



Carbon Aware Travel Choice



Information on Transport Alternatives – How to make it effective through 'Choice Architecture'

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University of the
West of England



CATCH: Purpose



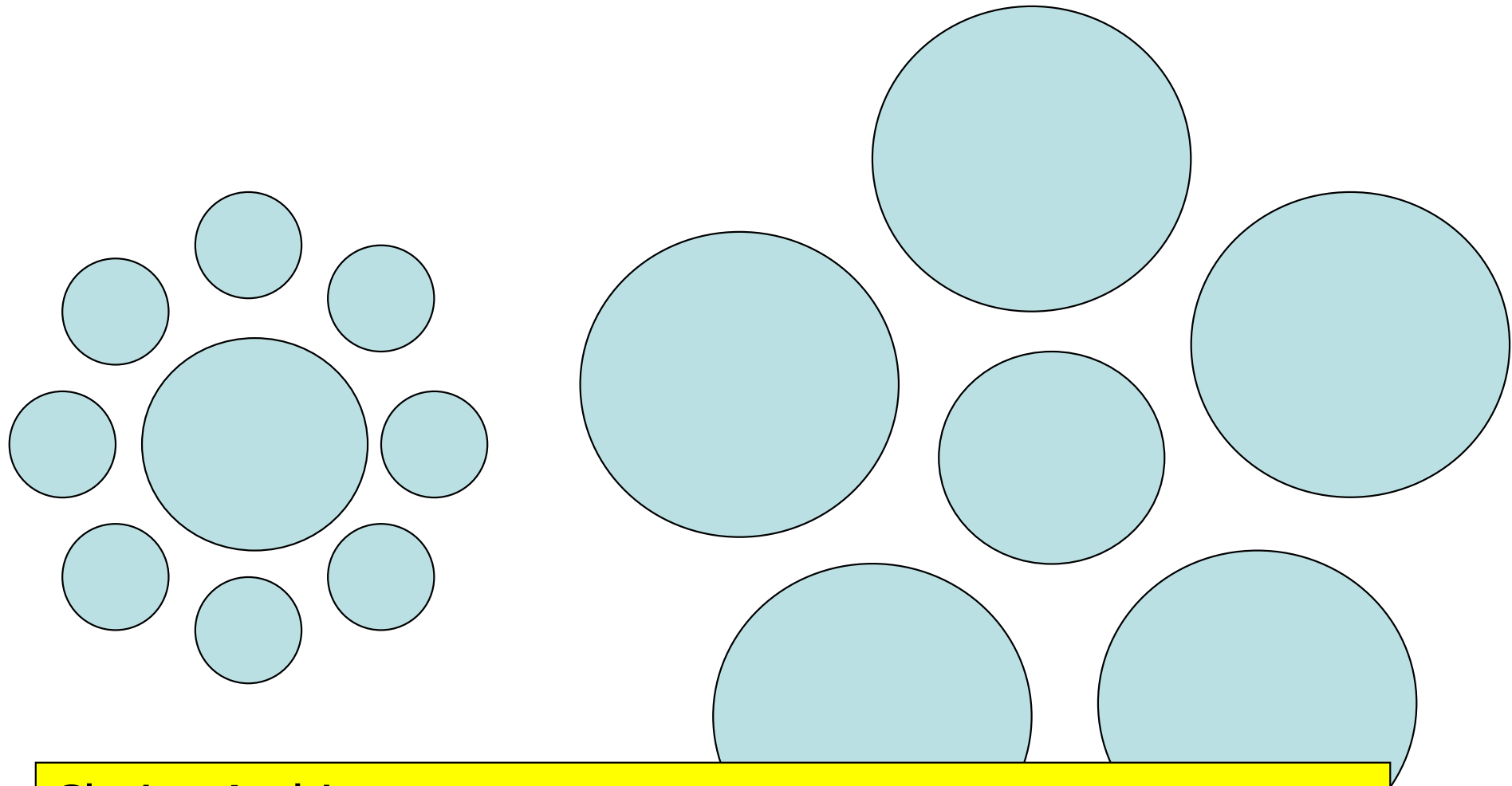
- Developing a knowledge platform for stakeholders to reduce CO₂ produced through transport.
- Focus is on changing travel behaviour to more environmentally responsible.

Grounding, guidance and evaluation of the CATCH information platform



- Report 1: “Behavioural Inception Report” - Desk Study, Literature Review
- Report 2: “Research and Design Guidance” Empirical stage - interviews, focus group, surveys/experiments
- Input to the design of the information platform
- Academic dissemination
- www.carbonaware.eu

Our decisions are influenced by the context of the problem, not just by the content (information)

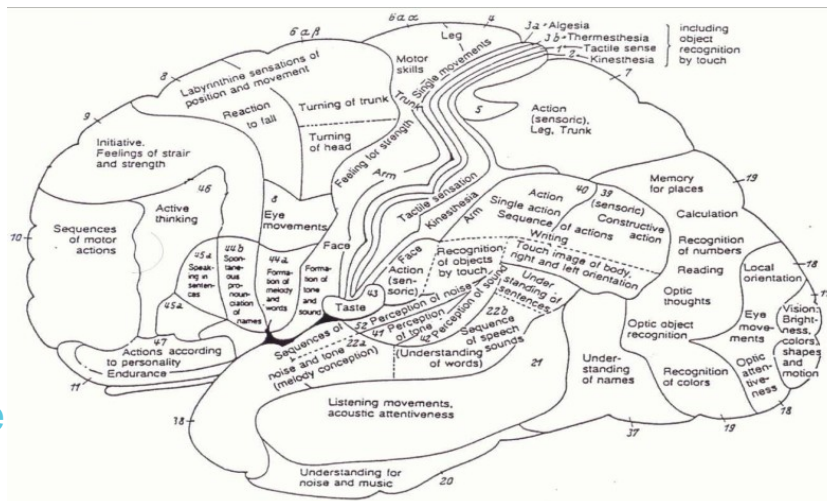


Choice Architecture

A nudge is any small feature in the environment that attracts our attention and alter our behaviour

≡ Modularity of the Mind

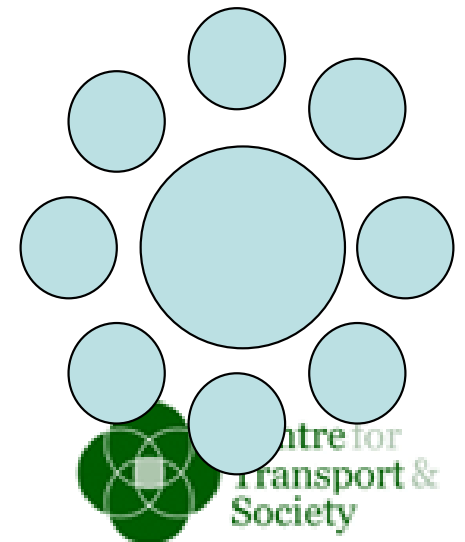
- **Modularity** - The mind is composed of an array of interacting, specialized subsystems with limited flows of intercommunication
- Automatic System vs. Reflective System
- Optical illusions cannot be "turned off" even when they are known to be illusions



Fodor, J.A. (1983). *Modularity of Mind: An Essay on Faculty Psychology*. Cambridge, Mass.: MIT Press.



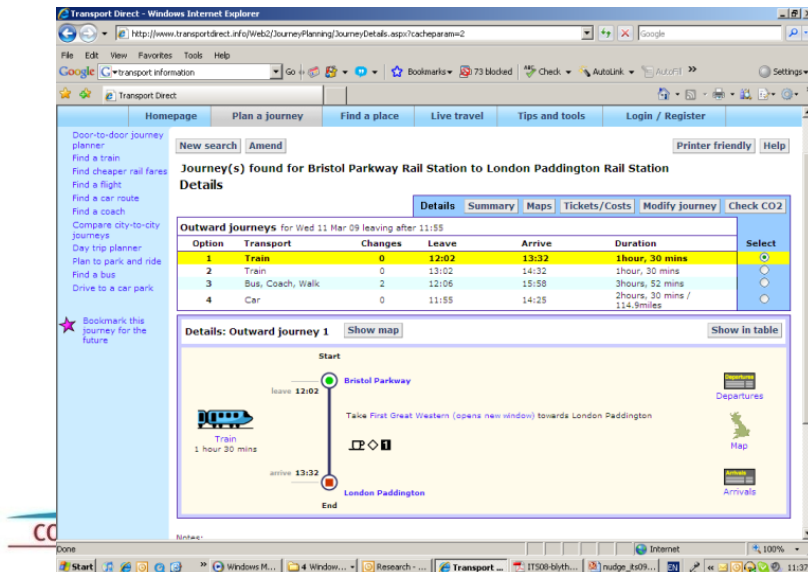
- **Content** of information will be processed by the **reflective system**
- **Context** of information will be processed by the **automatic system**



Travel information utopia



- Individuals provided with travel information can make more fully informed choices which will be to their personal advantage and potentially that of the transport system as a whole.



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☰ Too much information?



Nutrition Facts

Serving Size 1 Pack (40g)
Servings per Container 14

Amount Per Serving

Calories 160 **Calories from Fat** 27

% Daily Value*

Total Fat 3g 4.6%

Saturated Fat 0g 0%

Trans Fat 0g 0%

Cholesterol 0mg 0%

Sodium 100mg 4.2%

Total Carbohydrate 32g 10.7%

Dietary Fiber 5g 20%

Sugars 2g

Protein 4g

Vitamin A 8%

Vitamin C 17%

Calcium 6%

Iron 7%

*Percent Daily Value are based on a 2000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories	2,000	2,500
Total Fat	Less Than	65g	80g
Sat. Fat	Less Than	20g	25g
Cholesterol	Less Than	300mg	300mg
Sodium	Less Than	2,400mg	2,400mg
Total Carb.		300g	375g
Dietary Fiber		25g	30g

Nutrition Facts

Serving Size 1 Pack (40g)
Servings per Container 14

Amount Per Serving

Calories 155 **Calories from Fat** 23

% Daily Value*

Total Fat 2.5g 3.8%

Saturated Fat 0g 0%

Trans Fat 0g 0%

Cholesterol 0mg 0%

Sodium 100mg 4.2%

Total Carbohydrate 32g 10.7%

Dietary Fiber 6g 24%

Sugars 2g

Protein 4g

Vitamin A 7%

Vitamin C 15%

Calcium 6%

Iron 6%

*Percent Daily Value are based on a 2000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories	2,000	2,500
Total Fat	Less Than	65g	80g
Sat. Fat	Less Than	20g	25g
Cholesterol	Less Than	300mg	300mg
Sodium	Less Than	2,400mg	2,400mg
Total Carb.		300g	375g
Dietary Fiber		25g	30g

Nutrition Facts

Serving Size 1 Pack (10g)
Servings per Container 14

Amount Per Serving

Calories 40 **Calories from Fat** 14

% Daily Value*

Total Fat 1.5g 2.3%

Saturated Fat 0g 0%

Trans Fat 0g 0%

Cholesterol 0mg 0%

Sodium 6mg 0.3%

Total Carbohydrate 4g 1.3%

Dietary Fiber 2g 8%

Sugars 0g

Protein 4g

Vitamin A 0%

Vitamin C 0%

Calcium 2%

Iron 6%

*Percent Daily Value are based on a 2000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories	2,000	2,500
Total Fat	Less Than	65g	80g
Sat. Fat	Less Than	20g	25g
Cholesterol	Less Than	300mg	300mg
Sodium	Less Than	2,400mg	2,400mg
Total Carb.		300g	375g
Dietary Fiber		25g	30g

Nutrition Facts

Serving Size 1 Pack (5g)
Servings per Container 14

Amount Per Serving

Calories 20 **Calories from Fat** 5

% Daily Value*

Total Fat 0.5g 0.8%

Saturated Fat 0g 0%

Trans Fat 0g 0%

Cholesterol 0mg 0%

Sodium 5mg 0.2%

Total Carbohydrate 2g 0.7%

Dietary Fiber 0.5g 2%

Sugars 0g

Protein 2g

Vitamin A 3%

Vitamin C 13%

Calcium 2%

Iron 3%

*Percent Daily Value are based on a 2000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories	2,000	2,500
Total Fat	Less Than	65g	80g
Sat. Fat	Less Than	20g	25g
Cholesterol	Less Than	300mg	300mg
Sodium	Less Than	2,400mg	2,400mg
Total Carb.		300g	375g
Dietary Fiber		25g	30g

Ingredients :

Brown Rice, Barley, Sticky Brown Rice, Rice Bran, Black Rice, Indian Millet, Sticky Millet, Malted Barley, Chicory Fiber (Chicory Root Extract), Corn, Cane Sugar, Banana, Kale, Apple, Mandarin, Sesame, Acai, Wheat Grass, Potato, Angelicus Keiskei, Barley Grass, Salt, Cabbage, Pumpkin, Carrot, Radish Leaves, Chlorella, Spirulina, Millet, Shiitake Mushroom, Sea Tangle, Mugwort, Radish, Job's Tears, Black Sesame Seed, Brown Seaweed, Wild Parsley, Green Laver, Pine Needles, Plum (Japanese Apricot), Citron, Chinese Quince, Korean Raspberry, Acerola, Sedum, Lotus Root, Reishi Mushroom, Carrot Leaves, Sweet Potato, Burdock, Paecilomyces Japonica, Garlic, Yam

Serving Size : 40g/pkg.

Direction : Mix one pack of MEAL 53

Ingredients :

Brown Rice, Barley, Chicory Fiber (Chicory Root Extract), Sticky Brown Rice, Corn, Oat Fiber, Rice Bran, Malted Barley, Indian Millet, Cane Sugar, Kale, Sticky Millet, Psyllium Husk, Pumpkin, Sesame, Apple, Barley Grass, Salt, Job's Tears, Cactus Fruit (Opuntia Ficus-Indica), Perilla, Angelicus Keiskei, Sweet Potato, Potato, Shiitake Mushroom, Carrot, Radish Leaves, Sea Tangle, Mugwort, Radish, Seaweed Fusiform, Citron, Acerola, Pine Needles, Burdock, Lotus Root, Green Tea, Brown Seaweed, Yam, Green Laver

Serving Size : 40g/pkg.

Direction : Mix one pack of DIET 40 into a glass of water or juice. You may add honey. For best results, please drink plenty of water.

Ingredients :

Fermented Black Soybean, Kimchi

Serving Size : 10g/pkg.

Direction : Mix one pack of NATTO PLUS into a glass of water or juice. You may add honey. For best results, please drink plenty of water.

Store in a cool, dry place.

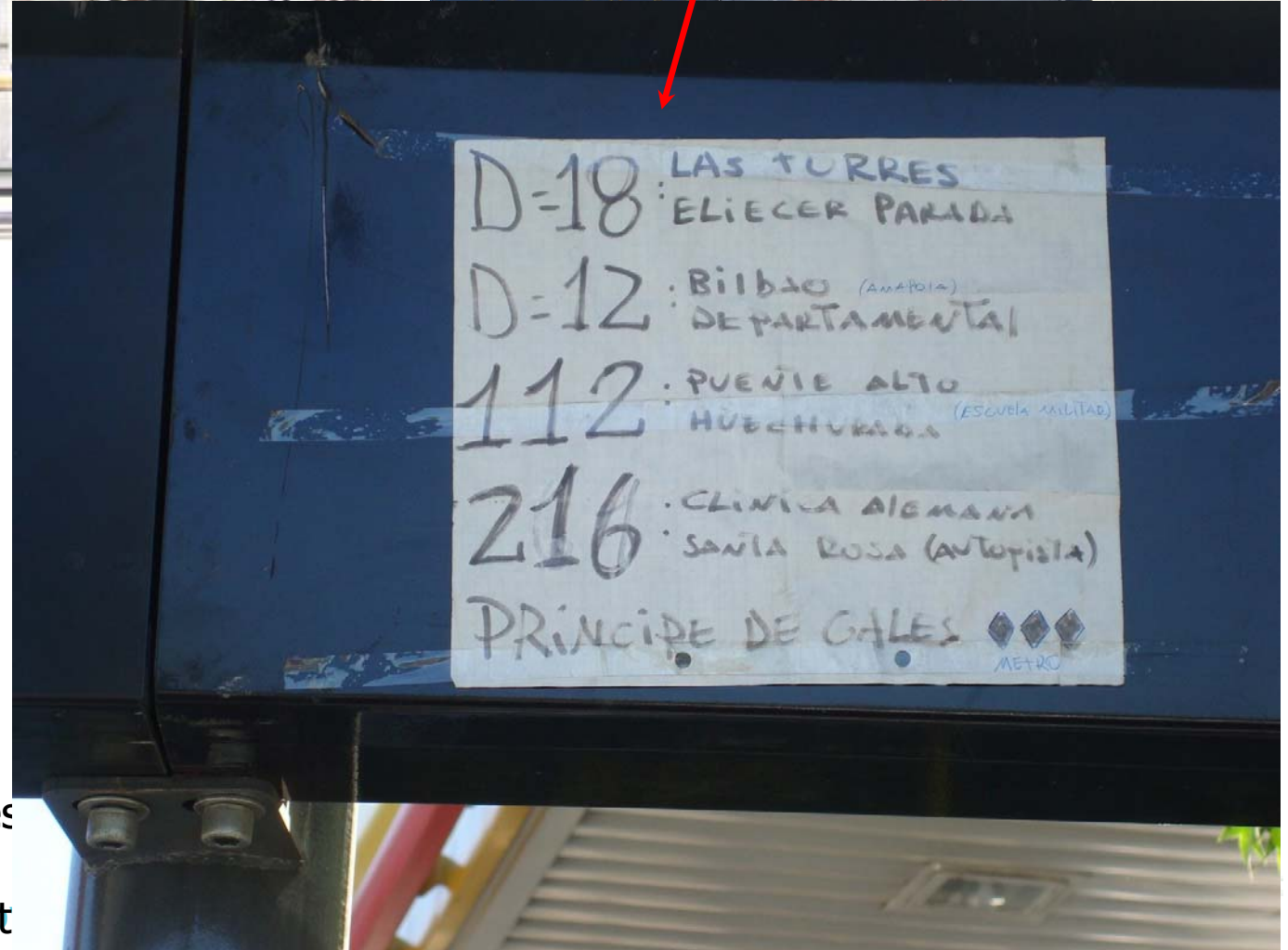
Ingredients :

Chlorella, Kale, Spirulina

Serving Size : 5g/pkg.

Direction : Mix one pack of KHLORELLA K into a glass of water or juice. You may add honey. For best results, please drink plenty of water.

Store in a cool, dry place.



reconfiguration of the bus routes
Santiago, Chile (2007)
Source of image: Sebastian Uret



The limitations of Information systems



- “Our expectations with respects to the effects of information provision on travel choices in general may be mildly optimistic...”(Chorus et al., 2006)
- Many information platforms are based on a naïve model of a rational user, through a cognitive process, compares alternatives by their attributes, but –
 - We don’t have unlimited cognitive power (memory, computation)
 - Our rationality is not unbounded. People’s cognitive biases cause them to understand, interpret and use information, not necessarily in accordance with “rational man theory” - Systematic deviations



Gain/Loss Framing



- People are more sensitive to 'bad outcomes' than to 'good outcomes': The psychological effect of a loss is about twice than the psychological effect of a same-sized gain
- Gains and Losses are defined and measured against a "Reference Point" (Kahneman & Tversky, 1979; Thaler, 1985)
- People tend to feel and behave differently when information is presented (or 'framed') in terms of gains or losses. The framing of outcomes could 'nudge' towards a specific choice



Framing Effects in Journey

Planning



Commuting choices

by car: 25 minutes

cycling: 20 minutes



By car: 25 minutes

Cycling: you will save 5 minutes on your journey



Cycling: 20 minutes

By car: your journey will take you 5 minutes longer

Which would be a stronger nudge?

Examples: Nudging through the design of information the worst catastrophe to take place in a U.S. school building



The remains of the New London School, March 18, 1937

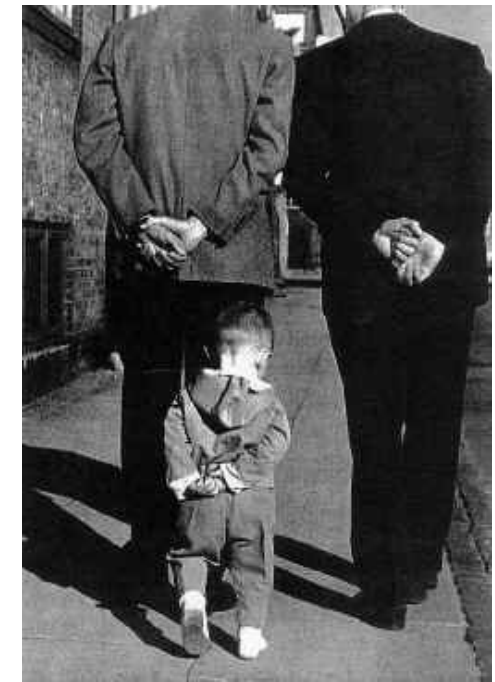
Adding odorant to natural gas (colourless, odourless) began in the United States after the 1937 New London School explosion.



The Social Nudge: Other people's behaviour matters



- People do many things by observing others and imitating/learning
- People are encouraged to continue to do things when they feel other people approve of their behaviour
- It is possible to nudge people via social comparisons



Exploiting Social Preferences: Energy Saving



Schultz *et al.* ran a field experiment where 300 households in California were informed about how much energy they and households in their neighbourhood had used

- Above average users reduced their use
- Below-average users increased their use



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Schultz, P.W., Nolan, J.M., Cialdini, R.B., Goldstein, N.J. and Griskevicius, V. (2007). The constructive, destructive and reconstructive power of social norms. *Psychological Science* 18, 429-434.

How Does Choice Architecture Work?



- Not just the content of information affects our behaviour and choices – the context is also important!
- By incorporating nudges into the design of information systems, we can help the automatic system make better decisions, so the reflective system doesn't have to do so much work...
- Nudges can help individuals to overcome cognitive biases, to improve perception of the choice attributes, to highlight the better choices, to motivate behaviour change
 - without restricting choices without making big changes the physical environment, or the economic attributes of the choices.

≡ The Importance of Context



- Is 150g/km good or bad?
- Depends on a number of things, doesn't it?
 - How many kilometers?
 - How often?
 - Is it per person?

≡ Adding Context to Define Amount



- 150g/km
- 10 000 km/year
- 1.6 passengers per trip (average)
- About 1000 kg/year
- Now, is that good or bad?
 - What's normal?
 - What's recommended?
 - What's the impact?

Adding Context to Aid Interpretation



- What's normal – averages
- What's recommended – sustainable levels, government objectives.
 - Cap and trade limits
 - What earth can sustain.
- What's the impact – absorbing the CO₂, sustainable levels.
 - Trees needed to absorb the CO₂.



Please complete these statements by checking the scale (e.g.) or don't know



For a 5 mile trip is 132 g of CO₂

Sustainable Unsustainable don't know

For a 5 mile trip is 230 g of CO₂:

Sustainable Unsustainable don't know

For a 5 mile trip is 500 g of CO₂:

Sustainable Unsustainable don't know

☰ Context Results



Considering the “I don’t know” responses.

- Percentage of a recommended level/limit worked best.
- Followed by the number of trees.

Anchoring Effect



- Is €5 expensive for a sandwich?
 - Other options are €7.50 and €10
 - Other options are €3 and €4
- Our perceptions are affected by information external to our immediate decisions
- Would this same affect have an impact on CO2?
 - Mass – most likely
 - Increasing context – less likely?

≡ Experiment



- Same 194 people
- Two groups, both saw 3 examples to rank, but the amount of CO2 varied
 - One group large amounts
 - One group small amounts
- In both groups, one example was the same



Please complete these statements by checking the scale (e.g.) or don't know



For a 5 mile trip is 132 g of CO₂
Sustainable Unsustainable don't know

For a 5 mile trip is 230 g of CO₂:
Sustainable Unsustainable don't know

For a 5 mile trip is 500 g of CO₂:
Sustainable Unsustainable don't know

Please complete these statements by checking the scale (e.g.) or don't



For a 5 mile trip is of CO₂:
Sustainable Unsustainable don't know

Previous:
132g

Previous:
230g

For a 5 mile trip is of CO₂:
Sustainable Unsustainable don't know



≡ Gain/Loss Framing



- “By switching the fleet to Fancy M vehicles, CO2 outputs will be reduced by 300 tonnes/year.”
- “By staying with the current fleet, an additional 300 tonnes/year of CO2 will be produced then if the fleet switched to Fancy M vehicles.”
- Should there be any difference in the reaction or choice?

≡ Loss Framing



- Change the syntax – the way the sentence is structured/organized.
- “Loss” – highlight the loss.
- People avoid losses more than they seek gains (loss aversion).
- Would such a technique work with CO2?

≡ Loss Framing Experiment



Option A produces 134g.
Option B produces 366g more.

OR

Option B produces 500g.
Option A produces 366g less.

- About the same?
 - Slightly different? Or
 - Much different?
- Over 2 times more likely to perceive the two amounts as “*much different*” if loss framing was used.

☰ What Next?



- Previous work includes a review of existing literature, empirical work, discussed concepts and ideas with citizens and practitioners.
- Inputs to the CATCH platform and tools design
- Your views.
- During the interactive section,
 - Quick survey to guide design.
 - Discuss personal interpretations and impressions.
- Down the path...
 - Surveys to guide design so that the information will stimulate and motivate positive change.
 - Evaluation

 **Thank you!**



For more information:

www.carbonaware.eu

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