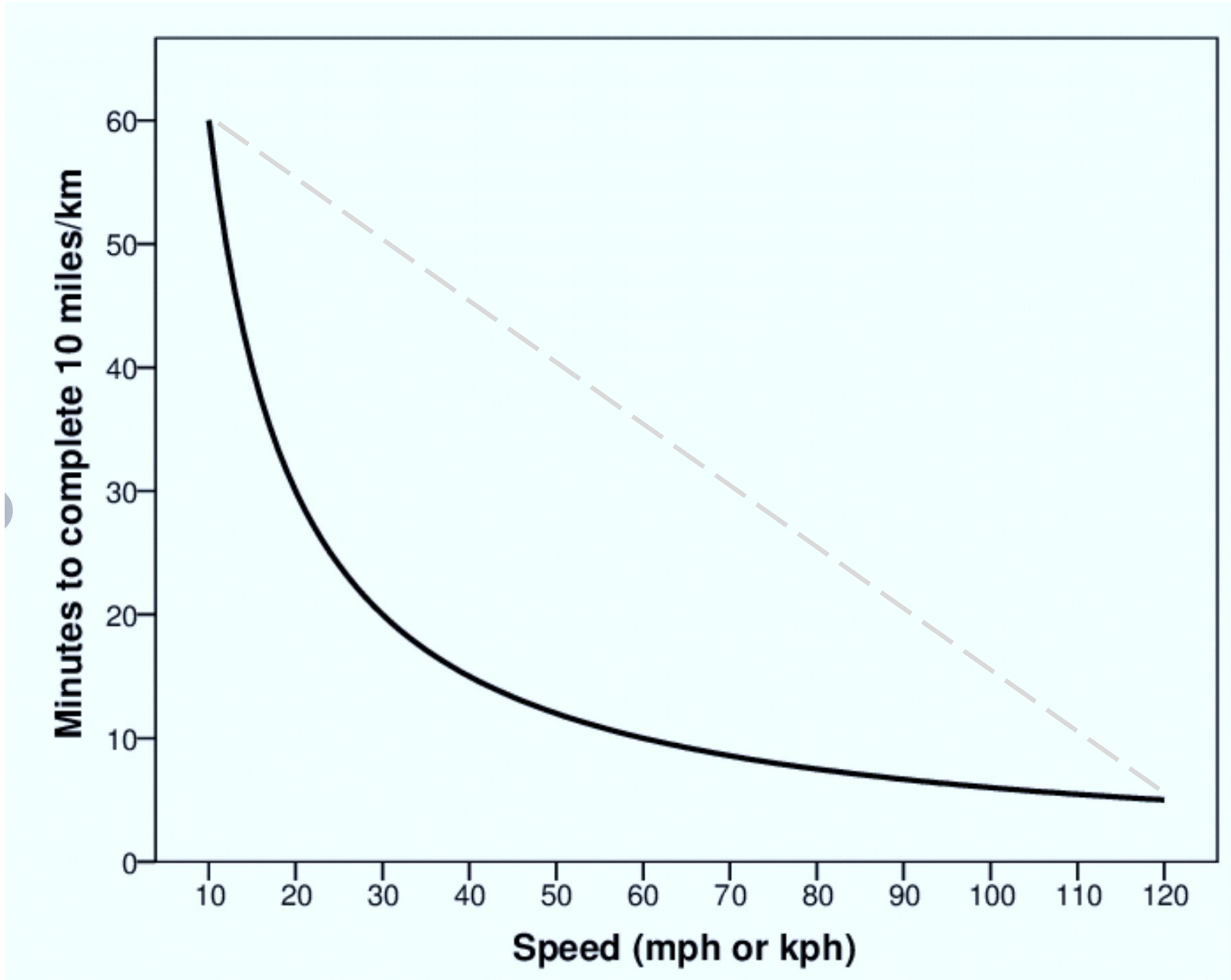
We're tend to Road B because of the

'proportion heuristic': the rule of thumb that time saved is the proportion of the speed increase from the initial speed.

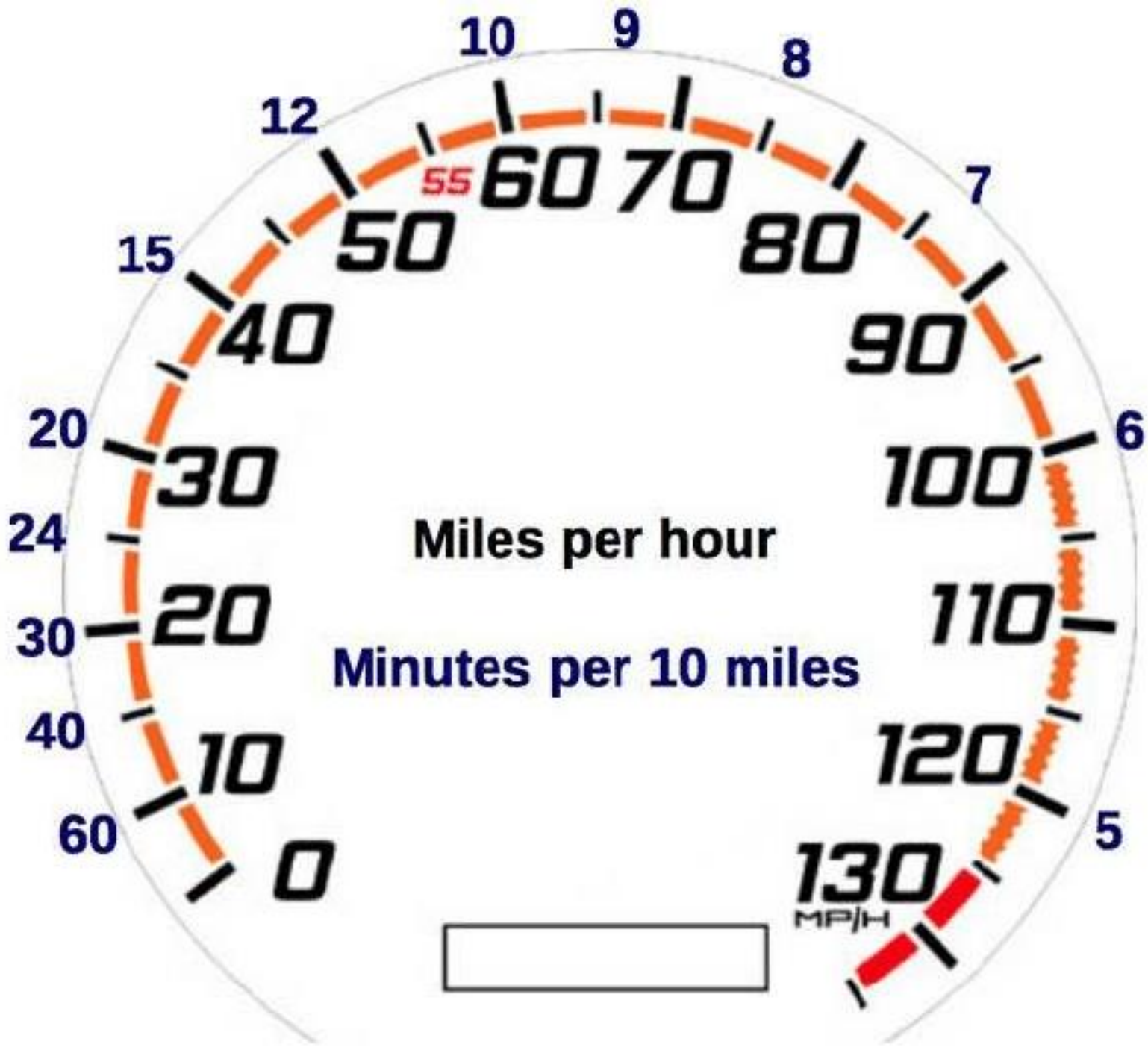
Note: In practice, road capacity (vehicles per minute) remains roughly constant because cars leave bigger gaps at higher speeds and are constrained by bottlenecks formed at entry and exit junctions.

BEHAVIOURAL INSIGHT : The Proportion Heuristic

Our intuition = linear
Our reality = curvilinear



IDEA : The PACEOMETER



Courtesy of Eyal Peer and Eyal Gamliel, 2012.

E. Peer and L. Solomon. 2012. Professionally biased: misestimations of driving speed, journey time and time-savings among taxi and car drivers. *Judgment and Decision Making* 7(2), 165.

WE ARE

HOMO SAPIENS

NOT

HOMO TRANSPORTICUS



Speed / Velocity
/ Pace

Fuel economy
MPG vs GPM
m/kWh vs kWh/m

Braking distances
Increase non-linearly

Fatality and KSIs per
capita / time /
distance travelled

Cost/Benefit
Ratios

Disability
criteria

Discount rates

Reaction times

Blood alcohol
volumes

Light levels
lux vs lumens

Sound and noise
Db on a Log scale

Demographics
Population growth

METRICS
INFLUENCE OUR
THINKING AND
BEHAVIOUR

Speed / Velocity
/ Pace

Fuel economy
MPG vs GPM
m/kWh vs kWh/m

Braking distances
Increase non-linearly

Fatality and KSIs per
capita / time /
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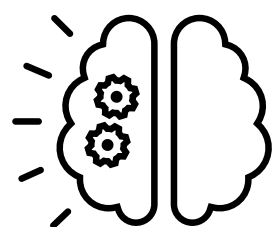
Sound and noise
Db on a Log scale

Demographics
Population growth

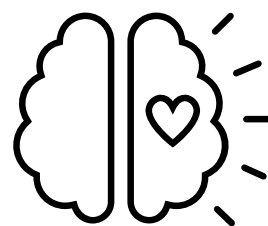
NEW
TECHNOLOGY
MEANS
NEW LANGUAGE

An example solution: New Car Labelling

Providing guidance to car dealerships on how to present clear, coherent and comparable information to prospective buyers.

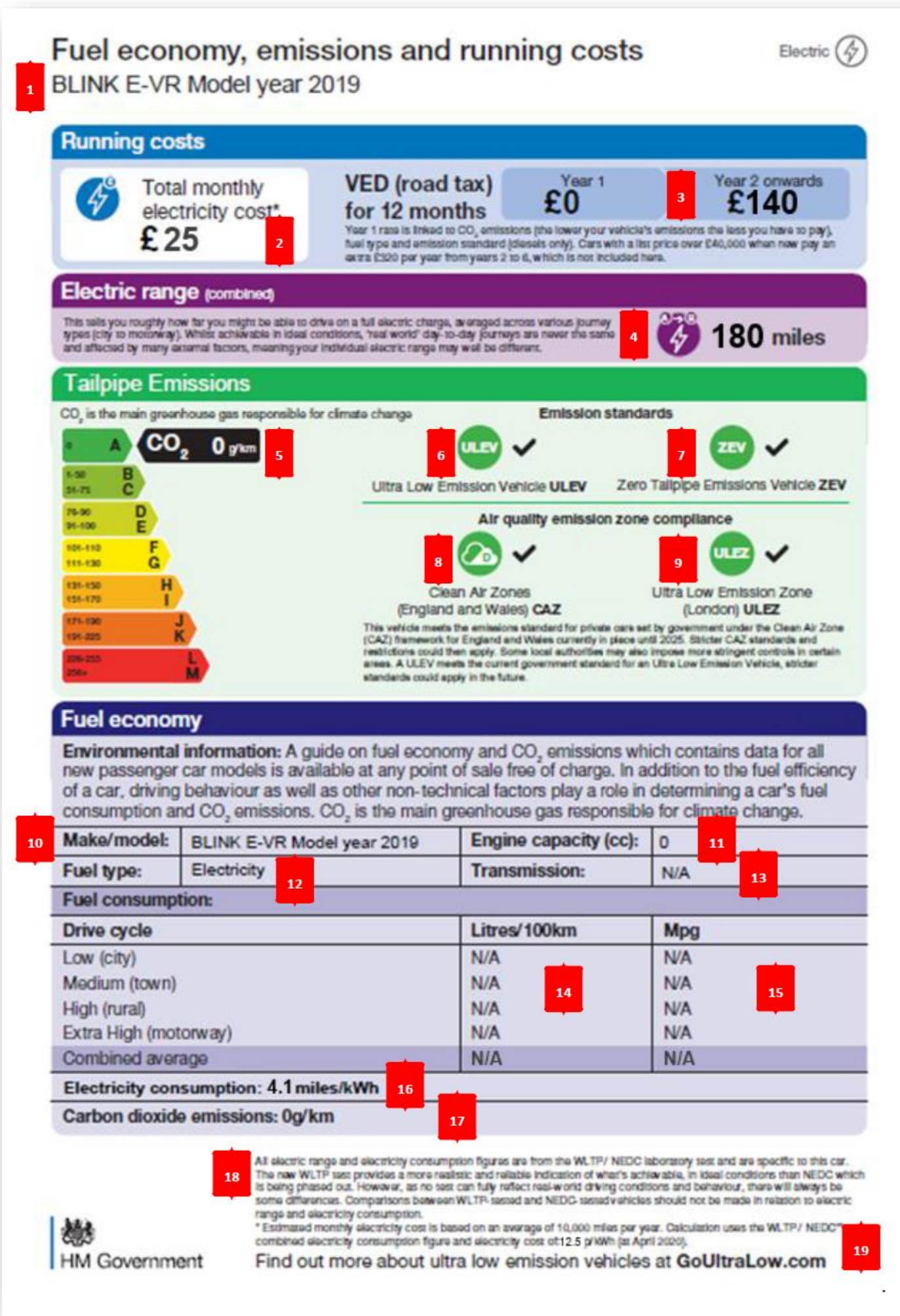



How we like to think: “I’ll weigh up the pros and cons of my new car and get the best one for me”



How we really think: “I’ve seen this brand around. That new battery sounds clean, green and might save me money”

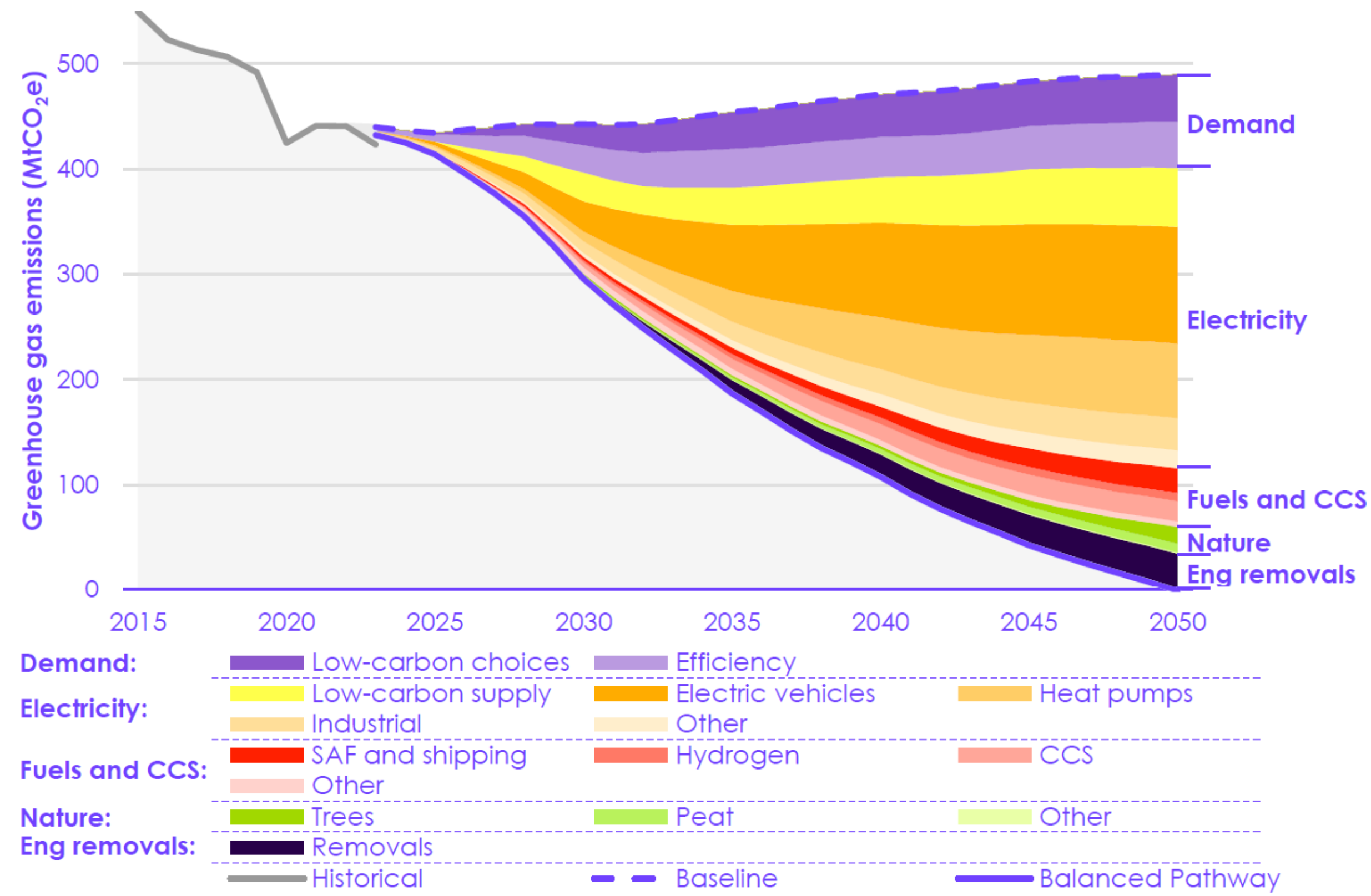
DVSA (March 2023) The Passenger Car (Fuel Consumption and CO2 Emissions Information) Regulations
<https://www.vehicle-certification-agency.gov.uk/publication/vca061-3/>



A photograph of a line of Tesla cars parked on a paved street. The cars are mostly black and white, with a white car in the middle of the line. In the background, there are hills and some trees. The sky is clear and blue. The cars are parked in a row, and the street is wide. The overall scene is bright and sunny.

2. SOCIETY & TRANSITIONS

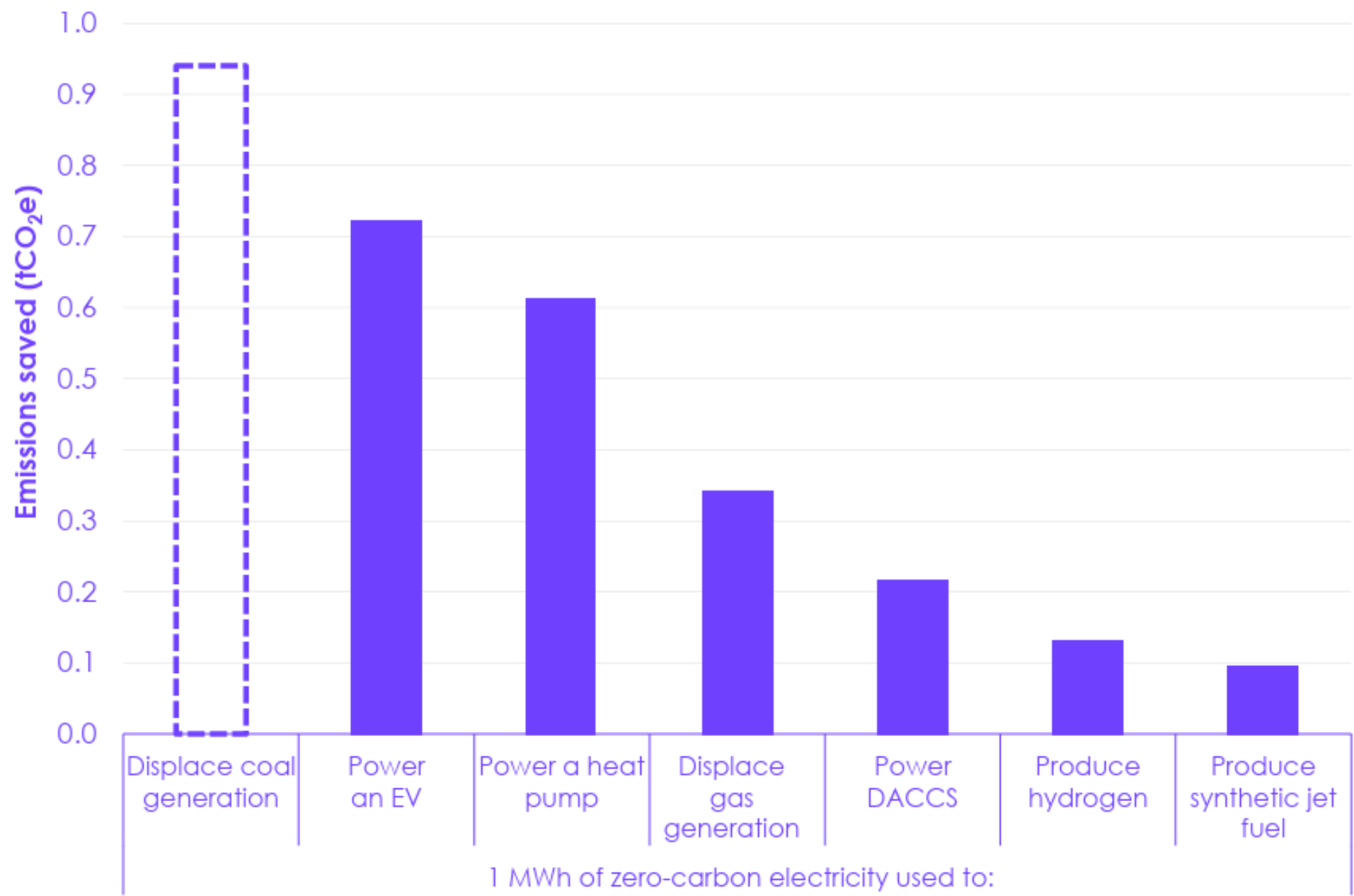
Putting electrification in context



“Electric cars and vans (53% and 19% respectively of surface transport emissions reduction in 2040”, p. 149)

Priorities to electrify

Figure 10.8 Best uses for zero-carbon electricity



Description: Chart shows emission savings from using 1 MWh of zero-carbon electricity, with the highest savings coming from direct electrification uses (for example, in electric vehicles and heat pumps) and the lowest savings for indirect uses (such as converting to hydrogen).
Source: CCC analysis.

Household choices and behaviours

Figure 8.1 Emissions reduction in 2040 that relies on household low-carbon choices

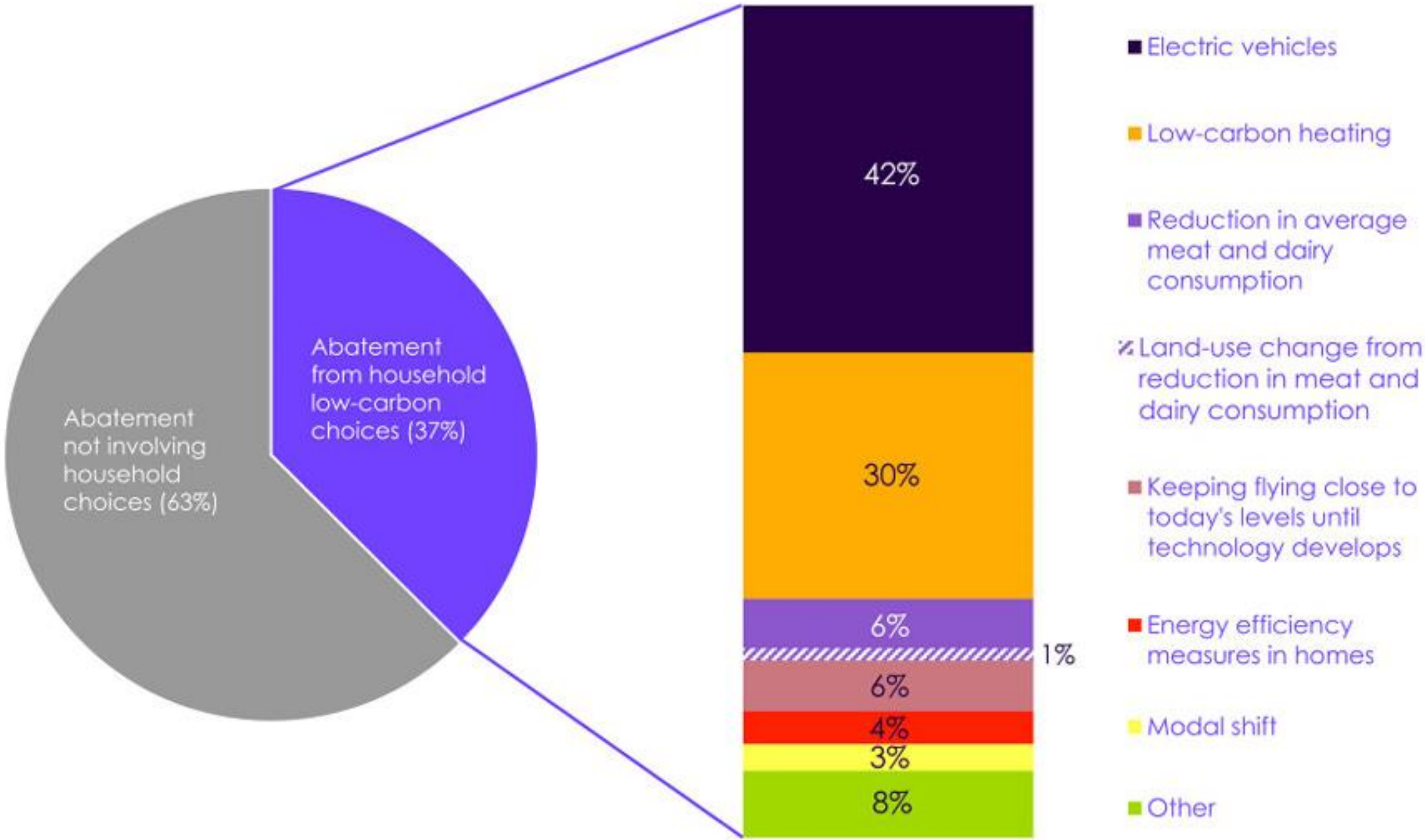
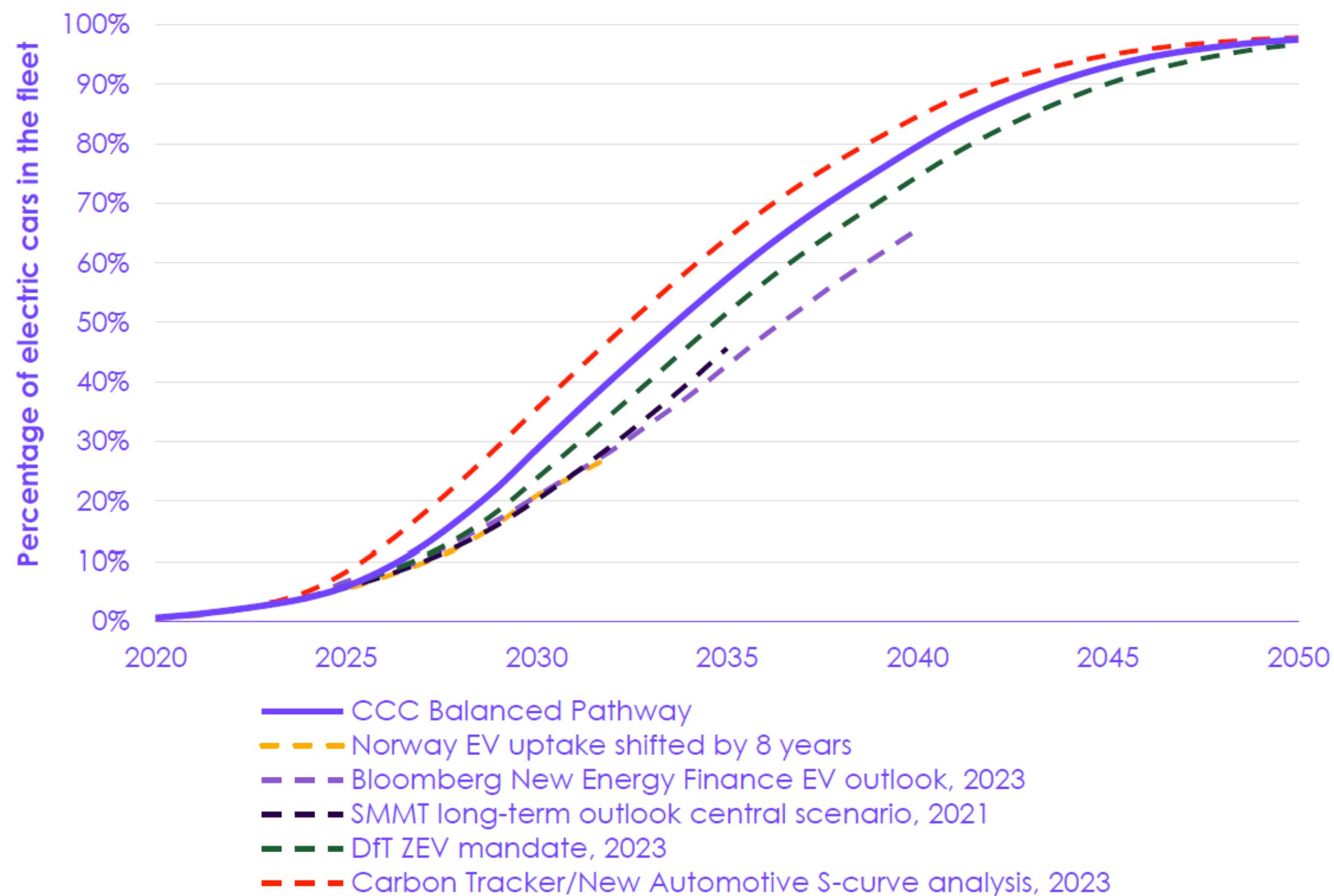


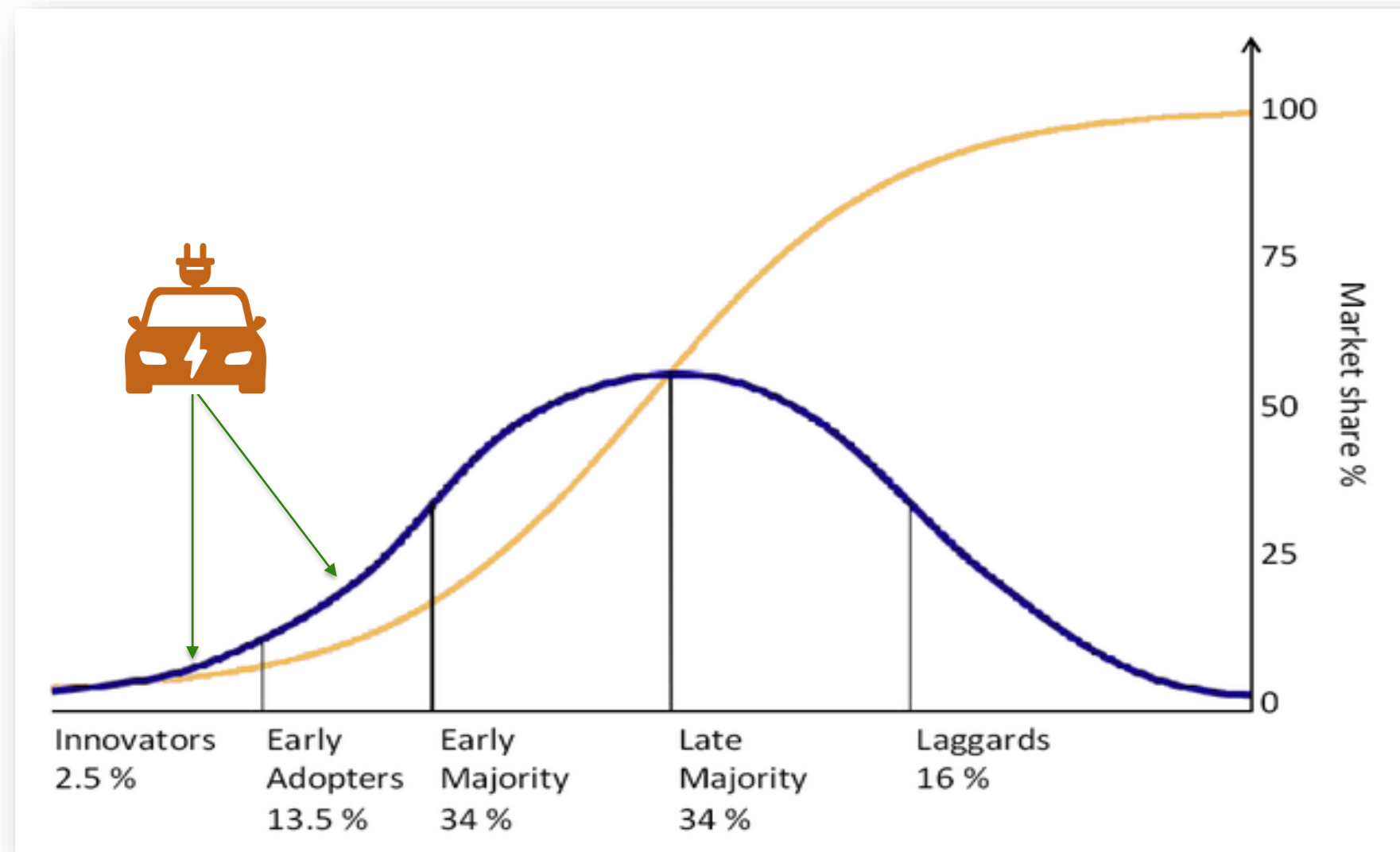
Figure 7.1.3 EV uptake in the Balanced Pathway compared to the ZEV mandate and forecasts from other sources



THEORY IS ALREADY AVAILABLE ON NEW TECHNOLOGY ADOPTION

Innovators or early adopters?

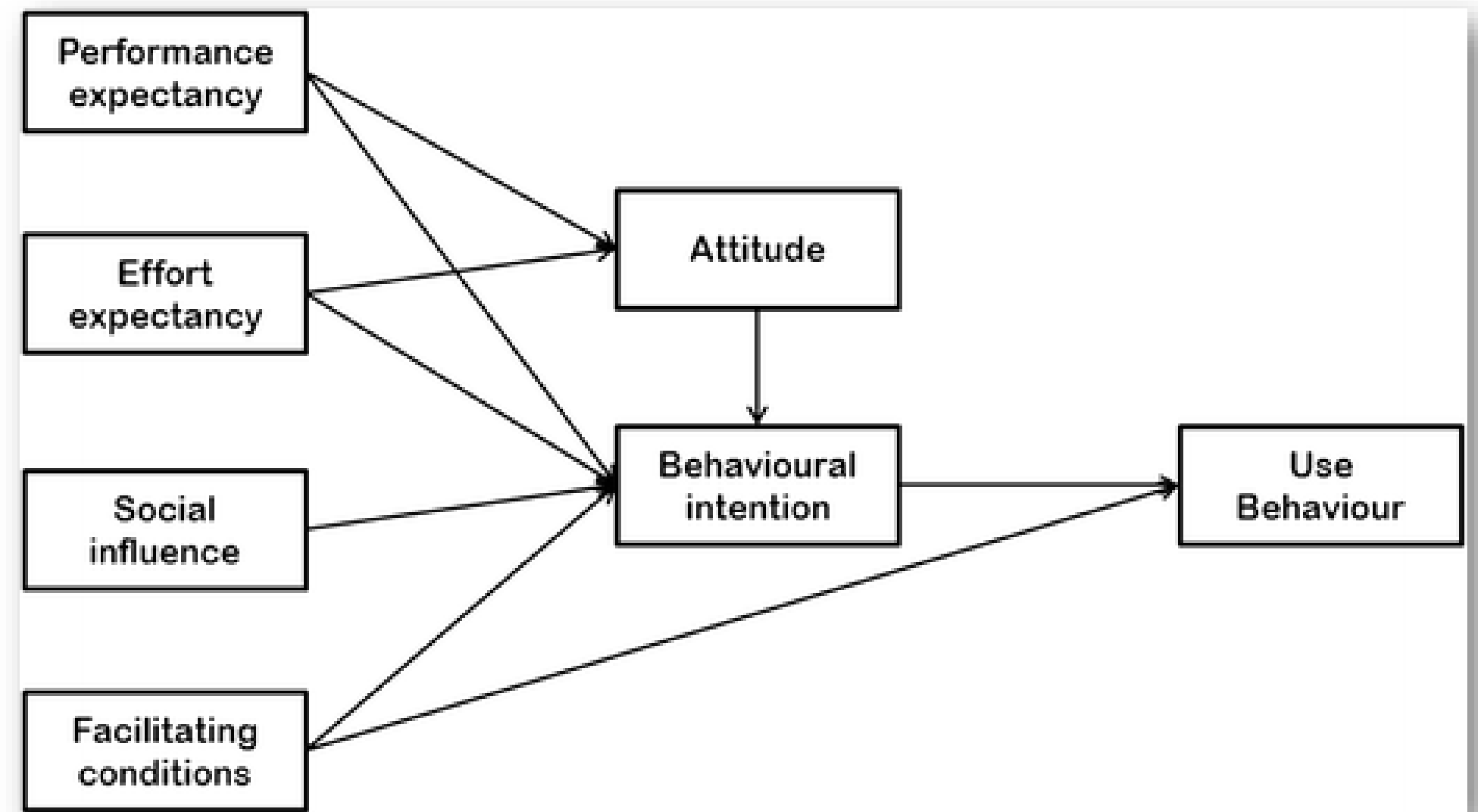
Re-frame objective to reach 'tipping point' faster?"



Rogers' Diffusion of Innovation Theory (1962, 1995)

Going beyond 'technology acceptance'

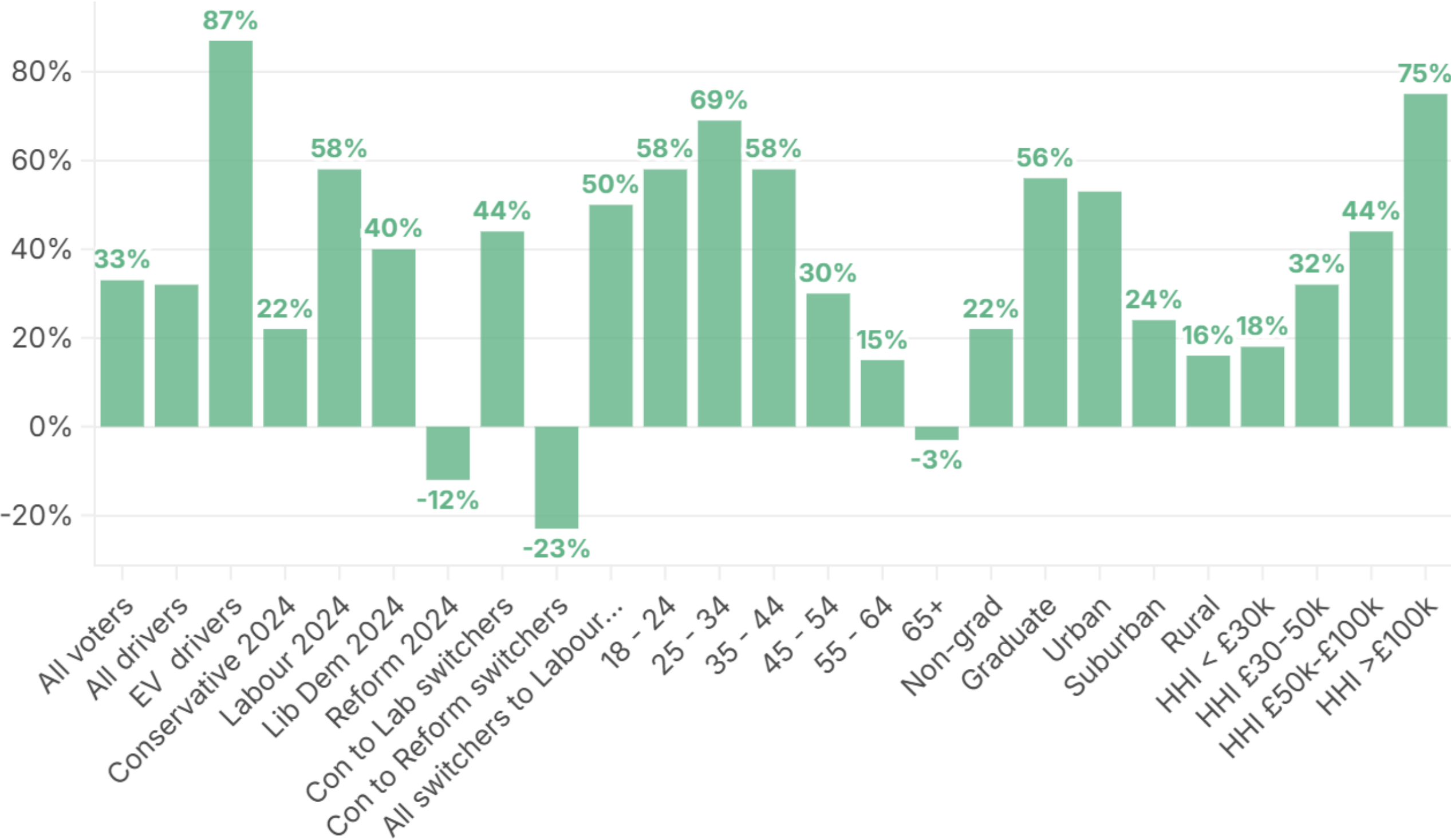
Validated frameworks are more robust



Unified Theory of Acceptance and Use of Technology
UTAUT (Source: Adapted from Venkatesh et al. 2003)

Figure 1: Most voters - and drivers - are positive towards electric vehicles

NET positivity to EVs (all those with a positive view minus all those with a negative view)



Source: FocalData for Persuasion UK/IPPR, 4,000 UK adults, w/c 24th October 2024

Question 4.

When people have renewed their annual **vehicle tax online**, they are presented with a ‘**thank you**’ page.

To understand **what motivated people to find out more about electric vehicles**, behavioural scientists at DfT conducted a **3 month online experiment** (a randomized controlled trial) with **4 million people** to test different messages.

Which of the following 8 messages got the most clicks on the green button?

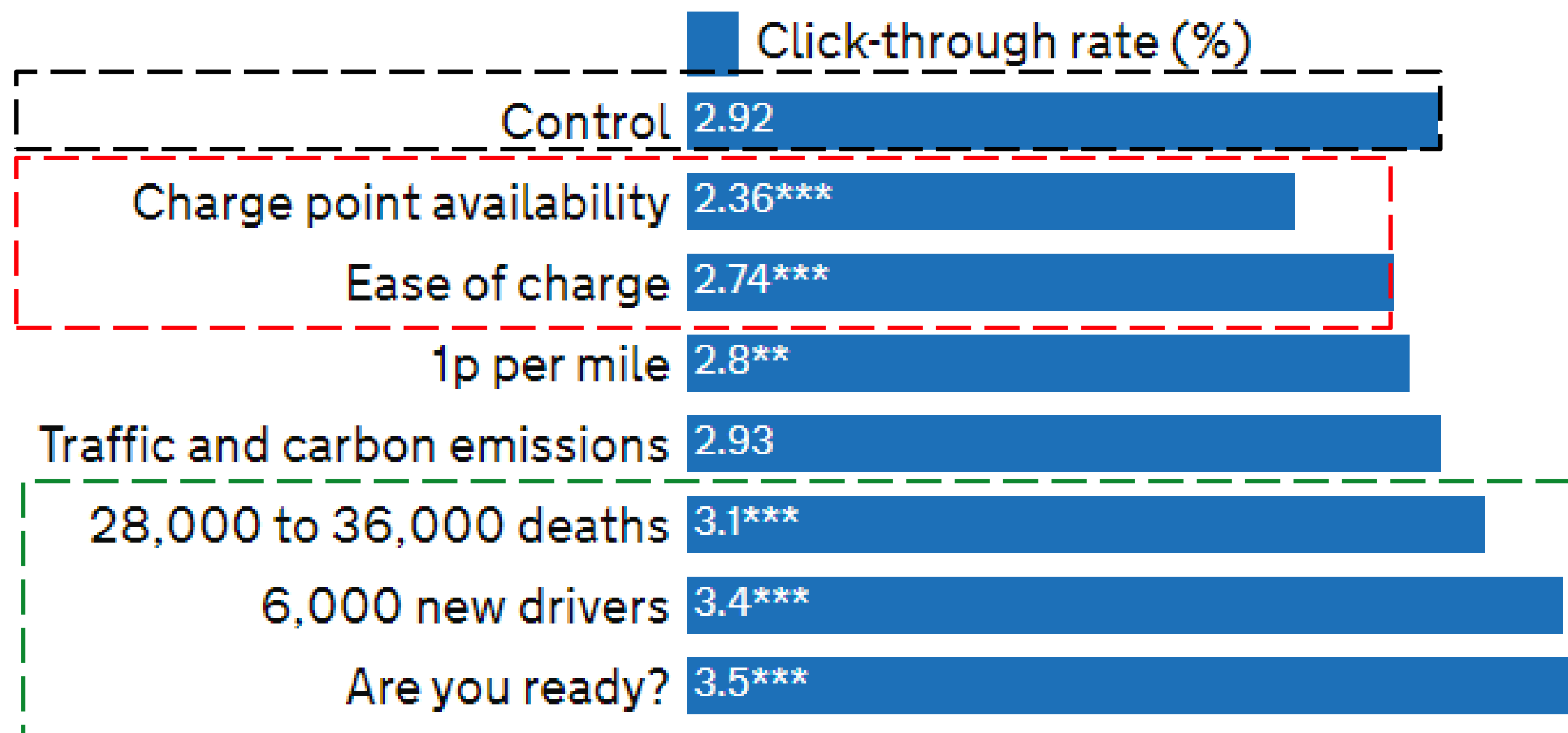


Question 4.

- | | |
|----|---|
| 1. | “ Information is available on electric vehicles.” |
| 2. | “Fully electric vehicles could cost from as little as 1p per mile to run – less than a quarter of the cost of the most fuel-efficient petrol or diesel vehicles” |
| 3. | “ Join the 6,000 new drivers every month who make the switch to an electric vehicle.” |
| 4. | “Road traffic is the biggest single contributor to carbon emissions in the UK. What you drive makes a difference.” |
| 5. | “Between 28,000 and 36,000 people die every year as a result of air pollution. What you drive makes a difference.” |
| 6. | “The Government are consulting on ending the sale of new petrol, diesel and hybrid cars and vans by 2035 or earlier. Are you ready?” |
| 7. | “Charging your electric vehicle at home can be as easy as charging your phone overnight.” |
| 8. | “ Rapid charge points for electric vehicles are available at almost all motorway service stations in the UK.” |

Make your next car electric: a behavioural science messaging trial

Published 1 February 2021



Finding broadly replicated in a message testing experiment in January 2025

| Change in attitude | Anti message only | Pro: Climate | Pro: Energy independence | Pro: Consumer benefit | Pro: Social norming | Pro: Pollution | Pro: Jobs/China |
|---|-------------------|--------------|--------------------------|-----------------------|---------------------|----------------|-----------------|
| Change in positivity to EVs (net) | -8.0% | +5.5% | -3.7% | -6.2% | +6.0% | -0.7% | -1.6% |
| Change in support for 2030 phase out policy (net) | -6.7% | +9.2% | +11.0% | +2.5% | +13.5% | +7.4% | +3.7% |
| Change in belief that 'EVs good for enviroment' vs bad (net) | -6.2% | +5.9% | -4.0% | +0.4% | +8.6% | +5.4% | -0.6% |
| Change in belief that 'EVs are affordable' vs unaffordable (net) | +3.1% | +3.4% | +3.9% | +8.3% | +5.3% | +3.4% | +5.9% |
| Change in belief that 'Evs are practical for people like me' vs impractical (net) | -1.2% | +5.9% | +2.6% | +5.4% | +5.8% | -0.6% | +2.1% |
| Change in belief that 'EVs are for everyone' vs just the elite (net) | -8.7% | ±0.0% | +2.9% | +2.4% | +7.2% | -5.4% | -5.2% |
| Increase in willingness to buy an EV (>5/10 willing) (just drivers in market for new car) | -2.1% | +2.5% | +3.5% | -1.2% | +2.1% | +0.4% | -2.3% |

Persuasion UK/IPPR, via YouGov December 2024/January 2025. Split over two experiments, 8,900 UK adults, c. 1,100 people per condition weighted on age, gender,

Peer influence on household energy behaviours

Kimberly S. Wolske¹, Kenneth T. Gillingham^{2*} and P. Wesley Schultz³

Studies across multiple disciplines demonstrate the importance of peers in shaping energy-related behaviours. Research on this process is wide ranging, from documenting spatial peer effects in the adoption of rooftop solar—when an individual's behaviour is influenced by the behaviours of neighbours—to showing how neighbour comparisons can be used to reduce household electricity consumption. However, gaps exist in our understanding of how and why these peer effects occur. In this Review, we examine recent findings on social influence in energy behaviour and discuss pathways through which social influence can result in peer effects. We propose a conceptual framework for predicting which social influence processes will most often result in peer effects, depending on the targeted energy behaviour. We also review the limitations of social influence as well as evidence for when it is expected to be the strongest.

In developed countries, households are significant energy consumers, accounting for approximately 40% of country-level greenhouse gas emissions through their home energy use and transportation behaviours¹. A growing focus in energy research is on understanding consumer choices around energy and in developing intervention strategies to promote shifts toward a more sustainable energy future^{2,3}. Examples of these desired changes include buying more energy efficient technologies, such as for lighting or transportation⁴; purchasing or generating energy from renewable energy sources, such as wind power or solar photovoltaics (PV)⁵; reducing consumption, either overall or at selected time periods when demand for energy is high^{6,7}; and shifting patterns of consumption to match time periods when energy can be generated

Peer effects

'Peer effects', as it is widely known in the economics, marketing and diffusion of innovations literatures, is an umbrella term that refers to when the attitudes, values or behaviours of an individual are influenced by the behaviours of members within a peer group¹³. In the energy context, nearly all of the peer effects research examines how peer behaviour affects individual behaviour, and accordingly, we focus on behaviour in this review. Peer effects are useful to study because they can imply a contagion effect, whereby pro-social decisions by members of a group exert an influence on the subsequent behaviours of others, thereby amplifying the positive effects (although negative peer effects that slow down diffusion could be possible, too¹⁴). A key distinction between peer effects and



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(a) Observable

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(b) Anonymous

From 'range anxiety' to 'charge-point anxiety'



**Keeping perception in line with reality.
Making the unfamiliar feel normal or special?**





Summing up...

- > **Think psychologically** when measuring and communicating new technologies
- > Where needed, **adapt and create new metrics**. And help people use them.
- > Research how technology is **understood by industry, government and people**
- > **Create and support** social/public policies to improve technology adoption
- > **Contribute to regulation and legislation** that supports conditions for innovation and socially sustainable technology standards
- > Never forget, those **two squares** really are the same shade of grey

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Pete Dyson
University of Bath

pd608@bath.ac.uk

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