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What makes a dark pattern... dark? design attributes, normative considerations, and measurement methods'

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I would like acknowledge that the land we are on is the unceded territory of Sylix (Okanagan) people

Outline

- Background
- Paper: Introduction and Methodology
- Paper: Findings
- Extension: Motivation & Introduction
- Extension: Methodology
- Extension: Findings
- Conclusion

Background

- Dark patterns are referred to as manipulative and deceptive design present in the user interfaces (Gray et al., 2018)
- Increased usage of dark patterns in many application such as online shopping, online gaming (Mathur et al., 2019)
- Regulators in the U.S.,Congress is considering legislation to restrict dark patterns due to financial and personal harm (Warner et al., 2019)
- Lack of rigid definitions
- Insufficient exploration of the intricate details in dark patterns

Paper: Introduction & Methodology

AIMS

- Review the existing literature on dark patterns and identify key definitions, taxonomies, and concepts
- Synthesize diverse definitions from various disciplines such as psychology, economics, ethics
- Develop a set of normative perspectives for analyzing dark patterns and their effects on individuals and society
- Propose empirical research methods to study dark patterns
- Provide a framework for future research to advance the understanding of dark patterns

Paper: Introduction & Methodology

- **Literature Review:** Comprehensive review of the literature on dark patterns identifying definitions, types of dark pattern and attributes
- **Synthesis of Normative Perspectives:** Connecting themes from different disciplines to a framework for evaluating the ethical implications
- **Development of Normative Lenses:** Describes a set of discrete normative perspectives and a empirical research method that can guide future research on dark patterns.
- **Case Study Demonstration:** Provides an example of how the “Trick Question” dark pattern can be investigated

Paper: Findings and Key Terms

Choice Architecture	Key Attributes (Required/Optional)	Description
Modify the decision space	Asymmetric	obscure user-beneficial options leading to unequal choices
	Covertness	influences user decisions by hiding the mechanism of influence by capitalizing on cognitive biases or design elements.
	Disparate Treatment	disadvantage and treat one group of users differently from another
	Restrictiveness	reduces the users' choice by forcing a certain action or limiting options
Manipulate the info. flow	Deceptiveness	induction of false beliefs through misstatements.
	Information hiding attribute	obscures or delays important information from reaching users

Paper: Findings and Key Terms

Types of Dark Patterns	Description	Types of Dark Patterns	Description
Scarcity	Create a sense of urgency leading users to make hasty decisions Example: Countdown timers, Limited quantity	**Sneaking**	Intentionally hiding certain elements, misrepresenting information
Trick Questions	Used to confuse or mislead users, Example: Hidden Agendas, Misleading Choice	**Forced action/ work**	Unnecessary or time-consuming tasks, often to the benefit of the platform
Coercion	Social pressure to coerce users into behaviors that benefit the designer or the platform	**Confirmshaming**	Shaming or guilt-tripping users if they choose an alternative option
Manipulating Navigation /Misdirection	Confusing or redirecting users within a application to influence their behavior	**Monetized Rivalries**	Exploits users' competitive instincts and emotions to encourage them to spend more time and money
Obstruction	Deliberately obstructs or complicates users' attempts to perform certain actions	**Social Proof**	People tend to follow the actions Example: Reviews with unclear origin
Nagging	Persistently and intrusively prompt users to take certain actions	**Cuteness of Robots**	Deliberately designed to be adorable in a way to evoke positive emotions

Paper: Findings and Key Terms

Normative Lens	Description
Individual welfare	Whether they diminish individual consumer welfare.
Collective welfare	Whether they diminish collective welfare
Regulatory objective	Democratically created rules and standards to view when dark patterns cause individual and collective harms
Individual autonomy	Individual autonomy lens is a rights-based lens. Autonomy is the normative value that users have the right to act on their own reasons when making decisions

Extension

Motivation & Introduction

- Apply the framework to various application domains
  - Domains: Shopping, Health and Education

- Shopping applications are the most popular category of smartphone applications (Adib & Orji, 2021).

- Evaluate health and fitness smartphone applications ensuring that users' health choices and lifestyles are not manipulated to prevent unintended physical and psychological harm (Thompson 2016; Sax et al. 2018; Zhang et al. 2020).

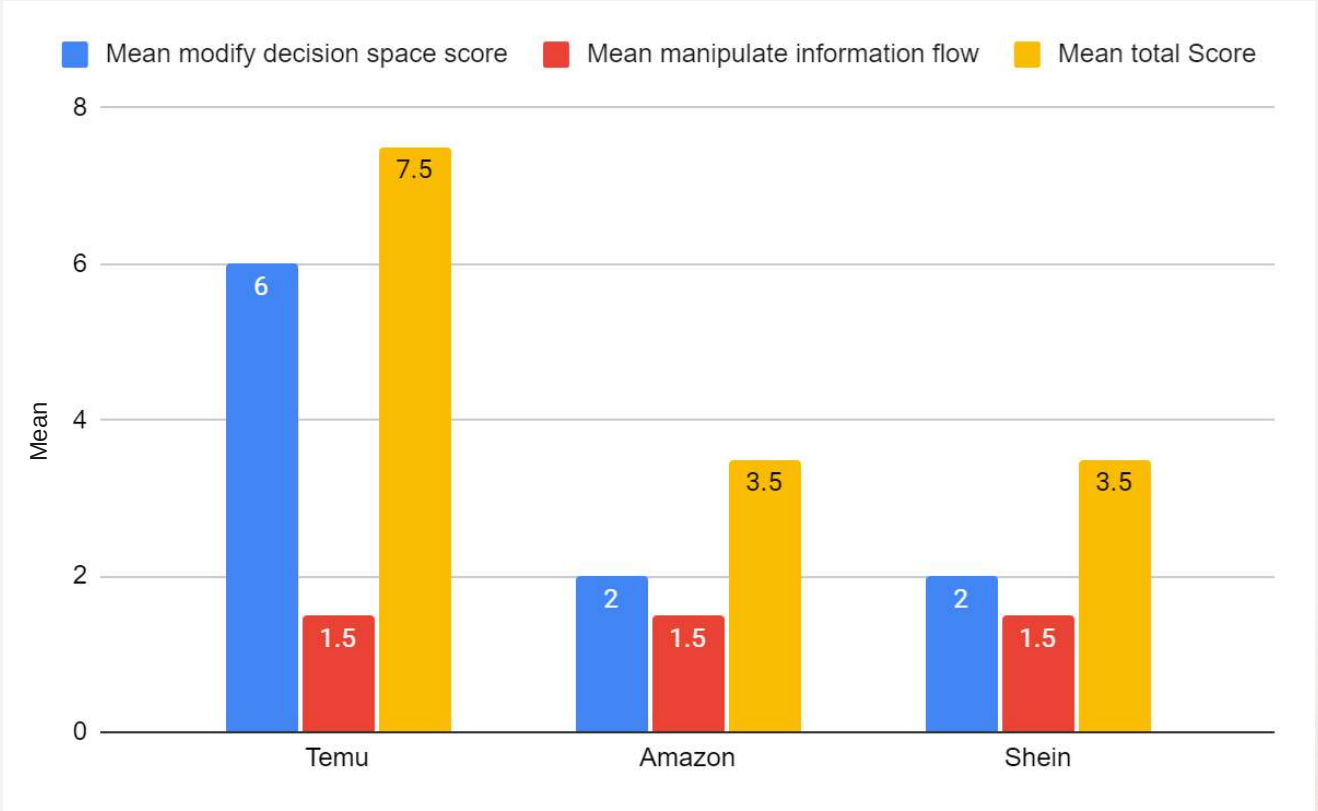
- In recent years, educational apps have been widely used as a learning tool but dark pattern may have harmful impacts on the effective learning, (Stockman and Nottingham 2024).

Extension

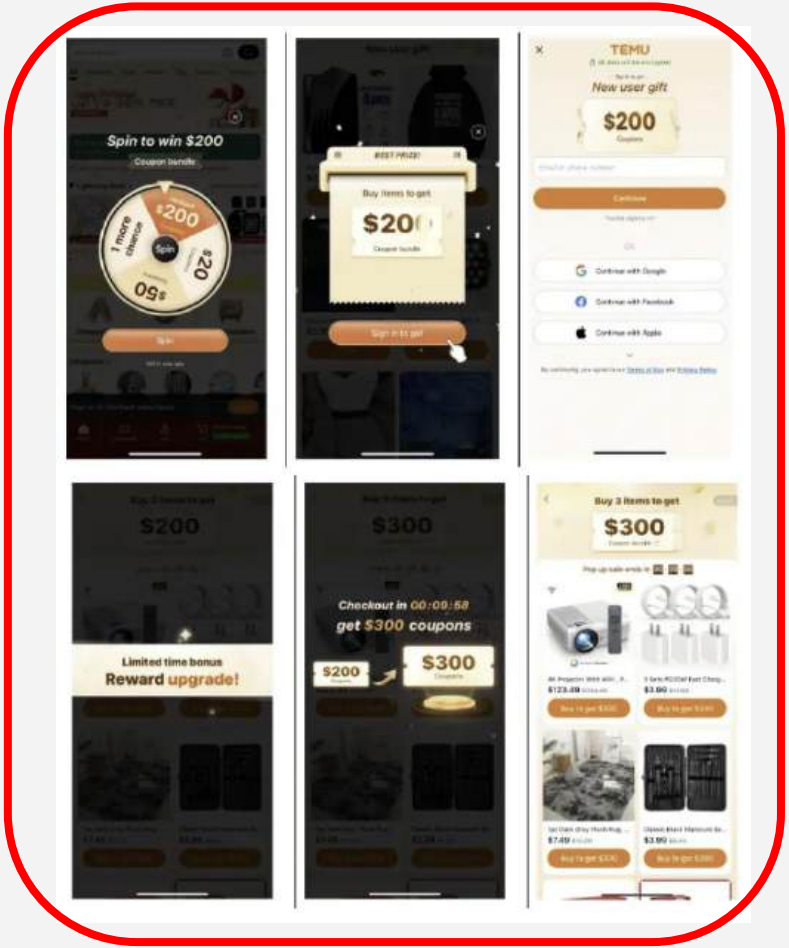
Methodology

- Top 3 applications in Canada on the App Store in each category
    - Health & Fitness: ShutEye Sleep Tracker, Yuka Food Scanner, Me+ Daily Routine Planner
    - Education: Duolingo, PhotoMath, PlantIn:Plant Identifier
    - Shopping: Temu, Amazon, Shein
- Identify type of dark patterns from the user experience
- Assign a score of 1 if there is presence of a required attribute, assign a score of 0.5 if there is an optional attribute
- Identify appropriate normative lens for each application category
- Compare the applications and compare across categories

Extension: Findings- Shopping Applications



Extension: Findings- Shopping Applications



Type of dark pattern:

Misdirection

Attribute:

Asymmetric, Covert

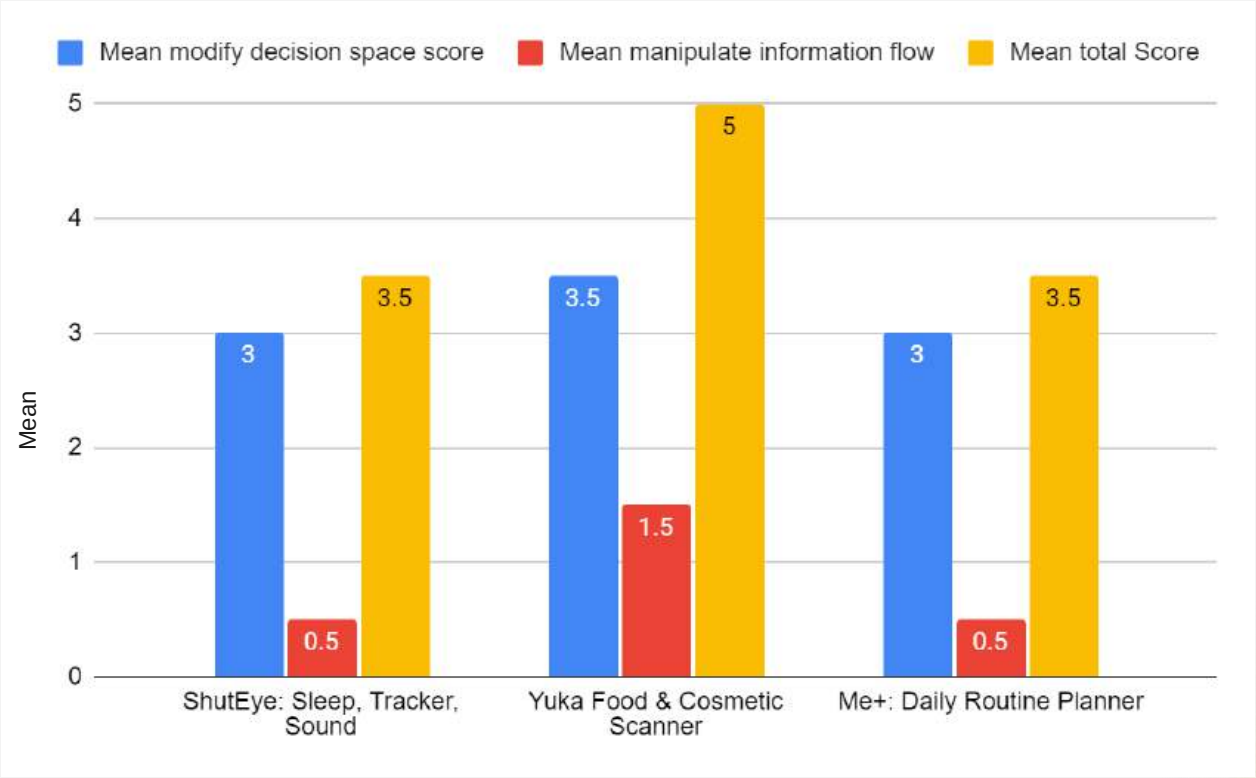
Normative lens:

Individual Welfare- Financial loss

Extension: Findings- Shopping Applications

Apps	Type of Dark Pattern	Modify Decision Space		Manipulate Information flow		Modify Decision Space score	Manipulate Information flow score	Total Score
		Required Attribute	**Optional Attribute**	**Required Attribute**	**Optional Attribute**			
TEMU	Sneaking (Mathur et al., 2019) / Hidden Cost Brignull (2023)			Deception	Information Hiding	6	1.5	7.5
	Scarcity (Mathur et al., 2019)		Covert					
	Confirm-shaming Brignull (2023)/Misdirection (Mathur et al., 2019)	Asymmetric	Covert					
	Nagging Brignull (2023)							
	Coercion (Conti et al., 2010)	Restrictive						
	Trick Questions (Conti et al., 2010)	Asymmetric Covert						

Extension: Findings- Health & Fitness Applications



Extension: Findings- Health & Fitness Applications

Types of dark pattern:

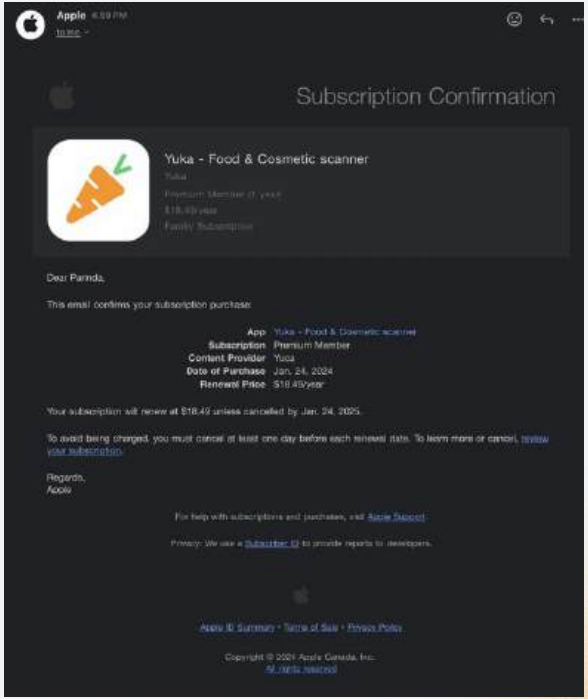
Obstruction

Attributes:

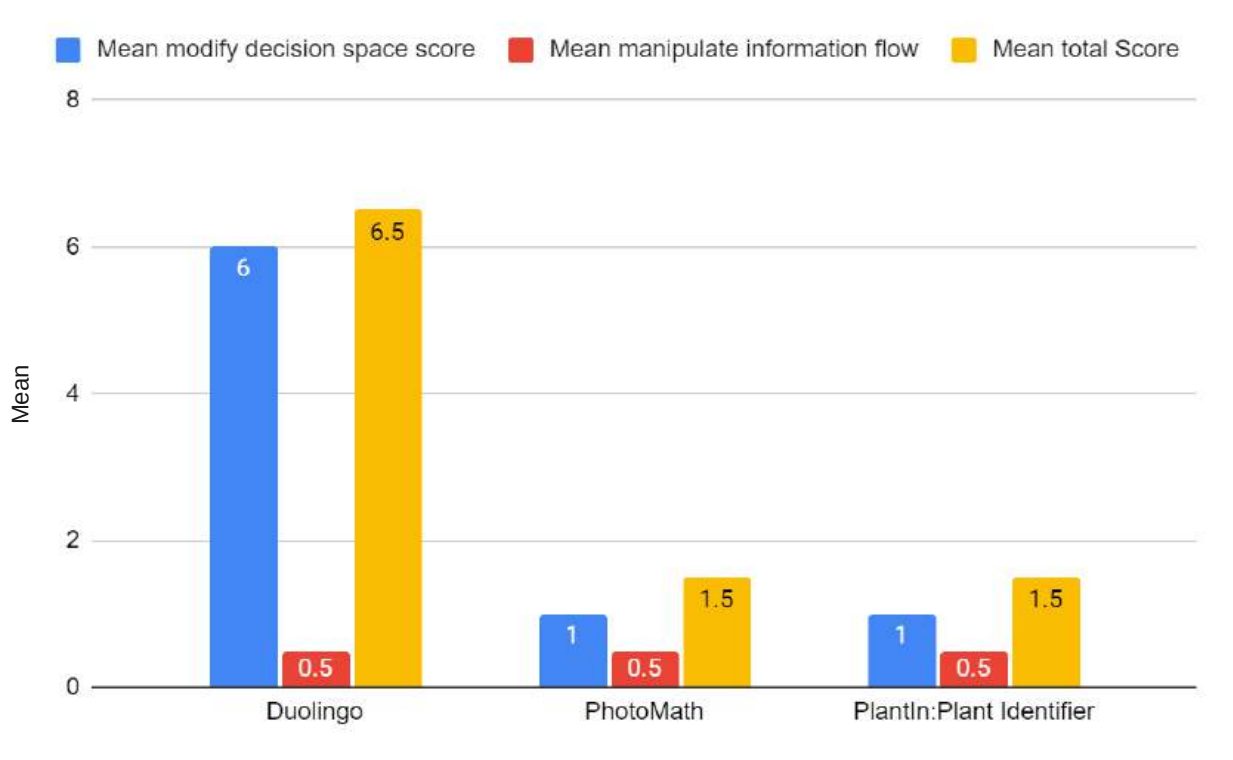
Restrictive, Information hiding

Normative Lenses:

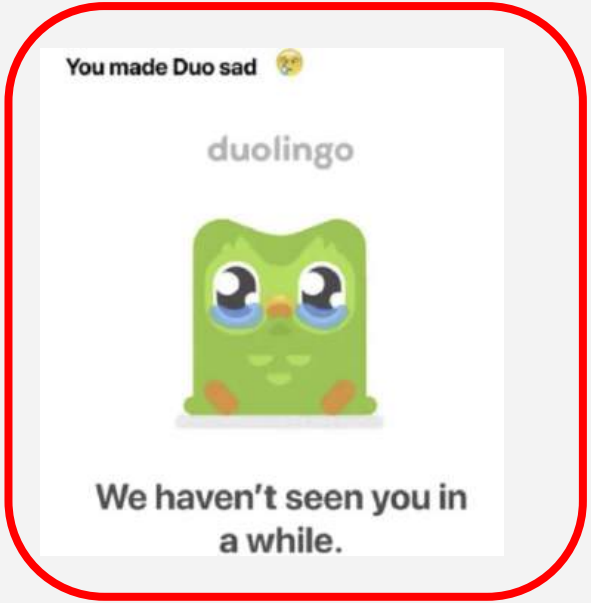
Individual Welfare , Individual Autonomy



Extension: Findings- Education Applications



Extension: Findings- Education Applications



Types of dark patterns:

Cuteness of Robots

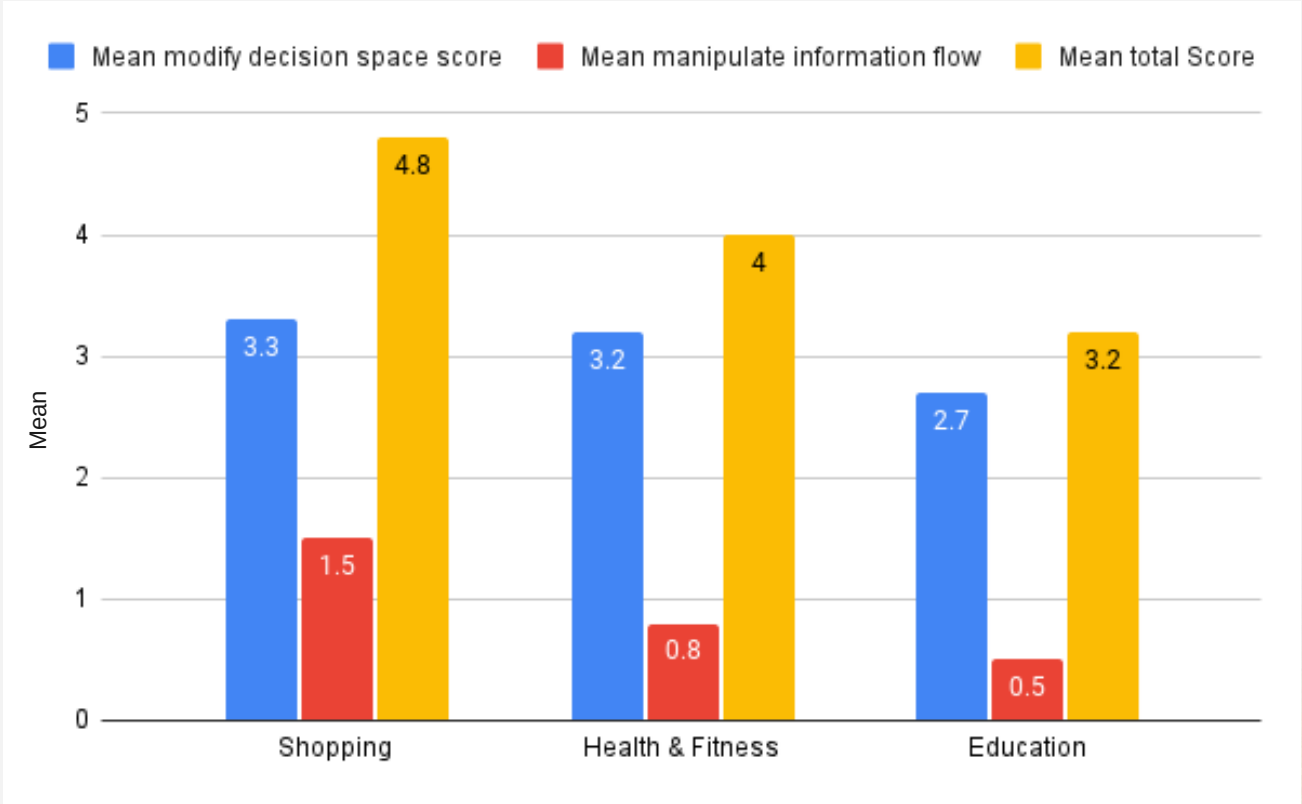
Attributes:

Covert

Normative Lens:

Individual Welfare

Extension: Findings- Comparison



Limitations and Future Directions

- Limited set of applications
- Terminological differences were not considered
- Identified dark patterns may not be exhaustive
- Unconscious researcher bias
- The scoring technique might not fully represent the darkness
- Carry interviews/focus groups with designers
- Extend the framework to understand ethical implications

Key Takeaways

- Dark patterns are most prevalent in shopping applications
- Modify Decision space is the more commonly manipulated choice architecture
- Similar dark patterns identified across applications
- Temu, Duolingo and Yuka Food Scanner reports the highest dark pattern score

References

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Conti, G., & Sobiesk, E. (2010, April). Malicious interface design: exploiting the user. In *Proceedings of the 19th international conference on World wide web* (pp. 271-280).

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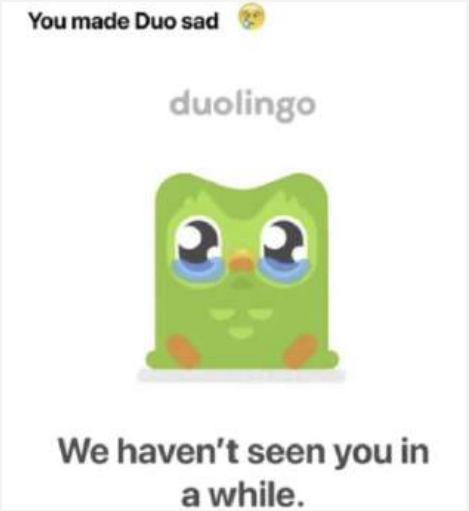
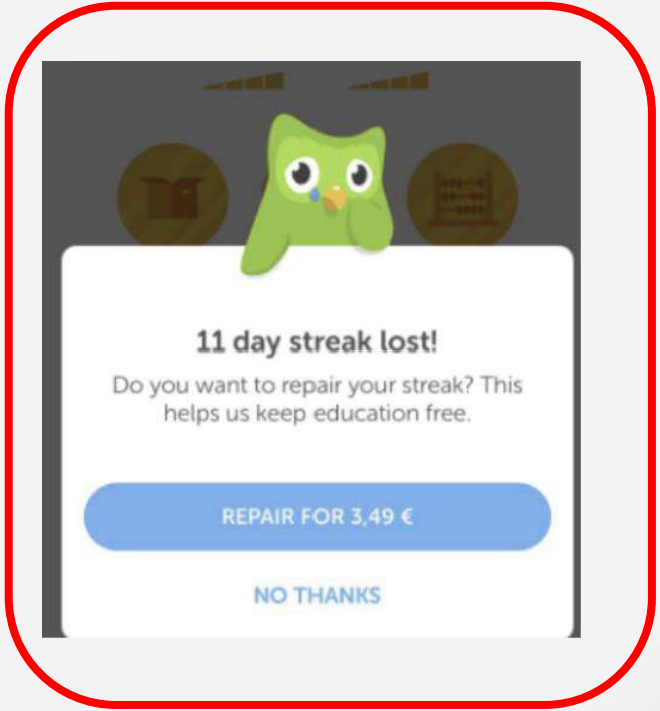
Lacey, C., & Caudwell, C. (2019, March). Cuteness as a ‘dark pattern’in home robots. In *2019 14th ACM/IEEE International Conference on Human-Robot Interaction (HRI)* (pp. 374-381). IEEE.

Thank You!
Question?

Extension: Findings- Education Applications





Types of dark patterns: Monetized Rivalries

Attributes: Disparate Treatment

Normative Lens: Individual Welfare

Extension: Findings- Comparison

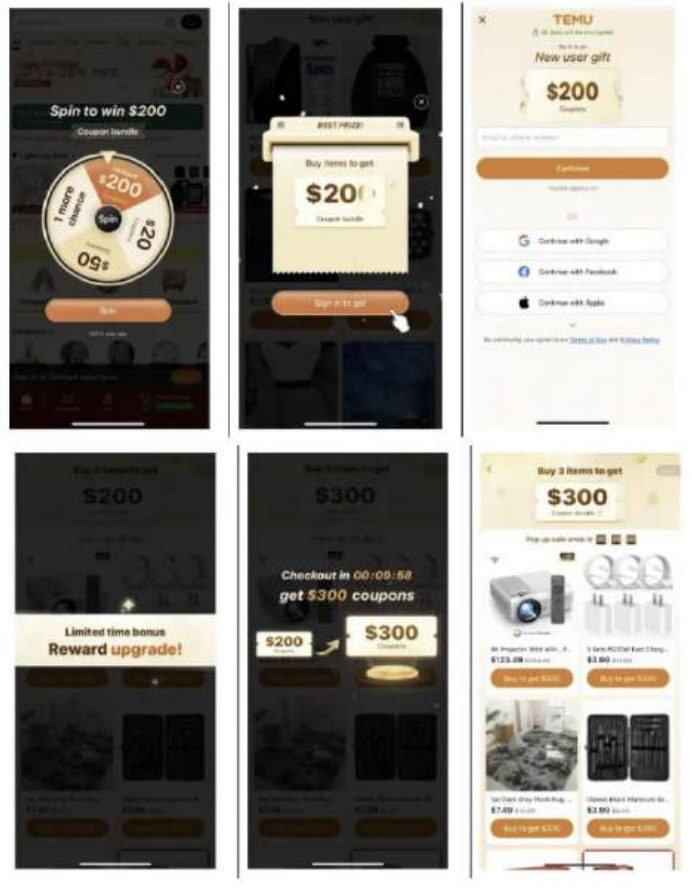
	Mean modify decision space score	Mean manipulate information flow score	Mean total score
Shopping	3.3	1.5	4.8
Health & Fitness	3.2	0.8	4
Education	2.7	0.5	3.2

- Shopping category report most use of dark patterns
- Modify decision space is the more commonly manipulated choice architecture

Extension: Findings- Shopping Applications

Apps	Type of Dark Pattern	Modify Decision Space		Manipulate Information flow		Modify Decision Space score	Manipulate Information flow score	Total Score
		Required Attribute	Optional Attribute	Required Attribute	Optional Attribute			
amazon	Sneaking (Mathur et al., 2019) / Hidden Cost Brignull (2023)			Deception	Information Hiding	2	1.5	3.5
	Scarcity (Mathur et al., 2019)		Covert					
	Confirm-shaming Brignull (2023)/Misdirection (Mathur et al., 2019)	Asymmetric	Covert					
SHEIN	Sneaking (Mathur et al., 2019) / Hidden Cost Brignull (2023)			Deception	Information Hiding	2	1.5	3.5
	Scarcity (Mathur et al., 2019)		Covert					
	Confirm-shaming Brignull (2023)/Misdirection (Mathur et al., 2019)	Asymmetric	Covert					

Extension: Findings- Shopping Applications



Type of dark pattern: Confirmshaming

Attribute: Asymmetric, Covert

Normative lens: Individual Welfare- Financial loss

Extension: Findings- Health & Fitness Applications

Apps	Type of Dark Pattern	Modify Decision Space		Manipulate Information flow		Modify Decision Space score	Manipulate Information flow score	Total Score
		Required Attribute	**Optional Attribute**	**Required Attribute**	**Optional Attribute**			
 ShutEye: Sleep, Tracker, Sound	Obstruction (Mathur et al., 2019) Scarcity (Mathur et al., 2019) Manipulating Navigation /Misdirection (Mathur et al., 2019)	Restrictive Asymmetric	 Covert Covert		Information Hiding	3	0.5	3.5
 Yuka Food & Cosmetic Scanner	Trick Questions Social Proof (Mathur et al., 2019) Obstruction (Mathur et al., 2019)	Asymmetric Covert Asymmetric	 Covert	Deception	Information Hiding	3.5	1.5	5.0
 Me+: Daily Routine Planner	Obstruction (Mathur et al., 2019) Scarcity (Mathur et al., 2019) Manipulating Navigation /Misdirection (Mathur et al., 2019)	Restrictive Asymmetric	 Covert Covert		Information Hiding	3	0.5	3.5

Extension: Findings- Education Applications

Apps	Type of Dark Pattern	Modify Decision Space		Manipulate Information flow		Modify Decision Space score	Manipulate Information flow score	Total Score
		Required Attribute	**Optional Attribute**	**Required Attribute**	**Optional Attribute**			
duolingo	Forced Work/Forced Action (Gray et al., 2018) Scarcity (Mathur et al., 2019) Confirm Shaming /Manipulating Navigation /Misdirection (Mathur et al., 2019) Coercion (Conti et al., 2010) Cuteness of Robots (Lacey et al., 2019) Monetized Rivalries (Zagal et al., 2013)	Restrictive Asymmetric Restrictive Covert Disparate Treatment	 Covert Covert		Information Hiding	6	0.5	6.5
photomath	Obstruction (Mathur et al., 2019)	Restrictive			Information Hiding	1	0.5	1.5
PlantIn: Plant Identifier	Obstruction (Mathur et al., 2019)	Restrictive			Information Hiding	1	0.5	1.5