

ANALYZING THE INFLUENCE OF CARBON LABELLING AND BEHAVIOURAL SCIENCE ON CONSUMER PURCHASING CHOICES IN NORTH AMERICA

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BACKGROUND

Climate change and consumption-based emissions

- Over 9.5 billion tons of carbon per year were released in the 2010s from burning fossil fuels¹
- Studies reported 25% more waste during holidays, as millions of single-use goods, commonly made using fossil fuels, are purchased and disposed²



LITERATURE REVIEW

Labelling across markets



- Product labelling can take place in various forms; two distinct types are i) award labels (i.e., Energy Star labels and nutritional values) and ii) warning labels (i.e., tobacco labels)

History and external influences of carbon labelling

- The first carbon label, the Carbon Reduction Label in 2006; it showcased the GHG emissions across the life cycle³
- Studies highlighted how most participants were confused by carbon emissions statistics and that companies viewed labels as a hassle⁴
- External influences also impact carbon labels, such as socioeconomic status, pre-existing understanding, and carbon literacy

Understanding behavioural economics and science

- In behavioural science, nudge theory/ choice architecture can influence decision-making
- System 1 vs System 2**: System 1 is impulsive and unconscious, and System 2 is a planner and intentional; nudging can manipulate these systems⁵
- Cognitive overload**: Process of being overwhelmed by too much information⁵
- Choice overload**: The slow-down in decision-making and the frustration of making a new choice given excess options⁵



RESEARCH QUESTION

- How can incorporating carbon emission labels influence decision-making and consumer behaviour when purchasing personal goods?
- How can behavioural approaches to labelling aid in motivating consumers to make more environmentally conscious decisions?

METHODOLOGY

A combination of primary research (survey experiments) and secondary research (literature review).

Survey experiment design:

- Three groups: (1) control group, (2) carbon label group, (3) advanced carbon group, a total of 339 participants
- The survey had four open-ended qualitative questions distributed using Amazon Mechanical Turk, and workers were paid \$ 0.50
- Participants were asked which product they would choose in a hypothetical scenario (i.e., Figures 1 & 2) and why

Data collection

- 500+ responses were manually reviewed for clarity and correctness



Figure 1. Carbon label group scenario



Figure 2. Advanced carbon label group scenario

KEY FINDINGS

- A greater preference for low-carbon choices in the advanced label group
- Low-carbon choice, Fig. 3, had most scores in the advanced label group
- Medium-carbon choice, Fig. 4, had least scores in the advanced group
- High-carbon group, Fig. 5, did not change across conditions
- Fig. 6 shows $p < 0.05$, so there is a statistically significant relation between carbon level choice and age, and the age groups were 24.2, 33.5, and 42.8
- Fig 7. showcases that income and carbon choice are statistically insignificant

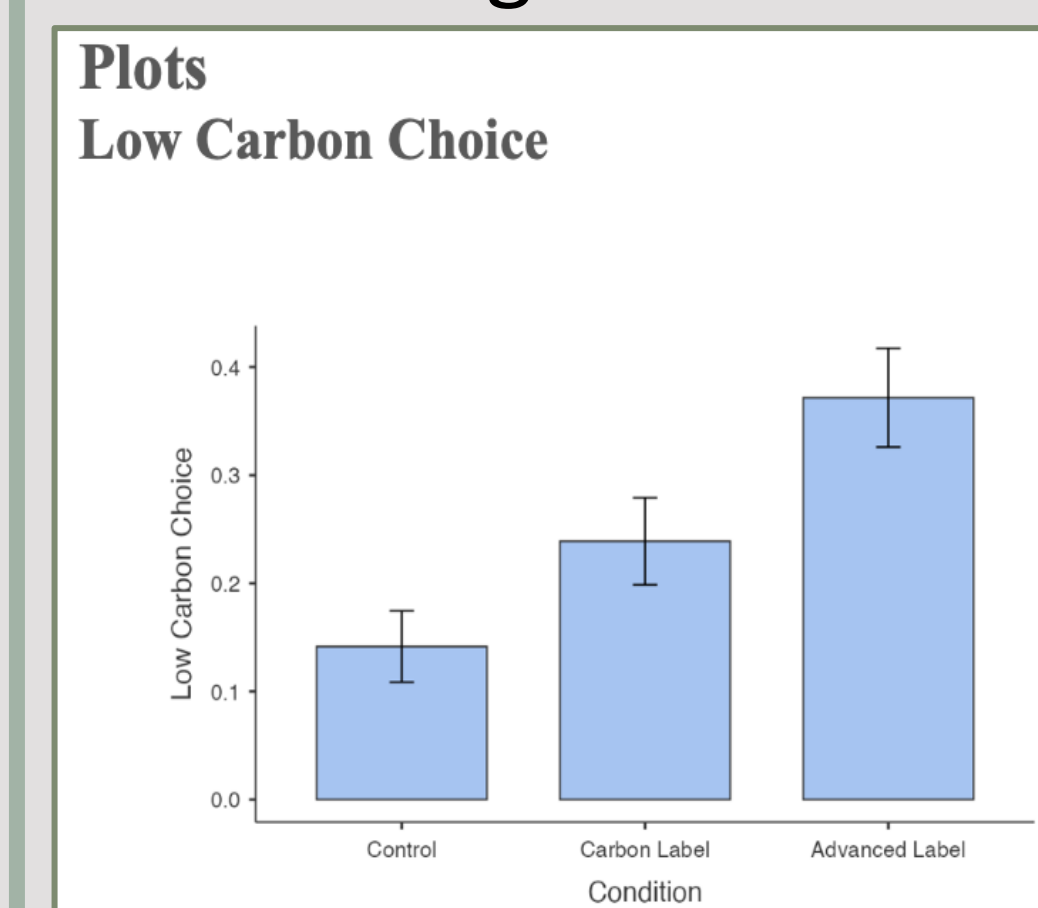


Figure 3. Low-carbon choice plot across the three conditions

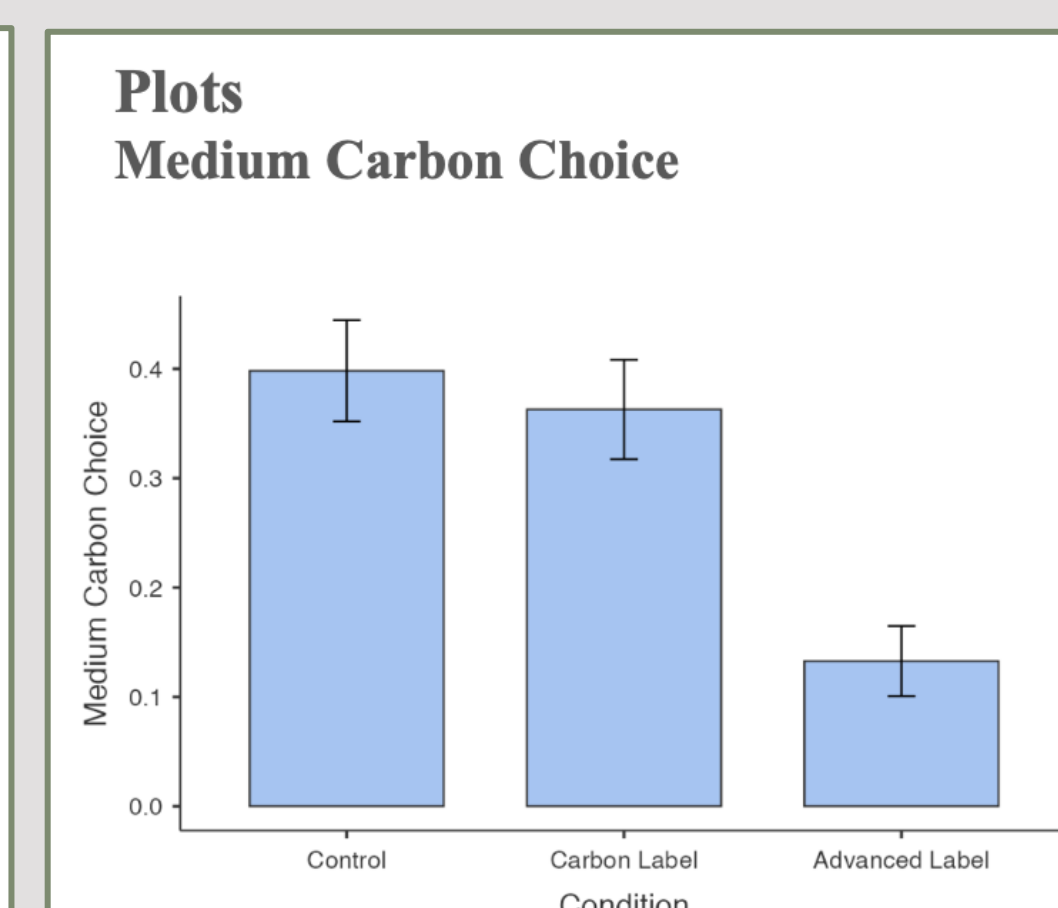


Figure 4. Medium carbon choice plot across the three conditions

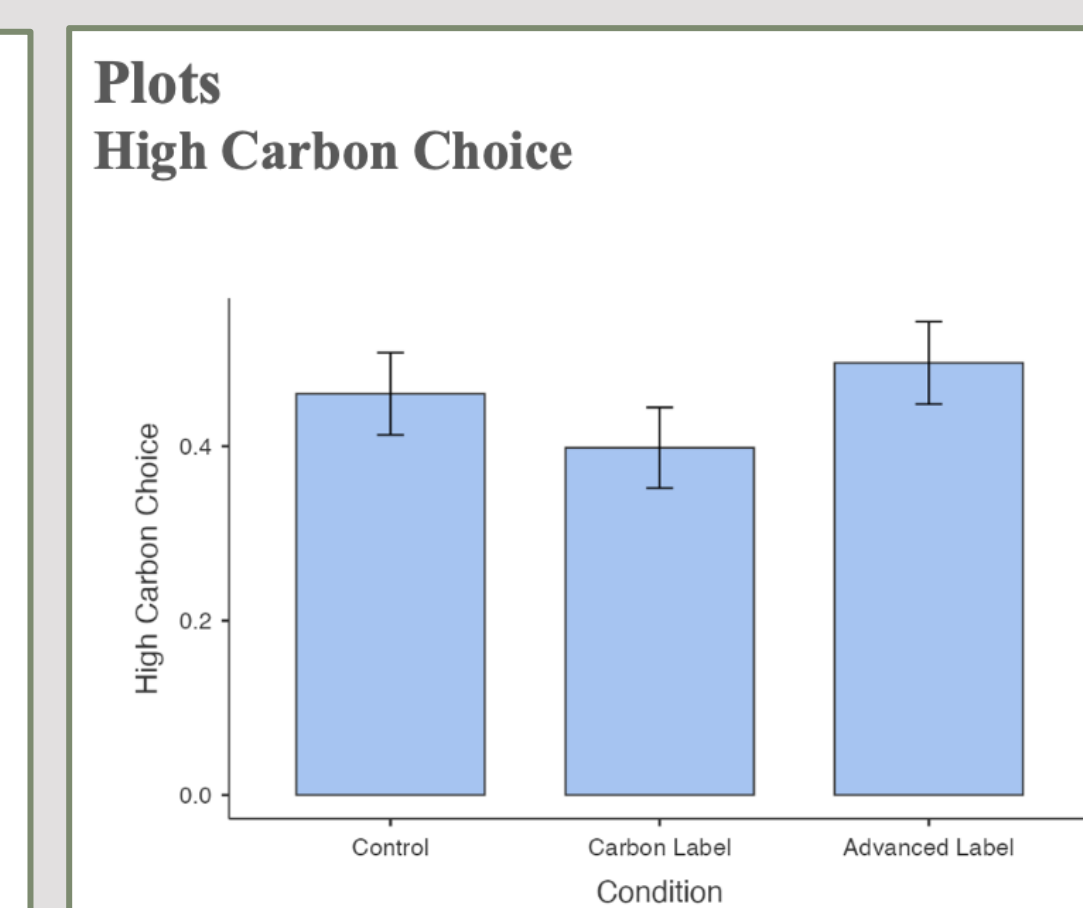


Figure 5. High carbon choice plot across the three conditions

Descriptives	Simple effects of Condition : Omnibus Tests				
	Age	F	Num df	Den df	p
N	339				
Missing	0				
Mean	33.5				
Median	31				
Standard deviation	9.28				
Minimum	22				
Maximum	76				
Moderator levels					
Age					
Mean-1-SD	9.71	2.00	333	<.001	
Mean	8.63	2.00	333	<.001	
Mean+1-SD	1.12	2.00	333	0.328	

Figure 6. Descriptive and simple effects model illustrating the age range and the p-value

ANOVA Omnibus tests					
	SS	df	F	p	η^2p
Model	3.839	5	4.272	<.001	0.060
Condition	3.438	2	9.566	<.001	0.054
Income	0.141	1	0.782	0.377	0.002
Condition * Income	0.600	2	1.668	0.190	0.010
Residuals	59.848	333			
Total	63.687	338			

Figure 7. ANOVA Omnibus test to analyze the relationship between income and carbon choice

DISCUSSION

Carbon choice across conditions

- Fig 3., shows that the low-carbon choice increased in the advanced carbon group; participants engaged more in the presence of behavioural concepts
- Fig 2., illustrates the behavioural schemes used; reordering helped to engage Systems 1 and cognitive overload since low-carbon is at the top; descriptive social norms engage with consumers (i.e., "join the climate movement")
- Medium-carbon (Fig 4) was least preferred, and the choices shifted to low-carbon choice since high-carbon had no major changes (Fig 5)

Carbon choice and its relation to age and income

- Fig 6., indicates that ages 24-36 were more likely to be influenced by carbon labels, while those ages 43+ were not
- Mindset differences across generations can influence the level of environmental concern
- Fig 7., illustrates no influence between choice and income
- MTurk users may have similar financial struggles despite income levels due to their reliance on precarious work

Presence of carbon literacy issues

- Many participants didn't understand the term carbon dioxide and assumed it referred to how carbonated the product is or that higher carbon is better

Limitations

- The survey environment**: a mock website or real-world experiment would create a more realistic atmosphere
- User verifications**: unclear if the same users were able to submit multiple answers
- Narrow convenience sample**: MTurk workers are still a narrow pool (i.e., mostly millennials that are more price conscious)



CONCLUSION

- This study illustrated that the presence of advanced carbon labels leads to greater success in having consumers lean toward low-carbon
- However, external influences continue to play a role in influencing the choice, so future studies are recommended to seek how policies and government officials can further engage with consumers on labelling

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