

# Learning from Each Other

**Trans-Disciplinary Research from the Human-Computer Interaction and Health Lab**

Jim Wallace  
Sept 23, 2022



**Human-computer interaction is research in the design and the use of computer technology, which focuses on the interfaces between people and computers.**

– Wikipedia

**Health**




**Technology**



# Food Literacy

- Defined as the *knowledge, skills, and awareness* required to achieve a nutritious diet
- We're seeing a substantial growth in food-related technologies: apps, meal kits, etc.
- We explore how food literacy can improve those technologies.





# Food Literacy while Shopping: Motivating Informed Food Purchasing Behaviour with a Situated Gameful App



<sup>1</sup>Marcela C. C. Bomfim,<sup>1</sup>Sharon Kirkpatrick,<sup>2</sup>Lennart E. Nacke,<sup>1</sup>James R. Wallace

<sup>1</sup>School of Public Health and Health Systems,<sup>2</sup>Stratford School of Interaction Design and Business  
University of Waterloo, Waterloo, Ontario, Canada

# It Started with an App ...

- Food Literacy was a useful way of informing software design
- How can we make this more available to the people who make software?

... and did you hear about the pandemic?



# Heuristics

- **Heuristics:** “Rules of thumb”, “guidelines”, simple rules ....
- Very popular in design research
- Could be useful way of empowering designers in the context of food?

## #3: User control and freedom

Users often perform actions by mistake. They need a clearly marked "emergency exit" to leave the unwanted action without having to go through an extended process.

When it's easy for people to back out of a process or undo an action, it fosters a sense of freedom and confidence. Exits allow users to remain in control of the system and avoid getting stuck and feeling frustrated.



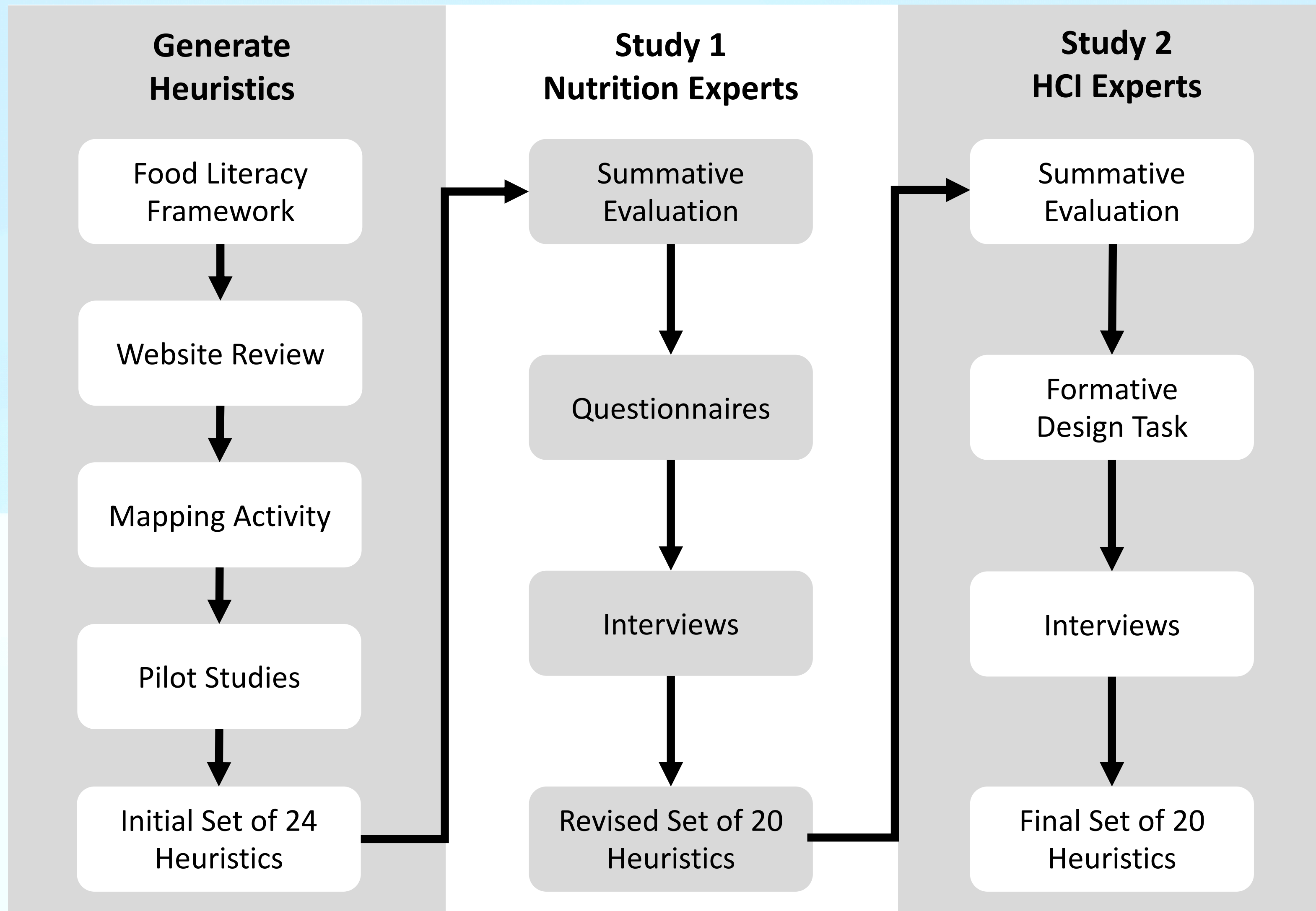
**Example of Usability Heuristic #3:**  
*Digital spaces need quick “emergency exits,” just like physical spaces do.*

### Tips

- Support *Undo* and *Redo*.
- Show a clear way to exit the current interaction, like a [Cancel button](#).
- Make sure the exit is clearly labeled and discoverable.

### Learn more

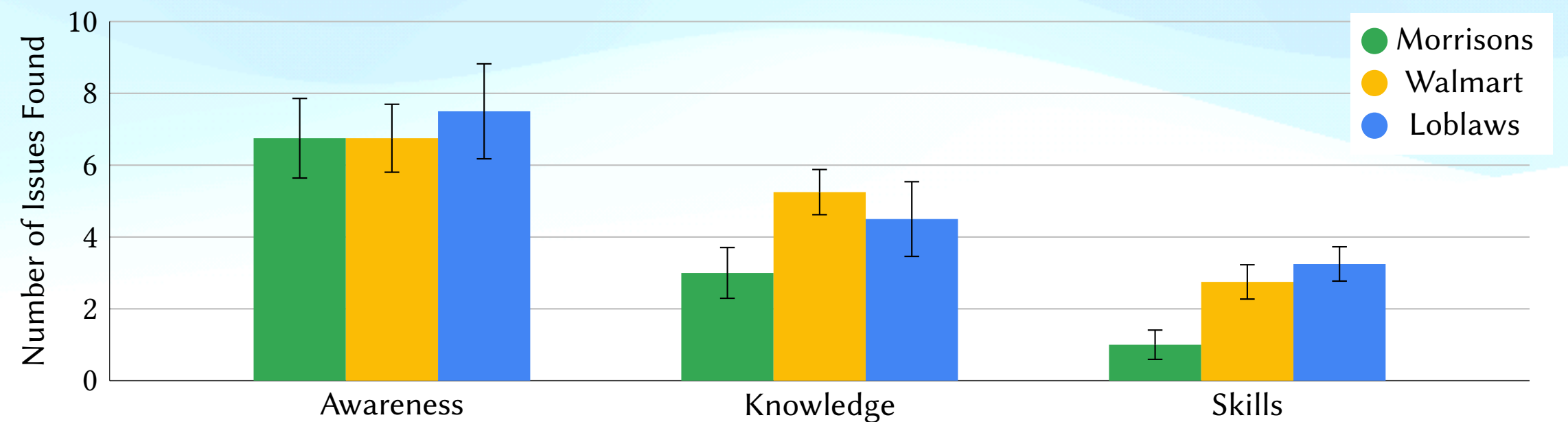
- [Full article: User Control and Freedom](#)
- [2-minute video: User Control and Freedom](#)



# Nutrition Experts

## Study 1

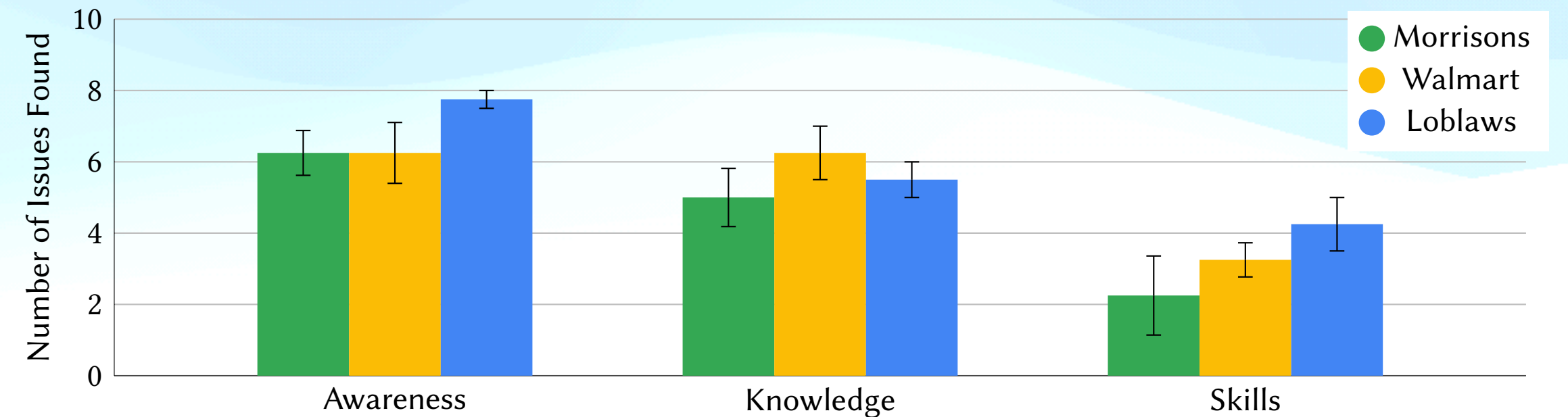
- Asked nutrition experts to use the 24 heuristics to evaluate three websites: Morrisons, Walmart, Loblaws
- Collected qualitative feedback on heuristics, interview data, as well as questionnaire responses on usability/understandability/usefulness/specificity of heuristics.



# HCI Experts

## Study 2

- Asked HCI experts to use the (revised) 20 heuristics to evaluate the same three websites: Morrisons, Walmart, Loblaws
- Collected qualitative feedback on heuristics, interview data, as well as questionnaire responses on usability/understandability/usefulness/specificity of heuristics.



# Our Heuristics

## In press at ToCHI

- Prompted HCI experts to self-reflect on technology design, their own experiences with food literacy
- Useful as both *summative* and *formative* design tools
- Revealed some tensions between HCI and Public Health practices

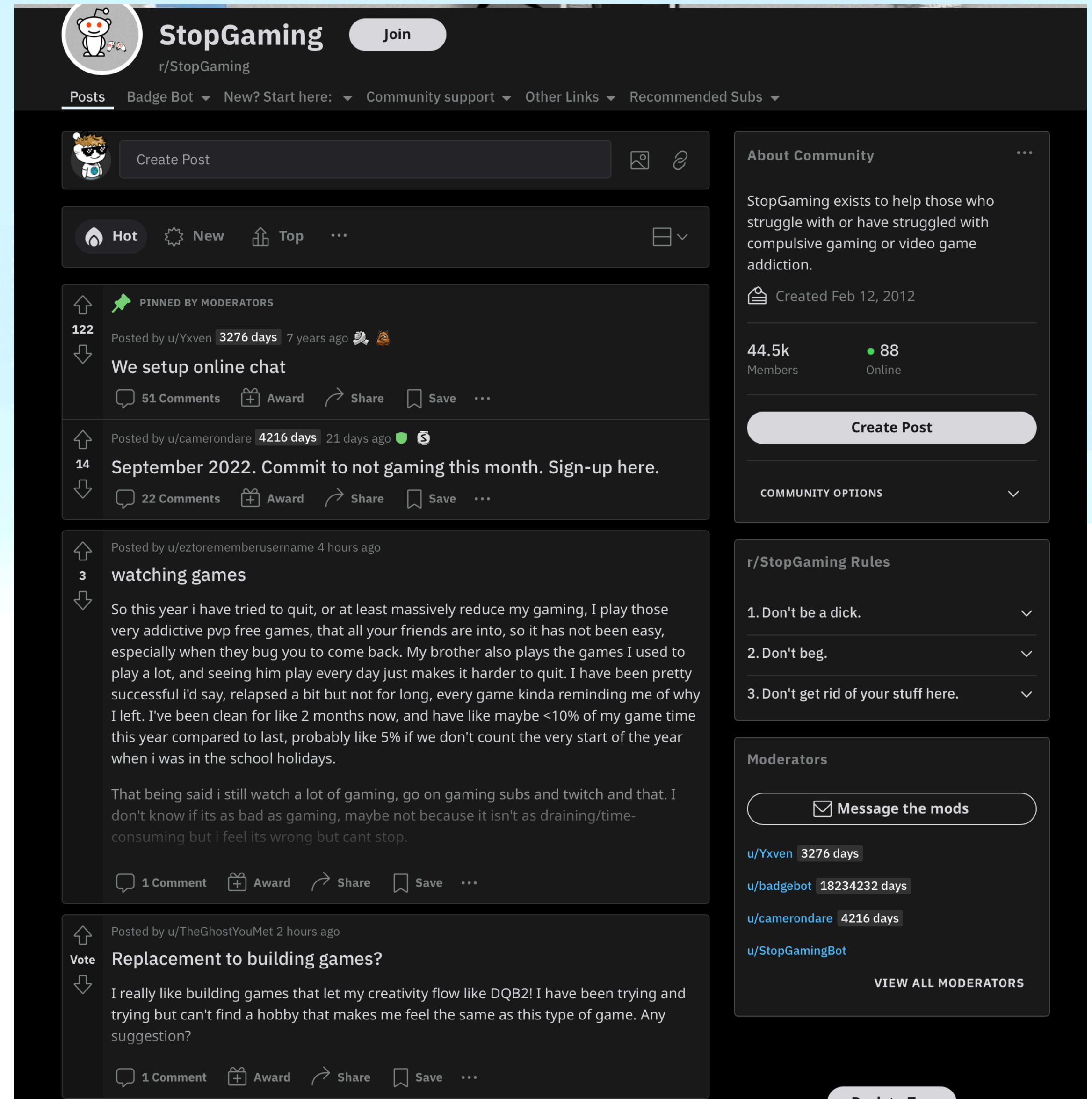
FOOD LITERACY HEURISTICS	
<b>Awareness</b>	
H1. Promote Sustainable Foods	Sustainable food choices are promoted in places such as search results, banners, and advertisements (e.g., In-season produce, local foods)
H2. Interpret Nutrition Content	Help customers interpret a product's nutrition content using symbols, stamps, or colours (e.g., Traffic light colours, Guiding Stars, "High in" symbols).
H3. Highlight Ingredients	Highlight important ingredients like added sugar, saturated fats, artificial ingredients.
H4. Sort by Nutrition Values	Enable customers to sort products according to their nutritional values (e.g., Sodium: Low to High; Sugar: Low to High).
H5. Filter by Nutrition Content	Enable customers to filter products based on specific dietary needs or lifestyles (e.g., low sodium, sugar, gluten-free).
H6. Moderate Ultra-Processed Foods	Ultra-processed foods (e.g., sugary drinks, cookies, ice cream) should not be prominent in search results, banners, and advertisements because they are a high-risk factor for many leading causes of death (e.g., heart disease, stroke, and type 2 diabetes).
H7. Provide Healthy Suggestions	Suggested items should have similar nutritional content or be healthier than the current product being visualized (e.g., Suggest low sodium options when viewing potato chips).
H8. Visualize Portion Sizes	Help customers to visualize appropriate portion sizes on a product's details (e.g., Use images of everyday objects like dice, golf ball, a deck of cards).
<b>Knowledge</b>	
H9. Show Ingredients	The product's list of ingredients is easy to find on a product's description page. A good place is right below the product's picture or price.
H10. Show Nutrition Facts	Customers can easily locate a product's nutrition information. A good place is right below the product's picture or price.
H11. Follow Food Guidelines	Incorporate information from food guidelines. For instance, promoting balanced meals, whole foods, water as a beverage of choice, cooking more often, and limiting the intake of ultra-processed foods.
H12. Educate about Nutrients	Educate customers about how individual nutrients affect their health, with clear statements displayed prominently. (e.g., "Too much sodium increases the risk of developing heart disease."; "A high fibre diet reduces the risk of different cancer types").
H13. Enable Comparisons	Enable customers to compare the nutrition value of two or more products side-by-side.
H14. Summarize Nutrition Info	Offer a visualization of nutrition information for all items in the shopping cart.
H15. Highlight Dietary Needs	Symbols are used and easy to find on the product's description to highlight specific dietary needs (e.g., vegetarian, no milk, halal, gluten-free).
<b>Skills</b>	
H16. Support Strategic Planning	Enable customers to plan ahead (e.g., Enable meal plan or creating a shopping list).
H17. Develop Cooking Abilities	Help customers develop cooking abilities by providing access to recipes either in-site or through external links.
H18. Teach Food Storage	Teach customers how to properly store a product (e.g., fridge, frozen).
H19. Teach Food Preparation	Teach customers how to prepare a product safely and how to integrate a product into a recipe (e.g., how to combine bell peppers).
H20. Support Budgeting	Support budgeting and place emphasis on healthy items. (e.g., highlight healthy items on sale; have a "Sort by" feature combining lower price and more nutritious items).

Table 7. Our final set of 20 food literacy heuristics, organized as groups of heuristics for *awareness*, *knowledge*, and *skills*.



# Online Communities

- Social networks like Reddit, Twitter, Facebook
- Large, online communities formed around myriad health concerns like addiction, mental health, vaccine hesitancy
- How do we apply qualitative methods like thematic analysis to data collected from these groups?



# “I Will Not Drink With You Today”: A Topic Guided Thematic Analysis of Addiction Recovery on Reddit



**Robert P. Gauthier<sup>1</sup>, Mary Jean Costello<sup>2</sup>, James R. Wallace<sup>1</sup>**

<sup>1</sup>School of Public Health Sciences, University of Waterloo

<sup>2</sup>Homewood Research Institute



UNIVERSITY OF  
**WATERLOO**



THE GAMES  
INSTITUTE

**WATERLOO HCI**



# From Proof-of-Concept to Tool

- Explored key steps in analyzing online data
- showed efficacy for Reddit communities and learning about recovery from substance use
- Can we put them together in a way that's accessible to non-programmers?



- Data Collection
- Data Cleaning & Filtering
- Modelling & Sampling
- Coding
- Reviewing
- Reporting

Online Sources

**Retrieve Reddit** Online communities' public discussions (made up of submissions and comments). [1](#)

Local Sources

**Import CSV** Used to import datasets created outside of this toolkit. The csv file must be encoded using utf-8.

- Data Collection
- Data Cleaning & Filtering
- Modelling & Sampling
- Coding
- Reviewing
- Reporting

Rules List

**Tokenizer:** spacy 3.2.1 en\_core\_web\_sm 3.2.0 **Method:** Lemmatizer: spacy en\_core\_web\_sm 3.2.0

Pause Auto-Apply

Create Rule Delete Rules

Step	Fields	Words	Parts-of-Speech	Action
1	<ANY>	<ANY>	X	remove
2	<ANY>	<ANY>	SPACE	remove
3	<ANY>	<ANY>	PUNCT	remove
4	<ANY>	<ANY>	NUM	remove
5	<ANY>	<ANY>	SYM	remove
6	<ANY>	<ANY>	<ANY>	remove spacy auto stopwords
7	<ANY>	<ANY>	<ANY>	remove tokens where their tfidf is in the lower 75.0%

# of Docs: 4545 / 4810  
 # of Words: 335437 / 3209975  
 # of Unique Words: 35368 / 38254

Included List

Search

Words	Parts-of-Speech	# of Words	# of Docs	TF-IDF Min	TF-IDF M
games	NOUN	4170 (0.1299%)	172 (3.5759%)	6.0534	36.3203
game	NOUN	3658 (0.114%)	195 (4.0541%)	5.833	27.3703
life	NOUN	3139 (0.0978%)	189 (3.9293%)	5.8853	39.0568
people	NOUN	2867 (0.0893%)	204 (4.2412%)	5.9652	41.0105
gaming	NOUN	2766 (0.0862%)	122 (2.5364%)	5.7231	23.1937
time	NOUN	2246 (0.07%)	92 (1.9127%)	5.9327	23.7308
play	VERB	1811 (0.0564%)	122 (2.5364%)	5.7803	15.7646
video	NOUN	1669 (0.052%)	149 (3.0977%)	6.4031	50.3103
addiction	NOUN	1541 (0.048%)	157 (3.264%)	5.9746	34.852
friends	NOUN	1372 (0.0427%)	174 (3.6175%)	5.7043	35.3668
want	VERB	1339 (0.0417%)	108 (2.2453%)	5.933	20.4358
like	ADP	1232 (0.0384%)	97 (2.0166%)	5.8932	25.4145
hours	NOUN	1206 (0.0376%)	112 (2.3285%)	6.3416	27.1785

Removed List

Search

Words	Parts-of-Speech	# of Words	# of Docs	TF-IDF Min	TF-IDF M
.	PUNCT	144933 (4.5151%)	4519 (93.9501%)	0.0624	30
i	PRON	120968 (3.7685%)	4449 (92.4948%)	0.078	36
,	PUNCT	99337 (3.0946%)	4339 (90.2079%)	0.1031	38
and	CCONJ	73324 (2.2843%)	4354 (90.5198%)	0.0996	23
the	DET	69360 (2.1608%)	4345 (90.3326%)	0.1014	25
to	PART	66273 (2.0646%)	4284 (89.0644%)	0.0794	24
a	DET	61172 (1.9057%)	4359 (90.6237%)	0.0973	21
you	PRON	58609 (1.8258%)	4040 (83.9917%)	0.1745	50
it	PRON	53035 (1.6522%)	4159 (86.4657%)	0.1452	91
	SPACE	50308 (1.5672%)	4039 (83.9709%)	0.1747	46
of	ADP	43273 (1.3481%)	4223 (87.7963%)	0.129	20
is	AUX	32123 (1.0007%)	3958 (82.2869%)	0.1899	29

## +Generic Sampling

## Random

This sampling approach depends on the the assumption that codes are uniformly distributed across the data. [1](#)  
However, assuming codes follow a uniform distribution may restrict visibility of interesting infrequent codes in the data.

## Topic Model Sampling

Topic model sampling attempts to generate samples in the form of groups of documents that are likely to contain similar topics. These groups can contain interesting phenomena that can be used to explore the data, develop codes, and review themes. However, generated topic model samples should to be treated as windows that look at potentially interesting parts of the data rather than as a generalizable representation of the data.

## Latent Dirchlet Allocation

This topic model is suited to identifying topics in long texts, such as discussions, where multiple topics can co-occur [2](#)

## Biterm

This topic model is suited to identifying topics in short texts, such as tweets and instant messages [3](#)

## Non-Negative Matrix Factorization

This topic model is suited to rough identifying topics when performing initial explorations [4](#)

Data Collection

Data Cleaning &amp; Filtering

Modelling &amp; Sampling

Coding

Reviewing

Reporting

Actions

Not Sure Useful Not Useful

View

Show Usefulness Show Documents From

Search

url	created_utc	title	text
StopGaming / R...dit / Discussions			
<a href="#">ko12g4</a>	2021-01-01 00:02:39UTC	With 2021 right around the corner, how about a year without gaming?	Sounds like a good idea .
<a href="#">ko1twp</a>	2021-01-01 00:49:40UTC	Desperation	Hello guys i will make this
<a href="#">ko4fr0</a>	2021-01-01 03:49:09UTC	Good luck in 2021	Happy New Year to every
<a href="#">ko569q</a>	2021-01-01 04:44:30UTC	January 2021. Commit to not gaming this month. Sign-up here.	Sign up for StopGaming!
Model_1			
Topic 2			
<a href="#">oa1nwa</a>	2021-08-23 15:05:07UTC	Just Loq Off - A Talk with Collin McSpirit on RuneScape Addiction	Thank you verv much for

C...s | Notes | References

Blank area for notes and references.

- Data Collection
- Data Cleaning & Filtering
- Modelling & Sampling
- Coding
- Reviewing
- Reporting

# Deployment with CIRN

## In press at GROUP

- Wanted to examine how the toolkit might be used in practice
- Research partnership through the Canadian Immunization Research Network, with Dr. Samantha Meyer and colleagues
- Two teams performed thematic analysis on ~600,000 posts to Canadian news sites:
  - One manual
  - One computational

# Findings...

- Teams ultimately created some very similar results
  - Enabled use of ML, examination of large data set
  - Might have influenced *how* teams approached analysis ...
- 
- Computational Thematic Analysis Toolkit is available now on GitHub for Mac and Windows, open sourced, **ready for future collaborations**

# Learning from Each Other

- I love working in SPHS, learning from my students
- UWaterloo is a truly multi-, trans-, and inter-disciplinary working environment: **take advantage of it**

Thanks for watching, what questions do you have?