

CS6750, Spring 2021: Assignment M5

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Abstract—Video games represent an area in human-computer interaction where interfaces are rapidly becoming invisible. However, video game interaction encompasses far more than a user interacting with a game. Before the user can realize their desire to play something, they must interact with other portions of the game console or system to perform activities including browsing already-owned games and purchasing new games. This study will examine the process of user interaction with one such console, the Nintendo Switch, as users aim to find a desired game to purchase via its eShop interface.

1 OVERVIEW OF EVALUATION PLAN

The research thus far has led to three design alternatives, shown in Table 1. Of these, two prototypes were selected to move forward with concept evaluation.

Table 1—Summary of developed design alternatives

Design Concept	Interaction Mode	Prototype	Evaluation Method
Yoshi, your personal eShop helper	voice	verbal	—
card-based category landing	visual/touch	paper	empirical
evolving, customizable controls	visual/touch	card	predictive (GOMS)

The first prototype showcases an alternative visual and navigation design for the Nintendo Switch eShop landing page based on categories and was evaluated empirically. The second prototype targets the eShop's interaction design, offering customizable mapping options intended to improve the efficiency of the experience particularly for expert users; this concept was evaluated using predictive evaluation methods, namely GOMS modeling.

2 EMPIRICAL EVALUATION—CARD-BASED CATEGORY LANDING

This evaluation tested the concept shown in Figure 1, a modified version of the eShop landing page (compare to Appendix 6.1). In particular, the experiment was designed to measure participant valuations of the *desirability* of the redesigned categories vs. the original eShop categories.



Figure 1—Paper prototype. Source: created by author.

Experiment recruitment targeted adult (age 18+) Nintendo Switch or Switch Lite owners who have owned their device for a minimum of six months, where the ownership duration is a proxy for expertise. Recruitment resulted in 22 target group participants ($n \geq 22$) out of 24 respondents. Each participant completed three experimental phases: (1) indicating their preference of a category in a round-robin tournament; (2) indicating their preference of category sets of the redesign vs. the original; and (3) synthesizing & providing their own original input for desired eShop categories. Control conditions included the presentation of the categories, delivery of the experiment, and participant background. To support the study, a digital artifact was created shown in Figure 2.

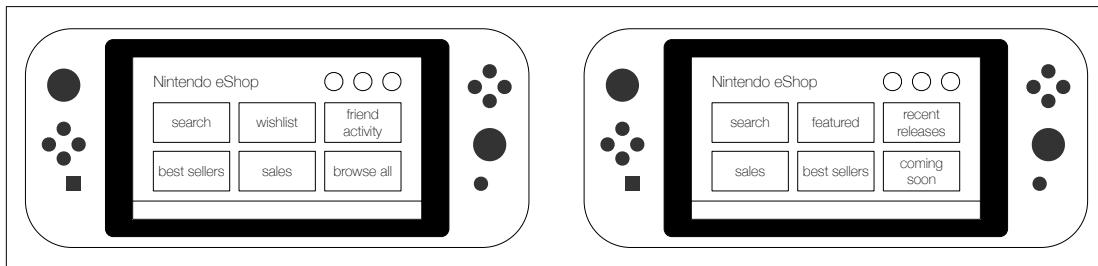


Figure 2—Experiment artifact with the redesigned (L) & original (R) categories in the card layout. Source: author.

2.1 Testing process

To administrate the study, the *PeerSurvey* platform was used. For each experimental phase, a corresponding survey section was designed (see Appendix 6.2); a demographic question set was included to determine target group representation. The survey was reviewed by a third party, refined, and then distributed via the *Ed Discussion* forum. With the exception of the following deviations, the experimental procedure was executed as described in the plan. **Procedure deviations**—only 15 round-robin pairings for six categories were presented to the participants, excluding the three common categories between the redesign and

the original (search, sales, best sellers). Including all nine categories would have resulted in 36 pairings. Based on the third-party review, this would have been too many questions for participants and created a barrier for completing the survey. Therefore, the common categories were not included in the round-robin tournament to keep the survey size digestible. *Impact*—due to the common category exclusion, their relative desirability remains unknown. *Future changes*—for a repeat experiment, all categories should ideally be included and the common categories also ranked against the full set.

PHASE 0	PHASE 1	PHASE 2	PHASE 3
demographic & target group screening questions	round-robin tournament of categories	selection between alternative sets	own original synthesis of desired categories

Figure 3—Experiment structure. Source: created by author.

2.2 Statistical trial

In Appendix 6.3, the raw experiment data is given with full analysis in Appendix 6.4. The analysis was conducted using Python with the libraries `numpy`, `pandas`, `SciPy`, and `seaborn`. The alternative hypothesis stated the redesign will be preferred over the original configuration, meaning that the original will be chosen less than half of the time. However, the expectation according to the null hypothesis was the original categories would be chosen equally or more often than the redesign. In the experiment, 73% percent of participants selected the redesign categories, as opposed to 27% for the original categories (see Appendix 6.4). To test the significance of this result, a one-sample t-test of the response rate for all questions in phase one per redesign category was used with an expected value of 50% (0.5). The resulting p-value was `1.4885369660896163e-11`. The alternative hypothesis is thus **accepted**.

2.3 Analysis and next steps

Table 2—Experiment ranking of categories

Total Selections	Mean Selection	Category	Type
69	13.8	recent releases	original
59	11.8	browse all	redesign
58	11.6	friend activity	redesign
52	10.4	featured	original
52	10.4	wishlist	redesign
40	8	coming soon	original

The outcome of the experiment is aligned with the expectations. This indicates potential support for the merits of the redesign and new categories over the original categories. In particular, the category ranking as shown in Table 2 can

be used to redesign the prototype. Unfortunately due to the exclusion of the common categories, the results for category desirability are not conclusive. Additionally, the impact of lurking variables must further be investigated and mitigated. From the results, further investigation is needed into the redesigned categories. Namely, the verbiage (expression) of the categories, supporting visual symbols per category, layout, proximity of related categories, and number displayed should be targeted. Additionally, further research should aim to thoroughly document confounding variables & design mitigation strategies.

3 PREDICTIVE EVALUATION—EVOLVING CONTROLS

To evaluate the *evolving controls* concept, a predictive approach was used by creating GOMS models for the main task as well as its decomposition into subtasks based on the data inventory findings (Appendix 6.5). This approach was selected due to its suitability for evaluating early stage efficiency of prototypes, which is fitting for a concept targeting expert users. Appendix 6.6 contains the complete card prototype, of which Figures 4 and 5 display two screens.

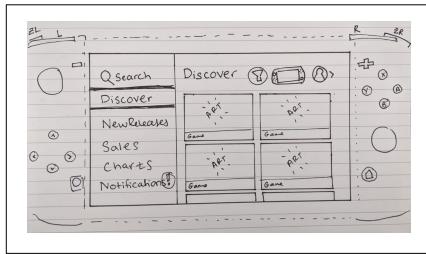


Figure 4—Entry screen. Source: author.

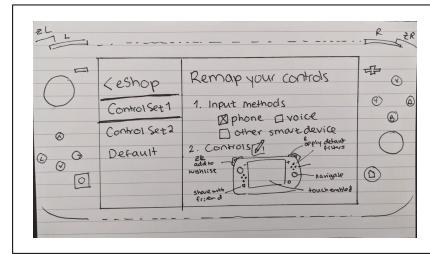


Figure 5—Remapping. Source: author.

The core task studied in this research is the pathfinding of a user to their desired destination in the Nintendo Switch eShop where the ultimate goal is to purchase a new game (not yet owned) that they would want to play. This task can be split into three distinct, non-sequential components: (1) browsing games; (2) identifying interest; and (3) evaluating purchase desire. These can be rephrased as the following subtasks: *discovery* (of a game), *evaluation* (based on the individual's criteria), and expressing *purchase* intention (through the purchase order).

3.1 Resulting models

Miniature versions of the developed GOMS models are given below in Figures 6–9. Full-scale versions of these can be found in Appendix 6.7.

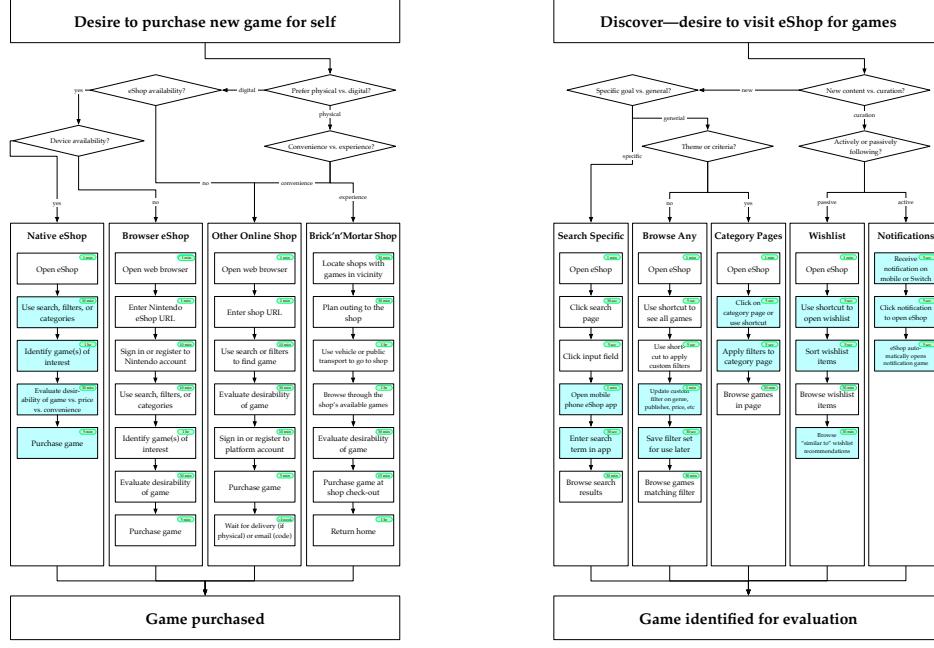


Figure 6—Core task. Source: author.

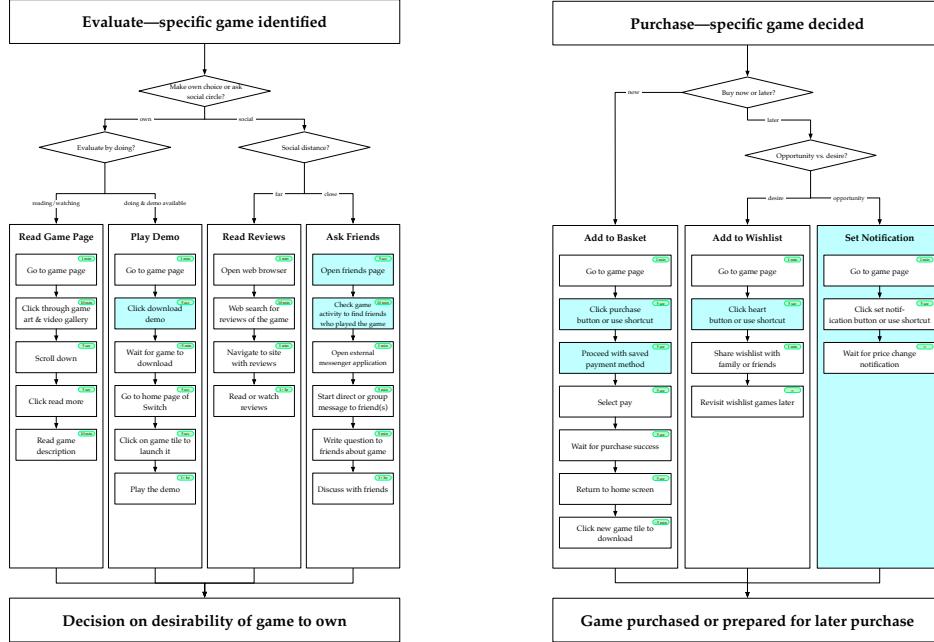


Figure 8—Evaluation subtask. Source: author.

Figure 7—Discovery subtask. Source: author.

Each model contains the initial situation at the top, conditional selectors, methods based on the selectors, and an end goal. Within each method, sequential operator (**Click input field**) are indicated along with estimated durations for completion (**1 min**). Certain methods and operators have a blue background (**Open mobile phone eShop app**) to indicate where they differ from the original Nintendo Switch eShop interface. While the origi-

Figure 9—Purchase subtask. Source: author.

nal plan was to create a separate model set for the original interface, a finding of the modeling exercise was that the models shared too much structure to justify the effort of creating further models. Instead, the blue background color was used to draw comparison between the original interface vs. the redesign.

3.2 Model interpretation

The majority of observed efficiency gains across all task models were an outcome of the shorter estimated duration to utilize a controller shortcut to navigate to a destination or trigger an action as opposed to clicking within the eShop interface. However, in terms of shorter steps or sequences to arrive at the end goal, the redesign is very close to the original interface. While efficiency could be increased by allowing even more flexible controller mappings and the creation of more shortcuts, this would come at the cost of putting more mental load on the user to remember the configured shortcuts and not accidentally trigger them (unwanted) during another action. This increase in complexity and mental load for the user may make further customization hurt the intention behind the redesign. Further research would be needed to determine what degree of customization remains helpful vs. harmful. In contrast to the customization aspect of this design alternate, the new notification feature (part of the personalization story) did appear promising from the models. Notifications provide shorter paths for both the *discovery* and *purchase* subtasks. Therefore, further iteration should focus on developing this feature more and investigating how users would want to interact with it.

4 MOVING FORWARD POST-EVALUATION

4.1 Planned activities

Having gone through initial needfinding, brainstorming of design alternatives, prototyping, and now evaluating those alternatives, the next step in the design life cycle is further needfinding. On the basis of the evaluation results, needfinding is required along two distinct dimensions: (1) findings from the existing concepts & prototypes; (2) findings that can inspire new design alternatives. For the former, the goal of the investigation would be to analyze the results, brainstorm further implications for the interface, gain more information from users, raise new questions, and potentially validate (or create) further assumptions. For the latter, the purpose is to revisit the underlying pain points and problem space

with a new perspective based on the research findings and explore further into the user interactions with the Nintendo eShop interface. Informed by the investigation to date, the intention is to be able to ask deeper questions and probe below the surface-level pains with the eShop. Such needfinding is likely again to lead to further design alternatives and prototypes which would again need to be evaluated. Potentially, new concepts from the next cycle may gain priority over the concepts from the current cycle based on the ongoing learnings.

4.2 Outstanding information needs

On the basis of the empirical investigation, its latter two phases (decision between alternatives & original idea synthesis for desired categories) point to further understanding needed into the wants of the user. Specifically, these indicate a revisit is needed to the context and goals items of the data inventory in Appendix 6.5. As a direct outcome of the predictive evaluation, the customization vs. mental load trade-off must be investigated with the users. It is necessary to understand to what degree further customization options help users vs. hinder them and achieve a balance between complexity vs. simplicity. Such findings would benefit not only the modeled design concept, but also the alternative category layout concept and potential future ideas. Furthermore, the modeling exercise raised questions about the granularity and time needed for the sub-tasks, in which situations certain subtasks may be conditional, and what are the selection criteria that may lead users to employ different methods.

4.3 Emergent design alternative possibilities

From the empirical investigation, the highlight was the possibility of customization for the cards on the landing page. Likewise, from the predictive evaluation the core features were the customization and notifications. On the basis of these highlights throughout the experience, a potential design alternative might be one that combines these features. Additionally, recommendations were not deeply explored in this evaluation but consistently mentioned by participants or provided as possible operators or methods in the models. A new design concept that would “build from the best” or most promising aspects could then combine a simplified card layout, customization of cards, a degree of customization for controller mappings & shortcuts, notifications, and recommendations.

4.4 Brainstorming prototype revisions

In addition to what was already discussed in the respective evaluation analyses, both prototypes would have to undergo refinement and further testing before being raised to the next fidelity level. Although the evaluations were generally positive, there will still too many open questions raised and potential new directions highlighted that could be incorporated into the designs. The reason for the decision to not move to higher fidelity despite the positive reception is higher fidelity comes at a higher cost of change, therefore it is more ideal to make more drastic changes now to the concepts with lower fidelity prototypes. As each concept thus would converge towards a more targeted, beneficial, and validated design, then the need would arise for higher fidelity prototypes.

4.5 Next evaluation steps

Assuming the necessary changes have been made, the next evaluation step would be qualitative evaluation. The benefit of this evaluation approach is the ability to gather multi-dimensional, unconstrained feedback from the users with less assumptions about their needs than in an empirical experiment or predictive evaluation. The reasoning behind selecting a qualitative approach is that as investigation has continued, the problem space and possible solution space has only grown. Therefore, qualitative approaches can help further expand the ideation realm and deepen understanding, which is needed at this stage in order to be able to start converging again towards concrete designs. However, after the next design cycle iteration and the further qualitative evaluation, it is then expected to use empirical methods to design experiments to further test the concepts against more concrete metrics.

5 REFERENCES

- [1] Fatykhova, A. A. (2021a). "CS6750, Spring 2021 Assignment M1". Unpublished. URL: https://drive.google.com/file/d/1kLVxgVA-1-vZsd_RTark0GMI3wtx0iX0/view?usp=sharing.
- [2] Fatykhova, A. A. (2021b). "CS6750, Spring 2021 Assignment M2". Unpublished. URL: <https://drive.google.com/file/d/1hHSPhLewfkAmx99YA3YCcQ73q2ueCCxI/view?usp=sharing>.
- [3] Fatykhova, A. A. (2021c). "Custom symbols". Unpublished, icons designed for use in assignments.
- [4] Nintendo of America Inc. (2020). *Parental Controls: Pin Reset*. URL: <https://parentalcontrols.nintendo.com/static/media/confirmation-yoshi.cfc2fe4f.svg> (visited on 02/25/2021).

5.1 In-text symbols

Table 3—Sources and explanations for symbols used in the text

Icon	Description	Source
	Yoshi egg (opens the voice assistant)	Fatykhova [3]
	friends (social shop category)	Fatykhova [3]
	Yoshi (voice assistant avatar & Nintendo character)	modified by author from Nintendo of America Inc. [4]

6 APPENDICES

6.1 Nintendo Switch eShop interface

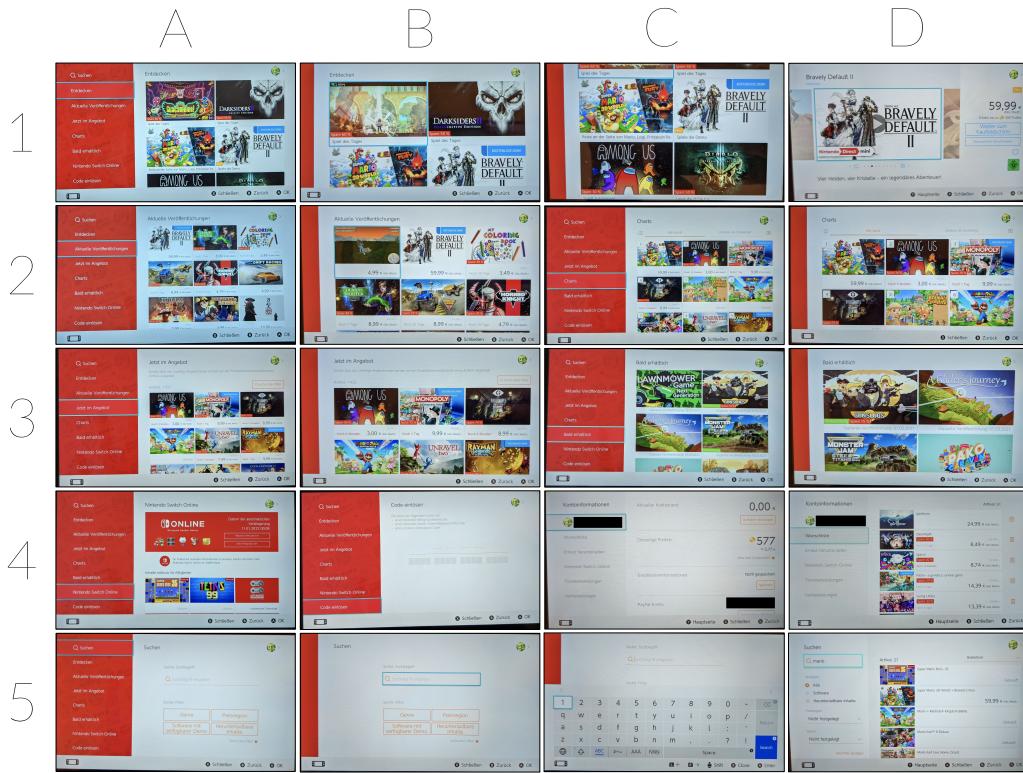


Figure 10—Nintendo Switch eShop interface components arranged in a matrix. Source: screenshots by author from own Nintendo Switch, showing the German eShop.

Table 4—eShop matrix from Figure 10 explained by row & column

	A	B	C	D
1	discover (entry)	discover, focused	discover, scrolled	game detail
2	new releases	new releases, focused	charts	charts, focused
3	sales	sales, focused	coming soon	coming soon, focused
4	Switch Online	code redemption	profile	wishlist
5	search	search, focused	search, input	search, results

Note: each main navigation item (*search, discover, new releases, charts, sales, coming soon, Switch Online*) has both a regular mode with the sidebar fully expanded and a “focused” mode where the sidebar is collapsed. On scrolling, the footer with the control help info disappears. As shown in C5, user input is provided via an on-screen keyboard.

6.2 Experiment design using PeerSurvey

Nintendo Switch eShop Categories

Are you a Nintendo Switch or Switch Lite owner? Participate in this experiment on the eShop categories!

* Required

How old are you?*

under 18
 18-24
 25-34
 35-44
 45-54
 55+

What gender do you identify as?*

female
 male
 other
 prefer not to say

Where are you currently located?*

North America
 South America
 Europe
 Asia
 Africa
 Oceania

Do you own a Nintendo Switch or Switch Lite?*

Switch
 Switch Lite
 both
 I do not personally own either but have access to a Switch or Switch Lite
 not applicable

How long have you owned your Switch or Switch Lite? If you own multiple devices, pick the older one.*

under 6 months
 6 to 11 months
 1 to 2 years
 over 2 years
 not applicable

How comfortable do you feel communicating in English?*

1 - very uncomfortable
 2 - uncomfortable
 3 - neutral
 4 - comfortable
 5 - very comfortable

Figure 11—Experiment survey, part 1. Source: created by author.



The Nintendo Switch eShop today is organized into category pages. In the next section, you will be shown titles of two possible categories and asked to indicate which you prefer.

continue

(1) Which eShop category would you prefer?*

featured
 recent releases

(2) Which eShop category would you prefer?*

featured
 coming soon

(3) Which eShop category would you prefer?*

featured
 wishlist

(4) Which eShop category would you prefer?*

featured
 friend activity

(5) Which eShop category would you prefer?*

featured
 browse all

(6) Which eShop category would you prefer?*

recent releases
 coming soon

(7) Which eShop category would you prefer?*

recent releases
 wishlist

(8) Which eShop category would you prefer?*

recent releases
 friend activity

(9) Which eShop category would you prefer?*

recent releases
 browse all

(10) Which eShop category would you prefer?*

coming soon
 wishlist

(11) Which eShop category would you prefer?*

coming soon
 friend activity

(12) Which eShop category would you prefer?*

coming soon
 browse all

(13) Which eShop category would you prefer?*

wishlist
 friend activity

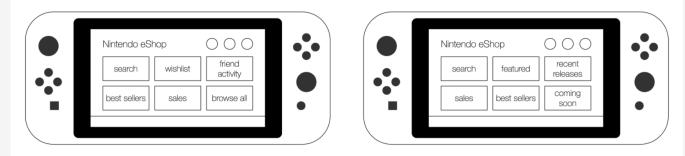
(14) Which eShop category would you prefer?*

wishlist
 browse all

(15) Which eShop category would you prefer?*

friend activity
 browse all

Figure 12—Experiment survey, part 2. Source: created by author.



The image shows two side-by-side versions of a mobile game console's eShop interface. Both screens have a black header with three circular icons and a black footer with three circular icons. The left screen has a 'search' button at the top left, followed by 'wishlist' and 'friend activity'. Below these are three buttons: 'best sellers', 'sales', and 'browse all'. The right screen has a 'search' button at the top left, followed by 'featured' and 'recent releases'. Below these are three buttons: 'sales', 'best sellers', and 'coming soon'.

Of these two interfaces, which interface would you prefer?*

left
 right

Please briefly explain the reason for your choice in the previous question.*

Type answer here...

If you could propose any category for the eShop, what would be your ideal categories? Please write them here as a comma-separated list (e.g., "category 1,category 2").*

Type answer here...

Figure 13—Experiment survey, part 3. Source: created by author.

6.3 Raw experiment data

Listing 1—Raw data as table

response	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	q11	q12	q13	q14	q15	q16	q17	q18	q19	q20	q21	q22	q23	q24	q25			
1	25-34	male	europe	switch	1 over 2 years	5 - very comfortable	continue	recent releases	coming soon	wishlist	friend activity	browse all	recent releases	recent releases	recent releases	coming soon	friend activity	browse all	wishlist	browse all	left	i picked up because more	coming soon,	browsing seller,	browsing all,			
																						i am always	important to	sales				
																						especially if	they include	good stuff	sections in it,			
																						but i would	prefer to have	new	section maybe			
																						in place of	in the	activities				
a	35-44	male	north america	switch	1 to 2 years	4 - comfortable	continue	recent releases	featured	wishlist	friend activity	browse all	coming soon	wishlist	friend activity	recent releases	coming soon	friend activity	browse all	friend activity	browse all	browse all	right	i'd pre prefer	search, new	releases,	of the two,	
																						coming soon,	coming soon,	and	activity, etc			
																						and wishlist	and	activity				
3	35-44	male	asia	switch lite	6 to 11 months	5 - very comfortable	continue	featured	featured	wishlist	friend activity	featured	recent releases	wishlist	friend activity	recent releases	wishlist	friend activity	coming soon	wishlist	wishlist	friend activity	left	it includes	titles, games	of 6.		
																						and friend	accessed under	(action/rpg/	entire/rpg/			
4	25-34	male	north america	switch	over 2 years	5 - very comfortable	continue	featured	coming soon	featured	featured	browse all	coming soon	recent releases	recent releases	recent releases	coming soon	coming soon	browse all	wishlist	wishlist	browse all	right	i would	most played	titles, genre	titles, genres	
																						be better off	under the	best menu	or something			
																						probably better	also friend	activity	under a social			
																						than the shop	as	interface as	the shop			
5	18-24	male	north america	i do not personally own a switch or switch lite	not applicable	5 - very comfortable	continue	recent releases	coming soon	wishlist	friend activity	featured	recent releases	wishlist	friend activity	recent releases	coming soon	friend activity	coming soon	friend activity	wishlist	friend activity	left	it includes mp	best sellers, preferences	wishlist	more than right	
																						best sellers,	best sellers,	wishlist	wishlist			
6	35-44	female	north america	switch	1 to 2 years	5 - very comfortable	continue	featured	featured	friend activity	browse all	recent releases	wishlist	friend activity	browse all	wishlist	friend activity	browse all	friend activity	browse all	friend activity	left	i usually rely	deals, genres	classe,	on friends		
																						on action	to nonaction	decide what	is silly, family			
7	18-24	male	north america	switch	over 2 years	5 - very comfortable	continue	featured	coming soon	wishlist	featured	featured	coming soon	wishlist	friend activity	recent releases	wishlist	coming soon	coming soon	wishlist	wishlist	friend activity	left	i get left one	next game to	which i think	is cool	
																						has wishlist	ch cool	op, mario, zelda	op, mario, zelda			
8	25-34	male	north america	not applicable	not applicable	5 - very comfortable	continue	recent releases	coming soon	featured	friend activity	browse all	recent releases	recent releases	friend activity	browse all	coming soon	coming soon	browse all	friend activity	wishlist	friend activity	left	to the left	activity while	on the left	category	
																						can be a	a button which	activity interface	minigames, o			
																						activity while	the instance	even dice	activity			
																						is on the right	does not have	this would	is not able			
																						to easily	access my	friends	activity			
9	18-24	male	south america	switch	1 to 2 years	5 - uncomfortable	continue	recent releases	featured	featured	featured	browse all	recent releases	recent releases	recent releases	coming soon	coming soon	coming soon	wishlist	wishlist	friend activity	left	activity	maybe there	category for	activity		
																						on the left	button while	activity	activity			
10	25-34	male	north america	i do not personally own a switch or switch lite	not applicable	5 - very uncomfortable	continue	recent releases	featured	featured	friend activity	browse all	recent releases	recent releases	friend activity	recent releases	wishlist	friend activity	browse all	friend activity	browse all	friend activity	left	i really don't	recent releases	button while	button while	
																						button while	button a	button while	button while			
																						button b	button b	button b	button b			
11	25-34	female	north america	switch	over 2 years	5 - very comfortable	continue	recent releases	coming soon	featured	friend activity	browse all	recent releases	recent releases	recent releases	coming soon	friend activity	browse all	friend activity	browse all	browse all	right	i don't think	would use the	feature	feature		
																						would use the	button a	button b	button b			
12	18-24	male	south america	both	under 6 months	5 - neutral	continue	featured	coming soon	featured	featured	featured	coming soon	recent releases	friend activity	recent releases	coming soon	browse all	friend activity	wishlist	friend activity	right	it has been	search, browses	best sellers,	all best		
13	18-24	male	north america	switch	1 to 2 years	5 - very comfortable	continue	featured	featured	featured	featured	browse all	recent releases	recent releases	friend activity	recent releases	browse all	wishlist	coming soon	browse all	browse all	left	based on	your previous purchases	previous purchases	previous purchases		

14	25-34	male	north america	switch	1 to 2 years	5 - very comfortable	continue	recent releases	coming soon	wishlist	friend activity	browse all	recent releases	recent releases	friend activity	recent releases	wishlist	friend activity	browse all	friend activity	browse all	browse all	which i would prioritize	i friend	browse all,	
15	25-34	male	north america	both	6 to 11 months	5 - neutral	continue	recent releases	coming soon	featured	featured	featured	friend activity	browse all	recent releases	recent releases	recent releases	recent releases	friend activity	coming soon	wishlist	wishlist	browse all	left	activity for friends	activity, best sellers,
16	25-34	male	north america	switch	under 6 months	4 - comfortable	continue	recent releases	coming soon	featured	featured	featured	friend activity	browse all	recent releases	recent releases	recent releases	recent releases	friend activity	coming soon	browse all	friend activity	browse all	left	is a great seller.	addition, but i featured.
17	18-24	male	north america	switch	1 to 2 years	5 - very comfortable	continue	featured	featured	featured	friend activity	featured	recent releases	recent releases	friend activity	recent releases	wishlist	friend activity	browse all	friend activity	browse all	browse all	left	be a separate bar	search should be a global search	
18	35-44	male	north america	switch lite	6 to 11 months	5 - very uncomfortable	continue	recent releases	coming soon	wishlist	featured	featured	friend activity	browse all	recent releases	recent releases	recent releases	recent releases	friend activity	coming soon	wishlist	wishlist	browse all	left	activity for friends	activity, best sellers,
19	18-24	male	north america	not applicable	not applicable	4 - comfortable	continue	featured	featured	featured	featured	featured	recent releases	friend activity	coming soon	friend activity	friend activity	browse all	left	is included	friend activity.					
20	25-34	female	north america	switch	1 to 2 years	5 - very comfortable	continue	featured	coming soon	wishlist	friend activity	browse all	recent releases	recent releases	recent releases	recent releases	browse all	coming soon	coming soon	browse all	friend activity	browse all	right	don't use a free	wishlist	
21	25-34	male	north america	switch	over 2 years	1 - very uncomfortable	continue	recent releases	coming soon	wishlist	featured	browse all	recent releases	wishlist	recent releases	recent releases	wishlist	coming soon	browse all	wishlist	browse all	browse all	left	easy to	friend activity	
22	35-44	male	north america	both	6 to 11 months	1 - very uncomfortable	continue	recent releases	featured	featured	featured	recent releases	browse all	recent releases	recent releases	recent releases	browse all	coming soon	friend activity	browse all	friend activity	browse all	left	actually no	actually no preference	
23	25-34	female	north america	switch	6 to 11 months	1 - very uncomfortable	recent releases	featured	wishlist	featured	browse all	recent releases	wishlist	recent releases	browse all	wishlist	recent releases	coming soon	browse all	wishlist	browse all	left	makes most sense to me as a hobby	make a search		
24	18-24	male	asia	switch	over 2 years	5 - very comfortable	continue	featured	featured	featured	featured	recent releases	coming soon	coming soon	coming soon	wishlist	browse all	browse all	right	i have no interest in genres, personal	genres, personal					
25	25-34	male	north america	switch	1 to 2 years	5 - very comfortable	continue	featured	featured	friend activity	featured	recent releases	wishlist	friend activity	recent releases	wishlist	friend activity	coming soon	wishlist	wishlist	browse all	browse all	left	interest in a zed recs	interest in a zed recs	
26	25-34	male	north america	switch	under 6 months	4 - comfortable	continue	featured	coming soon	wishlist	friend activity	browse all	recent releases	recent releases	friend activity	browse all	recent releases	coming soon	coming soon	wishlist	browse all	browse all	left	i really friend	activity veins	
27	25-34	male	asia	switch lite	6 to 11 months	4 - comfortable	continue	featured	featured	wishlist	friend activity	featured	recent releases	wishlist	friend activity	recent releases	wishlist	friend activity	coming soon	friend activity	wishlist	browse all	right	best sellers on nintendo	best sellers on nintendo	

Listing 2–Raw data as CSV

response,Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q10,Q11,Q12,Q13,Q14,Q15,Q16,Q17,Q18,Q19,Q20,Q21,Q22,Q23,Q24,Q25
 1,25–34,male,Europe,Switch,over 2 years,5 – very comfortable,continue,recent releases,coming soon,wishlist,friend activity,browse all,recent releases,recent releases,recent releases,coming soon,friend activity,browse all,wishlist,wishlist,browse all,left,"I picked right because ""browse all"" is always important to have, especially if they include good filtering options in it, but I would prefer to have ""coming soon"" section maybe in place of ""friends activities""","coming soon, best seller, browse all, sales"
 2,35–44,male,North America,Switch,1 to 2 years,4 – comfortable,continue,recent releases,featured,wishlist,friend activity,browse all,coming soon,wishlist,friend activity,recent releases,coming soon,friend activity,browse all,browse all,right,I'd pre prefer to have a mix of the two, pulling out friend activity and wishlist or maybe have 9 boxes, instead of 6.,"Search, new releases, coming soon, wishlist, friend activity , etc."
 3,35–44,male,Asia,Switch Lite,6 to 11 months,5 – very comfortable,continue,featured,featured,wishlist,friend activity,featured,recent releases,wishlist,friend activity,recent releases,wishlist,friend activity,coming soon,wishlist,wishlist,friend activity,left,It includes wishlist and friend activity ,NA
 4,25–34,male,North America,Switch,over 2 years,5 – very comfortable,continue,featured,coming soon,featured,featured,browse all,coming soon,recent releases,recent releases,recent releases,coming soon,browse all,wishlist,wishlist,browse all,right,"Wishlist can usually be accessed under account, but I feel it would be better off under the hamburger menu or something else. Friend activity is probably better under a social aspect rather than the shop interface. As such I would prefer the right.",most played titles , genres (action/rpg/adventure/etc...)"
 5,18–24,male,North America,I do not personally own either but have access to a Switch or Switch Lite,not applicable,5 – very comfortable,continue,recent releases,coming soon,wishlist,friend activity,featured,recent releases,wishlist,friend activity,recent releases,coming soon,friend activity,coming soon,friend activity,wishlist,friend activity,left,matches my preferences more than right,"best sellers , wishlist"
 6,35–44,female,North America,Switch,1 to 2 years,5 – very comfortable,continue,featured,featured,friend activity,browse all,recent releases,wishlist,friend activity,browse all,wishlist,friend activity,browse all,friend activity,left,I usually rely on friends activity to decide what next game to get.,"Deals, Genres, Classics, Nostalgia, Challenging, Silly , Family Games"
 7,18–24,male,North America,Switch,over 2 years,5 – very comfortable,continue,featured,coming soon,wishlist,featured,featured,coming soon,wishlist,friend activity,recent releases,wishlist,coming soon,coming soon,wishlist,wishlist,friend activity,left,The left one has wishlist which I think is the most important category .,"Multiplayer,Couch co-op,Mario,Zelda"
 8,25–34,male,North America,not applicable,not applicable,5 – very comfortable,continue,recent releases,coming soon,featured,friend activity,browse all,recent releases,recent releases,friend activity,browse all,coming soon,coming soon,browse all,friend activity,wishlist,friend activity,left,The interface to the left has a button which shows friend activity while the interface on the right does not have this. I would like to be able to easily access my friend's acitvity ,,"Maybe there could be a category for game demos, mini games, or even DLC"
 9,18–24,male,South America,Switch,1 to 2 years,2 – uncomfortable,continue,recent releases,featured,featured,browse all,recent releases,recent releases,recent releases,recent releases,coming soon,coming soon,wishlist,wishlist,friend activity,left,Easy-to-use ,Friend
 10,25–34,male,North America,I do not personally own either but have access to a Switch or Switch Lite,not applicable,5 – very comfortable,continue,recent releases,featured,featured,friend activity,browse all,recent releases,recent releases,friend activity,recent releases,wishlist,friend activity,browse all,friend activity,browse all,friend activity,left,"While I don't really need the wishlist button, a browse all seems necessary ",recent releases,featured,friend activity,best sellers,search,browse all"
 11,25–34,female,North America,Switch,over 2 years,5 – very comfortable,continue,recent releases,coming soon,featured,friend activity,browse all,recent releases,recent releases,recent releases,recent releases,coming soon,friend activity,browse all,friend activity,browse all,browse all,right,I don't think I would use the wishlist feature,For You (a recommendation list based on your previous purchases)
 12,18–24,male,South America,both,under 6 months,3 – neutral,continue,featured,coming soon,featured,featured,coming soon,recent releases,friend activity,recent releases,coming soon,browse all,friend activity,wishlist,friend activity,right,na,na
 13,18–24,male,North America,Switch,1 to 2 years,5 – very comfortable,continue,featured,featured,featured,browse all,recent releases,recent releases,recent releases,browse all,wishlist,coming soon,browse all,wishlist,browse all,browse all,left ,Has best sellers and browse all which I would prioritize ,,"Search , browse all , best sellers , sales"
 14,25–34,male,North America,Switch,1 to 2 years,5 – very comfortable,continue,recent releases,coming soon,wishlist,friend activity,browse all,recent releases,recent releases,friend activity,recent releases,wishlist,friend activity,browse all,friend activity,browse all,left,I think friend activity for active gamers is a great addition. But I do not think search should be a separate bar – there should be global search regardless of the page you are on,"browse all , friend activity , best sellers , featured , sales , wishlist "
 15,35–44,male,North America,both,6 to 11 months,3 – neutral,continue,recent releases,coming soon,featured,featured,recent releases,recent releases,recent releases,recent releases,recent releases,coming soon,friend activity,coming soon,wishlist,wishlist,browse all,left,n/a,n/a
 16,25–34,male,North America,Switch,under 6 months,4 – comfortable,continue,recent releases,featured,featured,friend activity,browse all,recent releases,recent releases,friend activity,browse all,coming soon,friend activity,browse all,friend activity,browse all,friend activity,left,friend activity and browse all included ,,"search , recently released , friend activity , sales , best seller , browse all"
 17,18–24,male,North America,Switch,1 to 2 years,5 – very comfortable,continue,featured,featured,friend activity,featured,recent releases,recent releases,friend activity,browse all,coming soon,friend activity,browse all,friend activity,browse all,friend activity,right,don't use a wishlist ,free
 18,35–44,male,North America,Switch Lite,6 to 11 months,5 – very comfortable,continue,featured,coming soon,wishlist,featured,browse all,recent releases,wishlist,recent

releases ,browse all ,coming soon ,friend activity ,browse all ,friend activity ,browse all ,friend activity ,left ,easy to understand ,na
19,18-24,male,North America,not applicable,not applicable,4 - comfortable ,continue ,featured ,featured ,recent releases ,recent releases ,recent releases ,recent releases ,coming soon ,friend activity ,browse all ,wishlist ,browse all ,left ,actually no preference ,actually no preference
20,25-34,female,North America,Switch,1 to 2 years,5 - very comfortable ,continue ,featured ,coming soon ,wishlist ,friend activity ,browse all ,recent releases ,recent releases ,recent releases ,browse all ,coming soon ,coming soon ,browse all ,friend activity ,browse all ,browse all ,left ,browse all makes most sense to me as a bottom left corner .,"browse all , sale , search"
21,25-34,male,North America,Switch,over 2 years,1 - very uncomfortable ,continue ,recent releases ,coming soon ,wishlist ,featured ,browse all ,recent releases ,wishlist ,recent releases ,recent releases ,wishlist ,coming soon ,browse all ,wishlist ,wishlist ,browse all ,left ,I think browse all is important to have . I also prefer wishlist as I may be waiting for a sale .,"search ,wishlist ,best sellers ,sales ,new releases and coming soon (combined)"
22,35-44,male,North America,both,6 to 11 months,1 - very uncomfortable ,continue ,recent releases ,featured ,featured ,recent releases ,recent releases ,recent releases ,recent releases ,browse all ,coming soon ,friend activity ,browse all ,friend activity ,browse all ,browse all ,right ,i have no interest in a wishlist or really friend activity veing shown here .,"genre ,personalized recs"
23,25-34,female,North America,Switch,6 to 11 months,1 - very uncomfortable ,recent releases ,featured ,wishlist ,featured ,browse all ,recent releases ,wishlist ,recent releases ,browse all ,wishlist ,coming soon ,browse all ,wishlist ,wishlist ,browse all ,left ,i think i like having search and best sellers on the left . I'm not sure why but they seem like something i'd click more . I like wishlist on there although I could do without friend activity . I also like the browse all section .,genres
24,18-24,male,Asia,Switch,over 2 years,5 - very comfortable ,continue ,featured ,featured ,recent releases ,recent releases ,recent releases ,recent releases ,coming soon ,coming soon ,coming soon ,wishlist ,browse all ,browse all ,right ,,"I would like to see featured and recent releases up first . Following the usual pattern of a grid , where it goes left->right and up->down , the design on the right fits best .","Nintendo Classics ,Indie Games ,Popular on Social Media"
25,25-34,male,North America,Switch,1 to 2 years,5 - very comfortable ,continue ,featured ,featured ,friend activity ,featured ,recent releases ,wishlist ,friend activity ,recent releases ,wishlist ,friend activity ,browse all ,friend activity ,wishlist ,friend activity ,left ,almost the same .,"sale ,wishlist ,featured ,friend activity , new release"
26,25-34,male,North America,Switch ,under 6 months,4 - comfortable ,continue ,featured ,coming soon ,wishlist ,friend activity ,browse all ,recent releases ,recent releases ,friend activity ,browse all ,coming soon ,coming soon ,browse all ,wishlist ,browse all ,friend activity ,left ,best sellers on the left and are easy to be found ,history
27,25-34,male,Asia,I do not personally own either but have access to a Switch or Switch Lite ,6 to 11 months,4 - comfortable ,continue ,featured ,featured ,wishlist ,friend activity ,featured ,recent releases ,wishlist ,friend activity ,recent releases ,wishlist ,friend activity ,coming soon ,friend activity ,wishlist ,friend activity ,left ,knowing the friend activity is essential to know for me .,"highly rated , most bought"

6.4 Experiment results

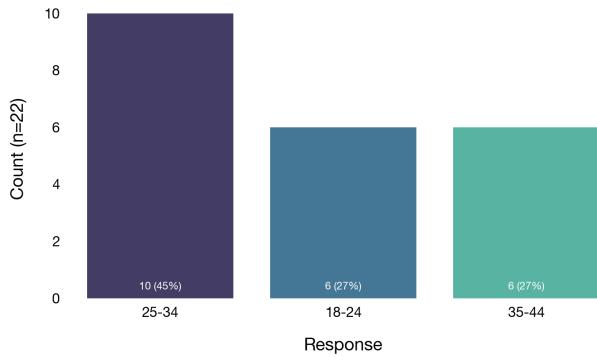


Figure 14—(Q1) "How old are you?"

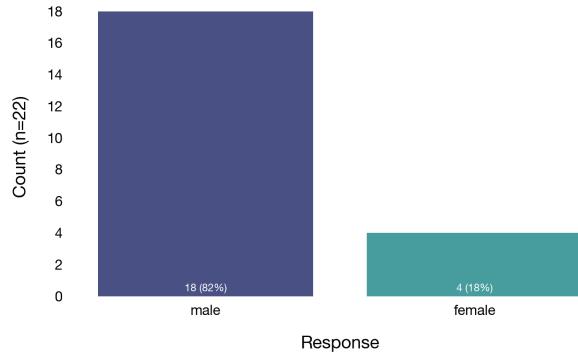


Figure 15—(Q2) "What gender do you identify as?"

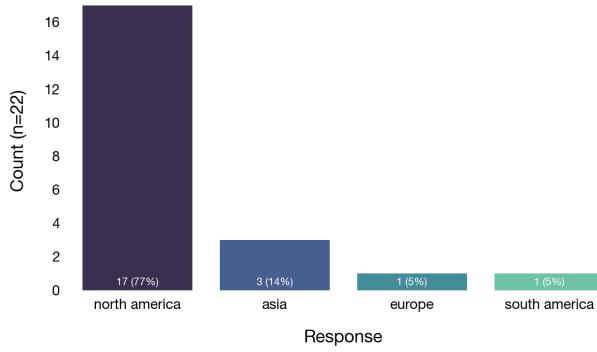


Figure 16—(Q3) "Where are you currently located?"

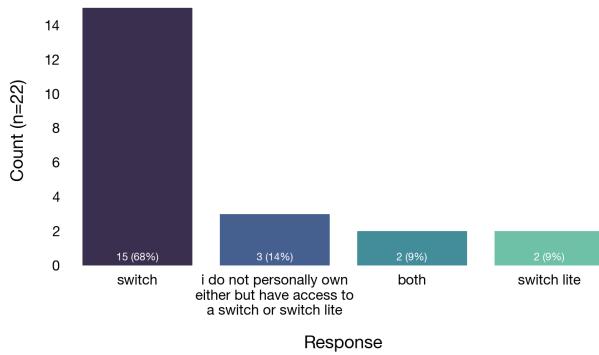


Figure 17—(Q4) "Do you own a Nintendo Switch or Switch Lite?"

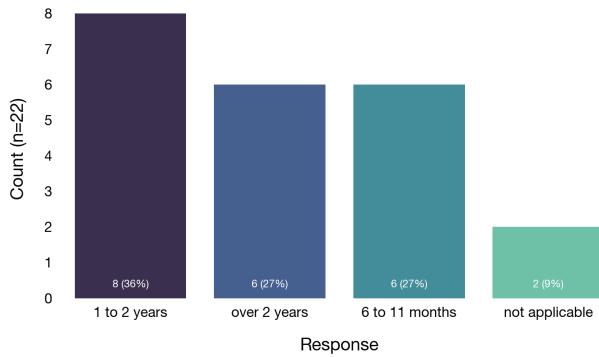


Figure 18—(Q5) "How long have you owned your Switch or Switch Lite? If you own multiple devices, pick the older one."

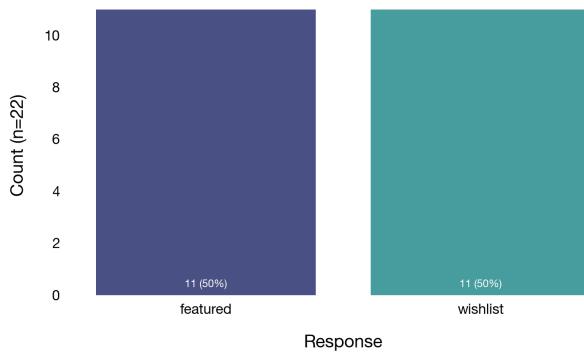


Figure 19—(Q10) "(3) Which eShop category would you prefer?"

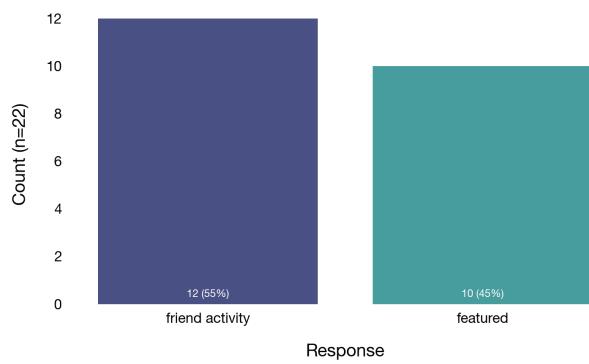


Figure 20—(Q11) "(4) Which eShop category would you prefer?"

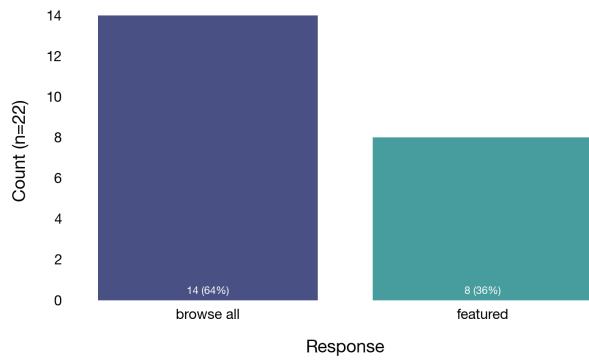


Figure 21—(Q12) "(5) Which eShop category would you prefer?"

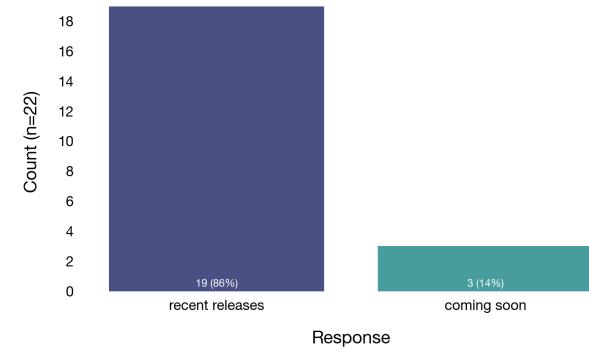


Figure 22—(Q13) "(6) Which eShop category would you prefer?"

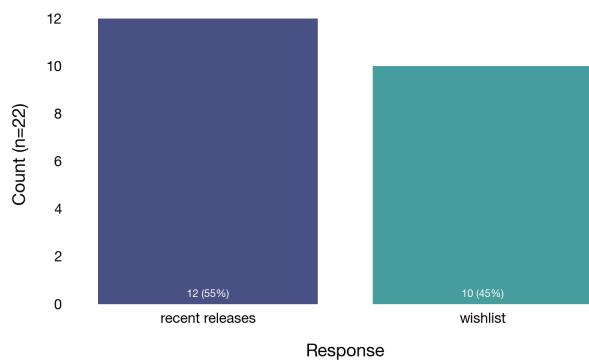


Figure 23—(Q14) "(7) Which eShop category would you prefer?"

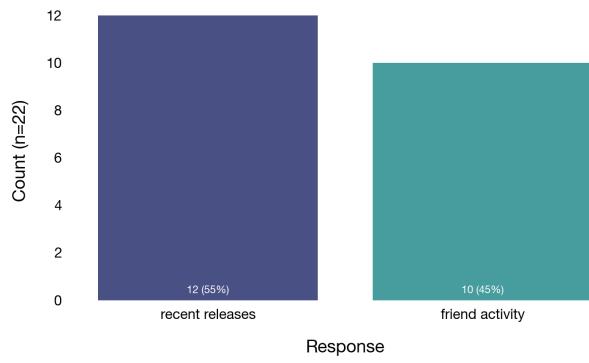


Figure 24—(Q15) "(8) Which eShop category would you prefer?"

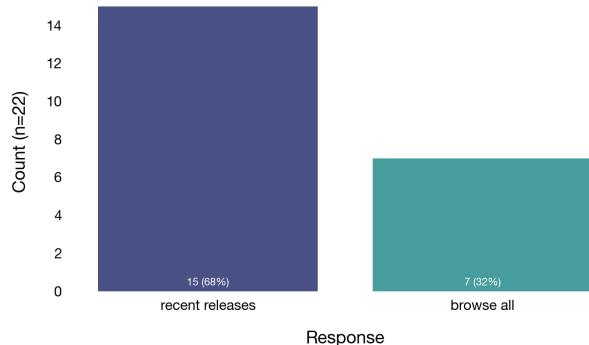


Figure 25—(Q16) "(9) Which eShop category would you prefer?"

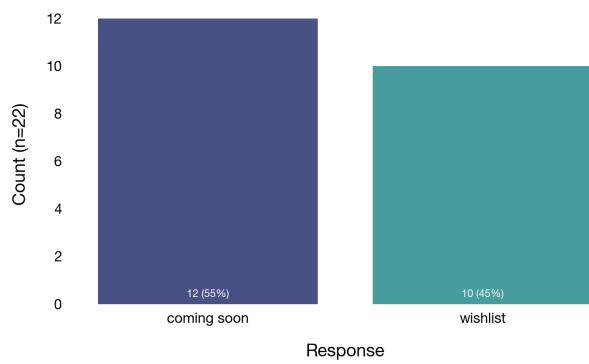


Figure 26—(Q17) "(10) Which eShop category would you prefer?"

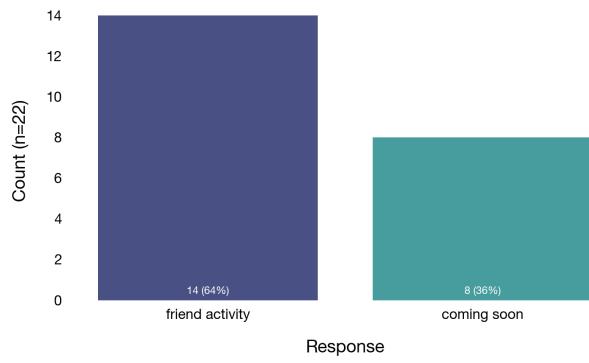


Figure 27—(Q18) "(11) Which eShop category would you prefer?"

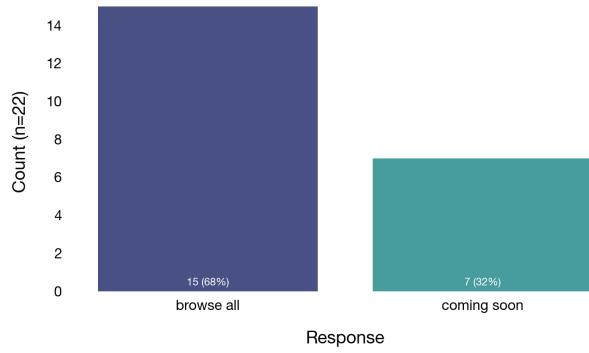


Figure 28—(Q19) "(12) Which eShop category would you prefer?"

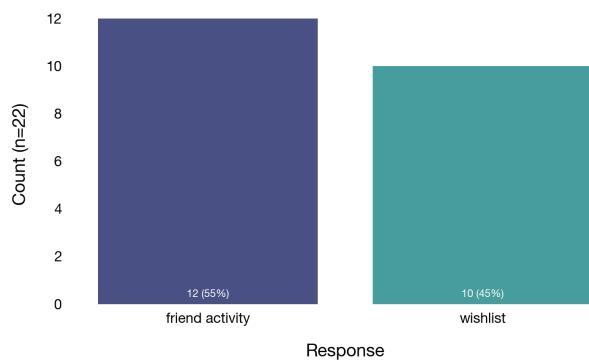


Figure 29—(Q20) "(13) Which eShop category would you prefer?"

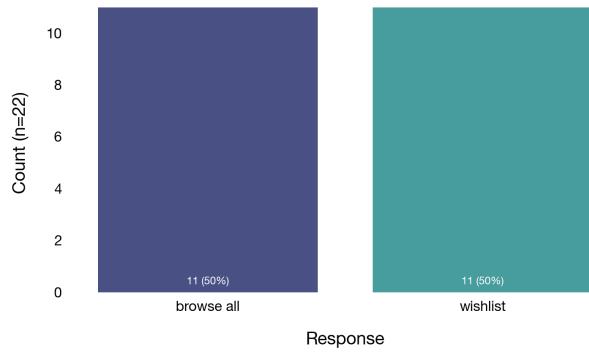


Figure 30—(Q21) "(14) Which eShop category would you prefer?"

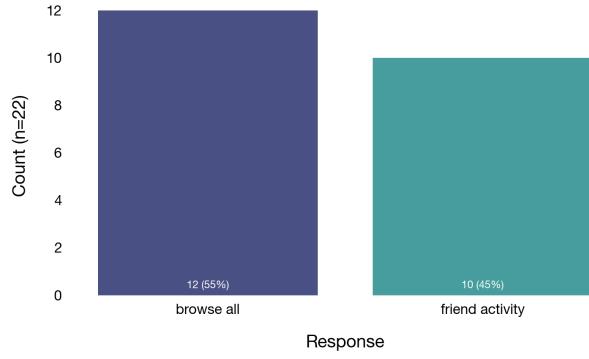


Figure 31—(Q22) "(15) Which eShop category would you prefer?"

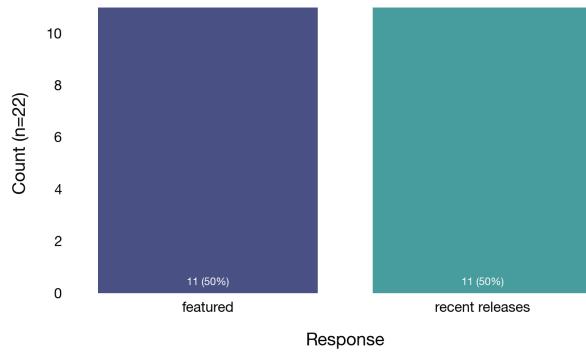


Figure 32—(Q8) "(1) Which eShop category would you prefer?"

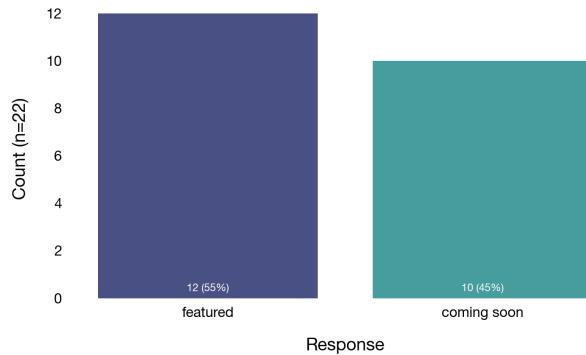


Figure 33—(Q9) "(2) Which eShop category would you prefer?"

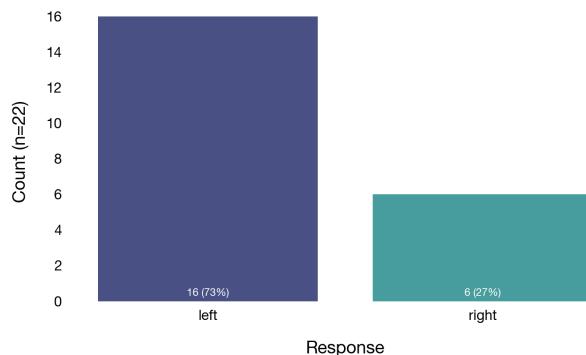


Figure 34—(Q23) "Of these two interfaces, which interface would you prefer?"

6.5 Data inventory

The following is an excerpt from past needfinding research (Fatykhova, 2021).

"Who are the users?"—they are primarily between 18–35, split evenly between genders, and have high levels of expertise with video game platforms, the Nintendo Switch console, and the eShop itself. Of the survey target group respondents, the majority (56%) were between the ages of 25–34, followed by 18–24 (37%), and the remainder 35 and older with 44% of respondents identifying as female and 46% male. This is supported also by the demographics of the think-aloud participants and interviewees. From the survey, 63% have owned a Switch for over a year, 28% 6 months up to 1 year, and 9% less than 6 months, while the other approaches' participants owned Switches for several years. Therefore, the implication is that the average user has high expertise with game platforms and the Switch. However, 7% of respondents indicated they have not purchased games through the Nintendo eShop itself, although they have purchased games through other channels (browser eShop, other digital stores such as Amazon, and physical stores) and only 84% indicated they have made purchases through the console eShop, indicating that anywhere between 7–20% of participants may not have used the eShop on the console.

"Where are the users?"—the users who prefer using the Nintendo Switch in docked mode are usually at home, where they have access to an external screen, whereas users who prefer handheld mode or only own a Switch Lite can be at home or commuting. Most survey respondents owned a Nintendo Switch (86%) or both a Switch and Switch Lite (5%), but some only owned a Switch Lite (9%). For those owning a Switch Lite, they only have the option of handheld mode, as it cannot be docked to an external display. Despite this, 42% of participants overall indicated they prefer using it in handheld mode – even though the majority Switch users would have access to docked mode. Likewise, in the think-aloud exercise, the participants both also preferred handheld mode over docked.

"Where is the context of the task?"—as users interact with the eShop, they are also distracted by their social environment (e.g., family members), activities such as ordering food, playing with pets, or even considering playing existing games they own. The survey indicated that most users (88%) purchase games for their own use, as opposed for a family member or friend (21%). The think-aloud exercise and interview participants reported similar contexts and motivations.

"What are their goals?"—most users want to purchase a game for their own entertainment, some make purchases for family members or friends (from the survey), some explore the eShop as a casual entertainment activity (from the interviews), some to identify games to purchase physical copies of, some for expanding their digital collection, and some to support specific game studios (from the interviews).

"What are their needs?"—users must have an internet connection, the Nintendo Switch console, their account password, and a payment method setup. Additionally, users make use of their mobile phones or computers to research games they find on the eShop interface. Regarding the eShop functions, the most frequently used feature on the basis of the survey is the search (70%), followed by discounts (63%), then featured games/best sellers (58%), and finally the wishlist (14%). The areas with the lowest satisfaction ("dissatisfied" or "highly dissatisfied") are the discounts section (21%) and the new releases (14%). The areas with the highest satisfaction are the best sellers and discounts (both 65%), new releases (60%), and the search (54%). Despite the overall satisfaction ratings, many respondents indicated experiencing negative emotions while using the eShop interface.

"What are their tasks?"—physically, users must be holding either the Switch or a controller, whose buttons they manipulate to enter the eShop; cognitively, users identify the area of the eShop they are interested in (e.g., new releases) based on their goal and how to manipulate it (e.g., with filters) to achieve what they are looking for. Socially, users check game ratings and reviews, discuss with friends, coordinate with others for purchasing cooperative games, and look to connect with specific game studios.

"What are their subtasks?"—each task can be broken down into the user manipulating the interface, waiting for it to load, interpreting the result, identifying if their action had the desired result (e.g., filter settings), browsing and comparing games, reading details or watching videos about a specific game, and managing their game wishlist or purchase basket. More specific subtasks identified on the basis of the think-aloud exercise and participant observation include turning on the console, opening the eShop, entering their password, selecting an eShop category, entering the content view, reading game pages, adding/removing items from their wishlist, and searching.

6.6 Card prototype

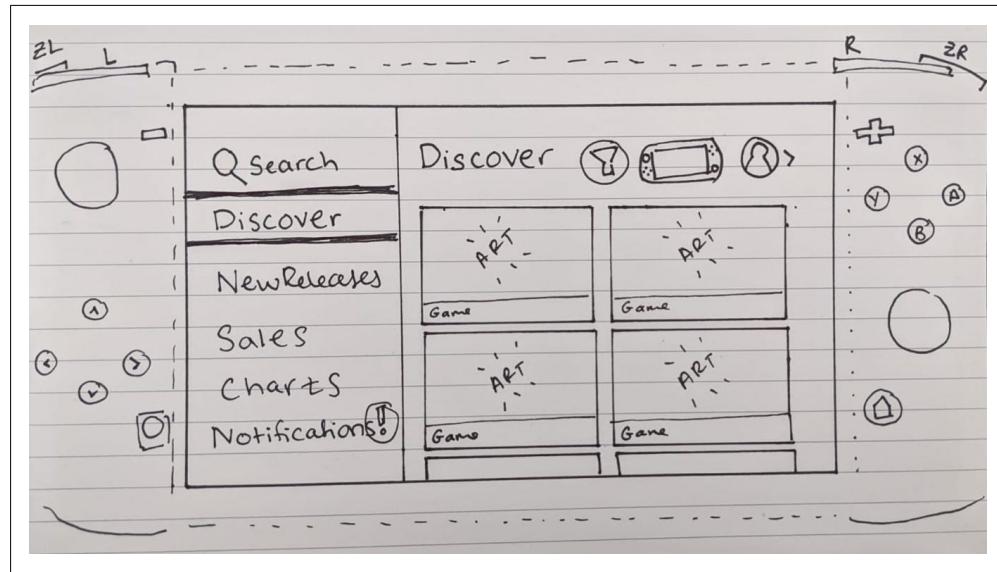


Figure 35—Card prototype, discover entry screen. Source: created by author.

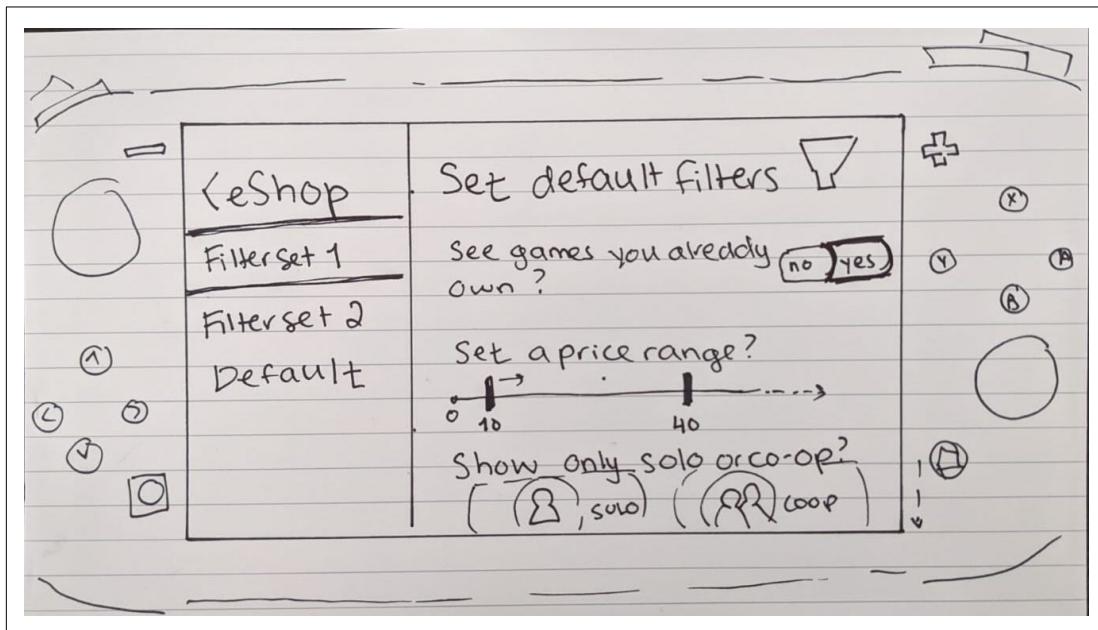


Figure 37—Card prototype, first custom filter setting screen. Source: created by author.

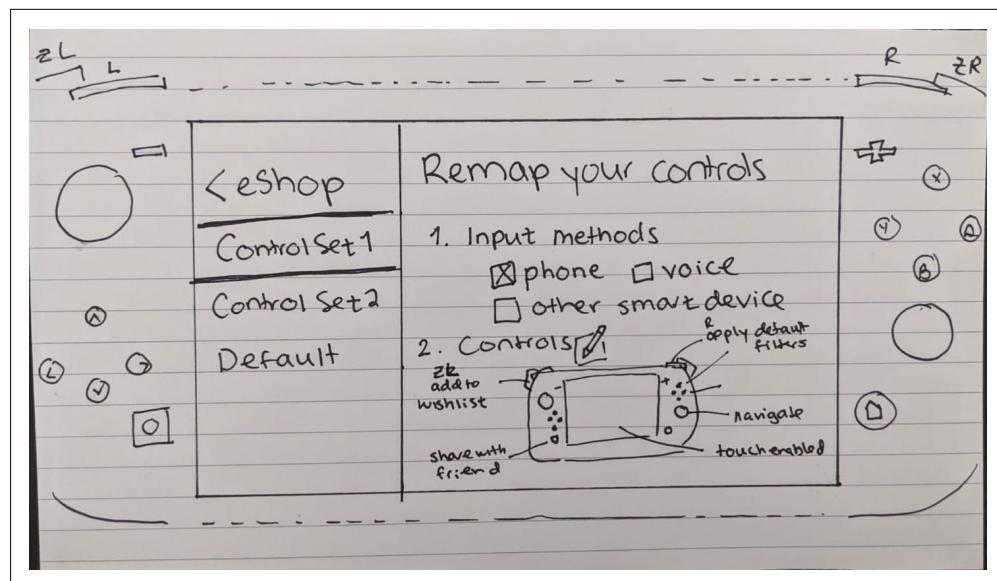


Figure 36—Card prototype, remapping controls and alternative inputs. Source: created by author.

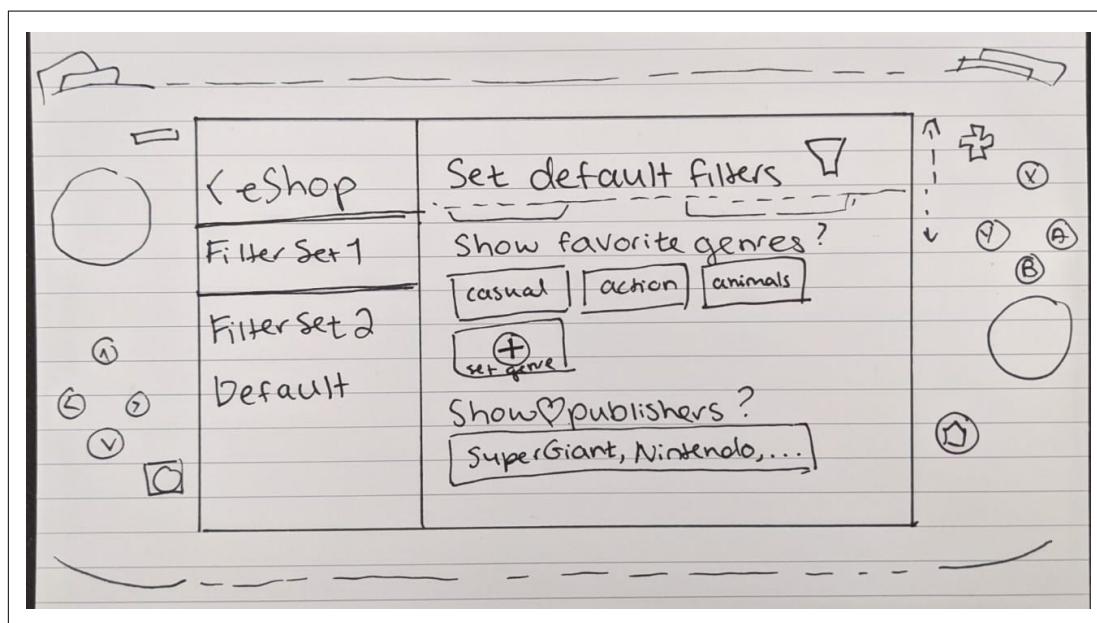


Figure 38—Card prototype, second filter setting screen. Source: created by author.

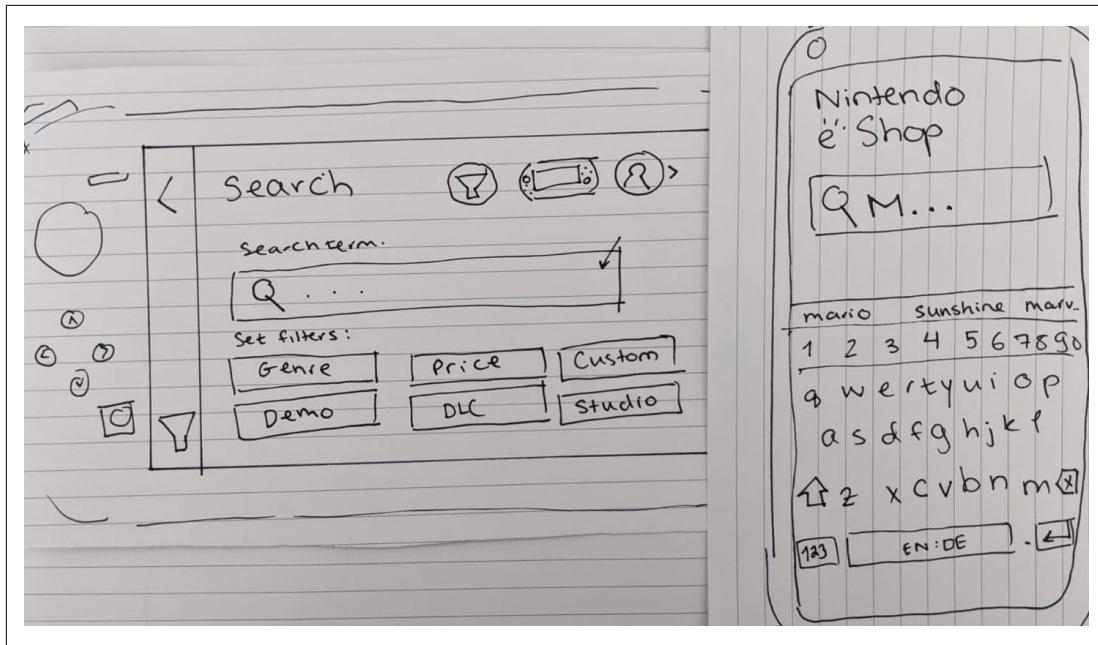


Figure 39—Card prototype, search combination of console and phone. Source: created by author.

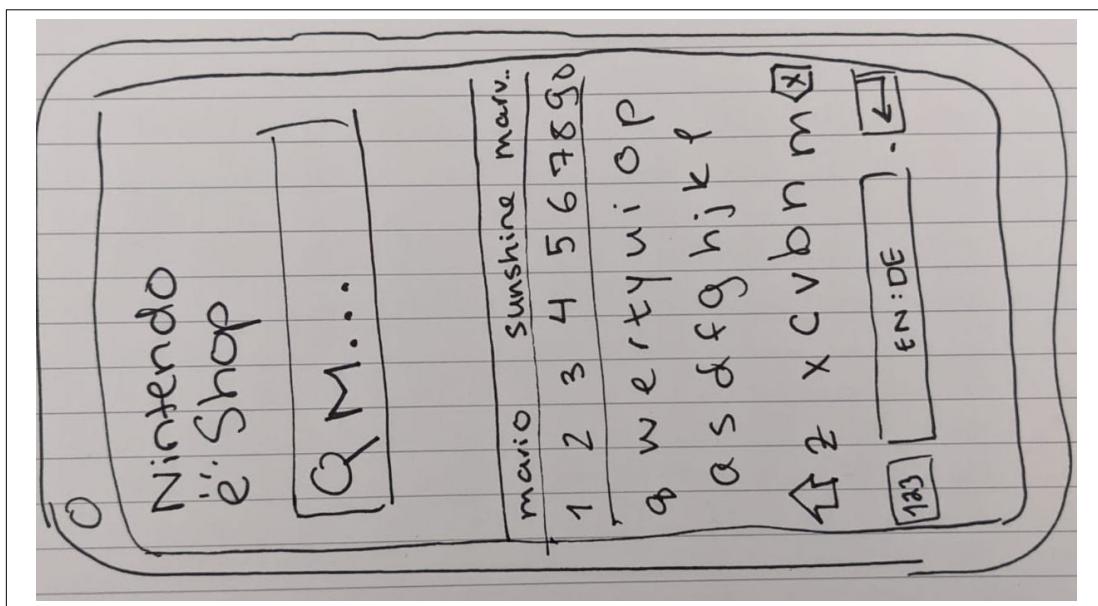


Figure 40—Card prototype, search helper on the companion mobile app outside the console. Source: created by author.

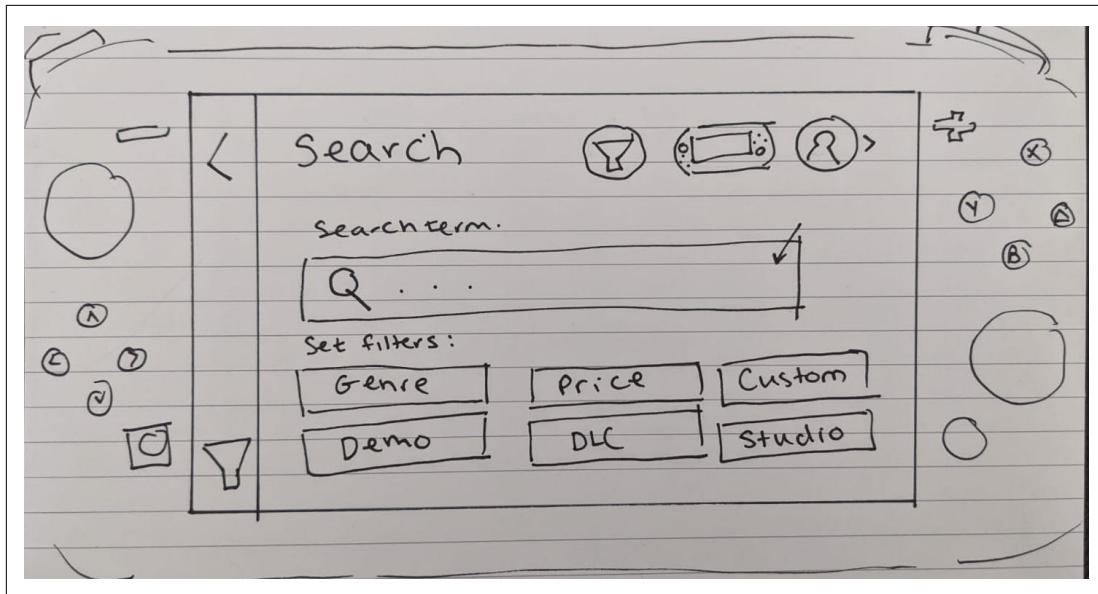


Figure 41—Card prototype, search screen on the console. Source: created by author.

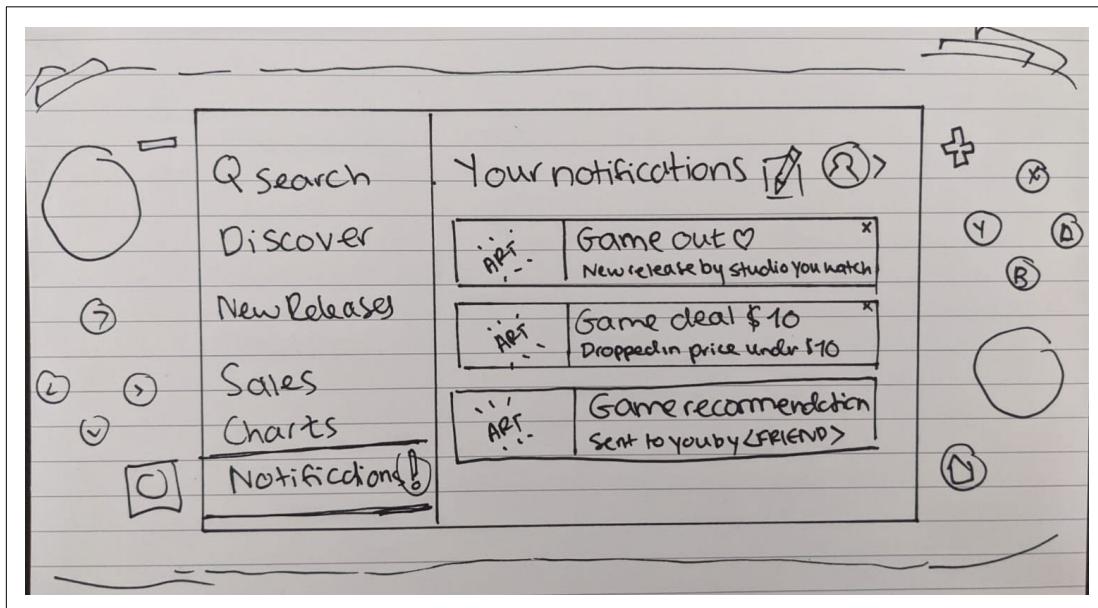


Figure 42—Card prototype, notifications tailored to the user. Source: created by author.

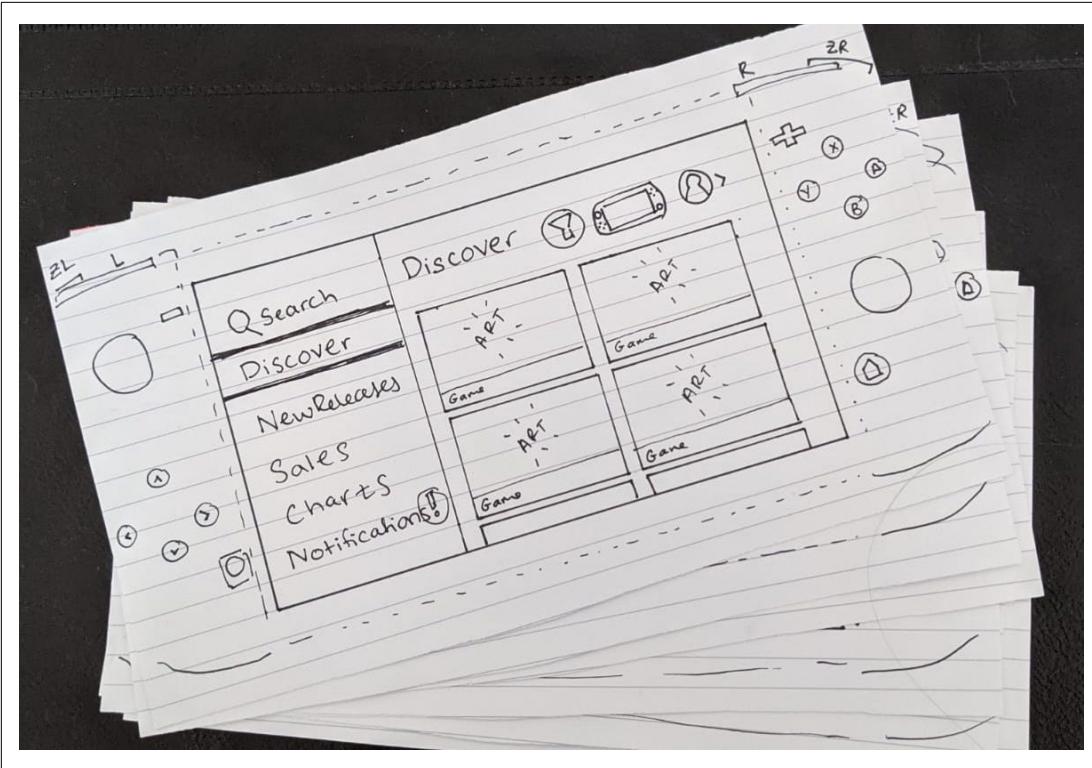
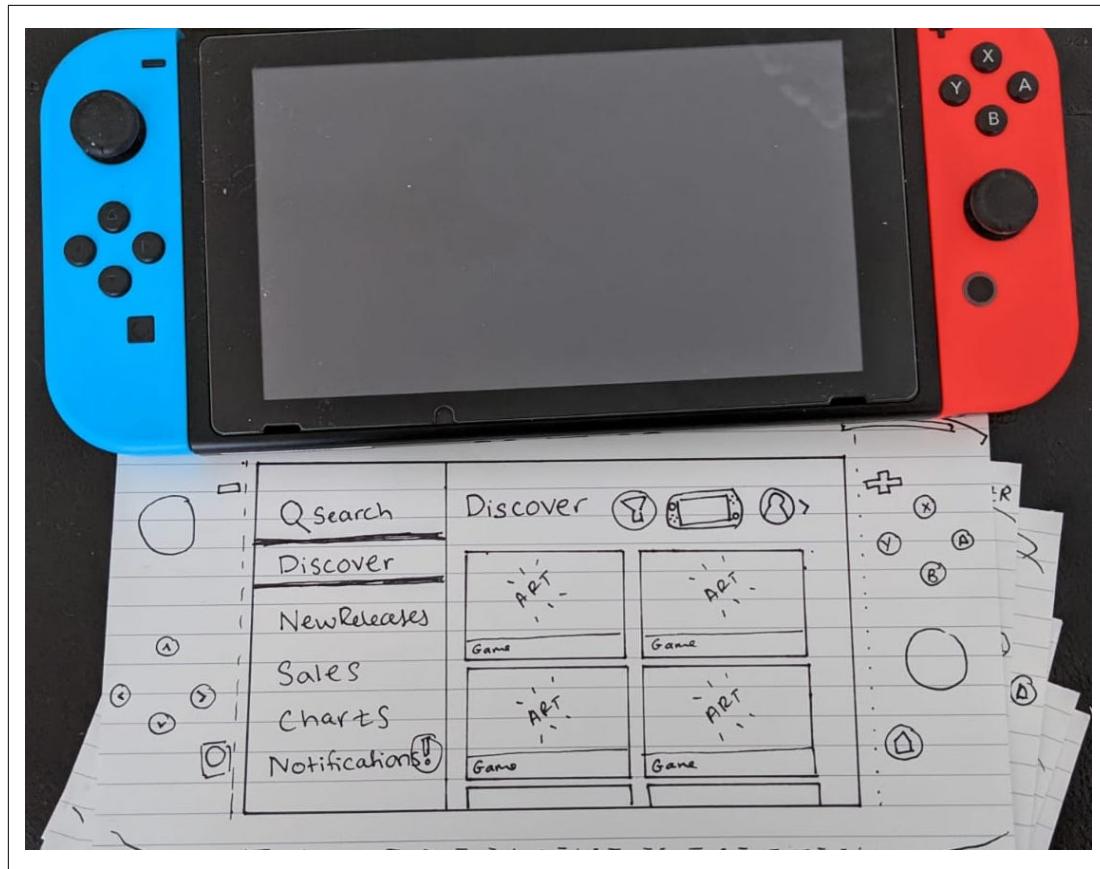


Figure 43—Card prototype, stack of all cards. Source: created by author.



*Figure 44—Card prototype, size comparison to the Switch.
Source: created by author.*



Figure 45—Card prototype, second size comparison to the Switch with the eShop open. Source: created by author.

6.7 GOMS models

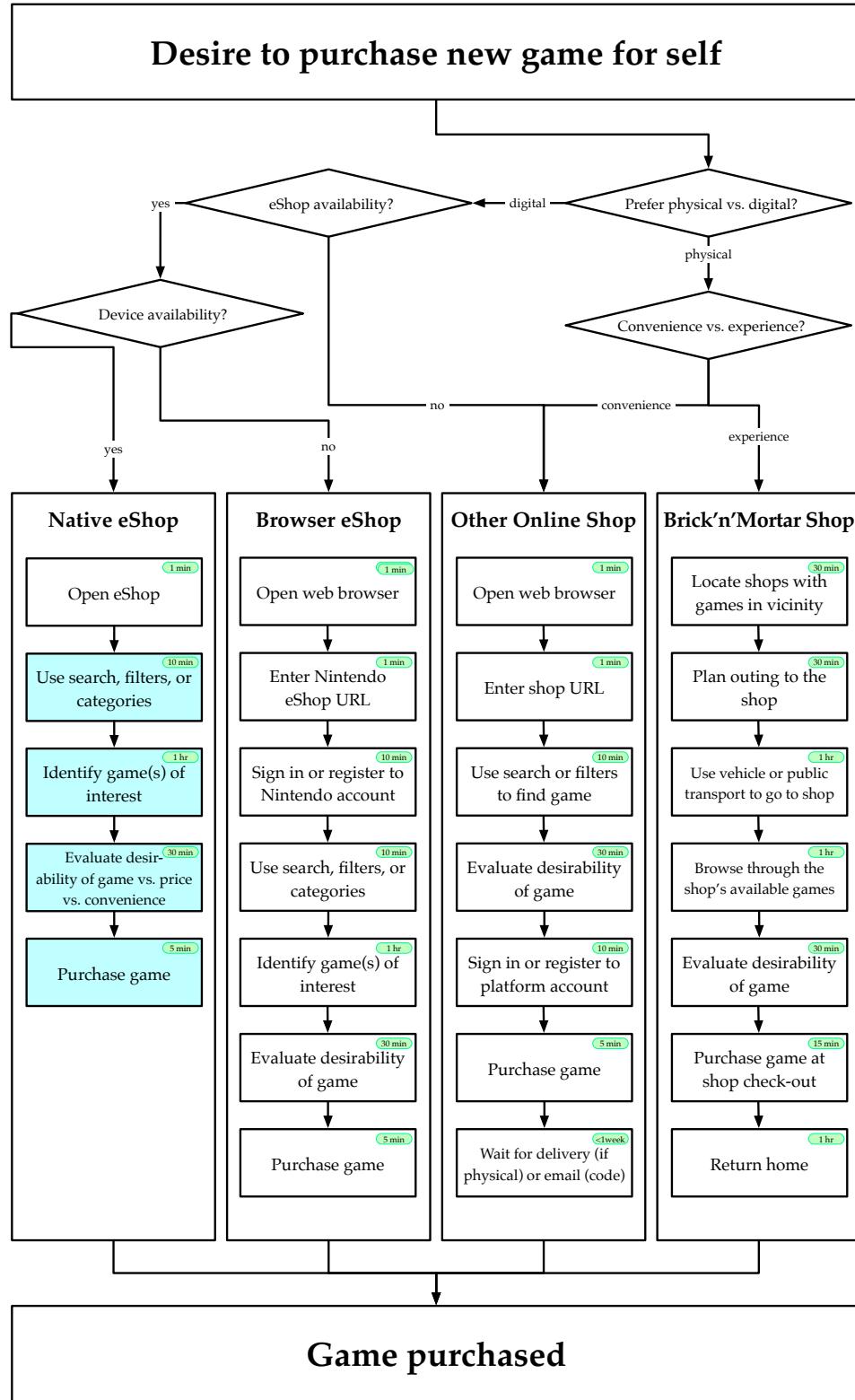


Figure 46—Core task. Source: author.

Discover—desire to visit eShop for games

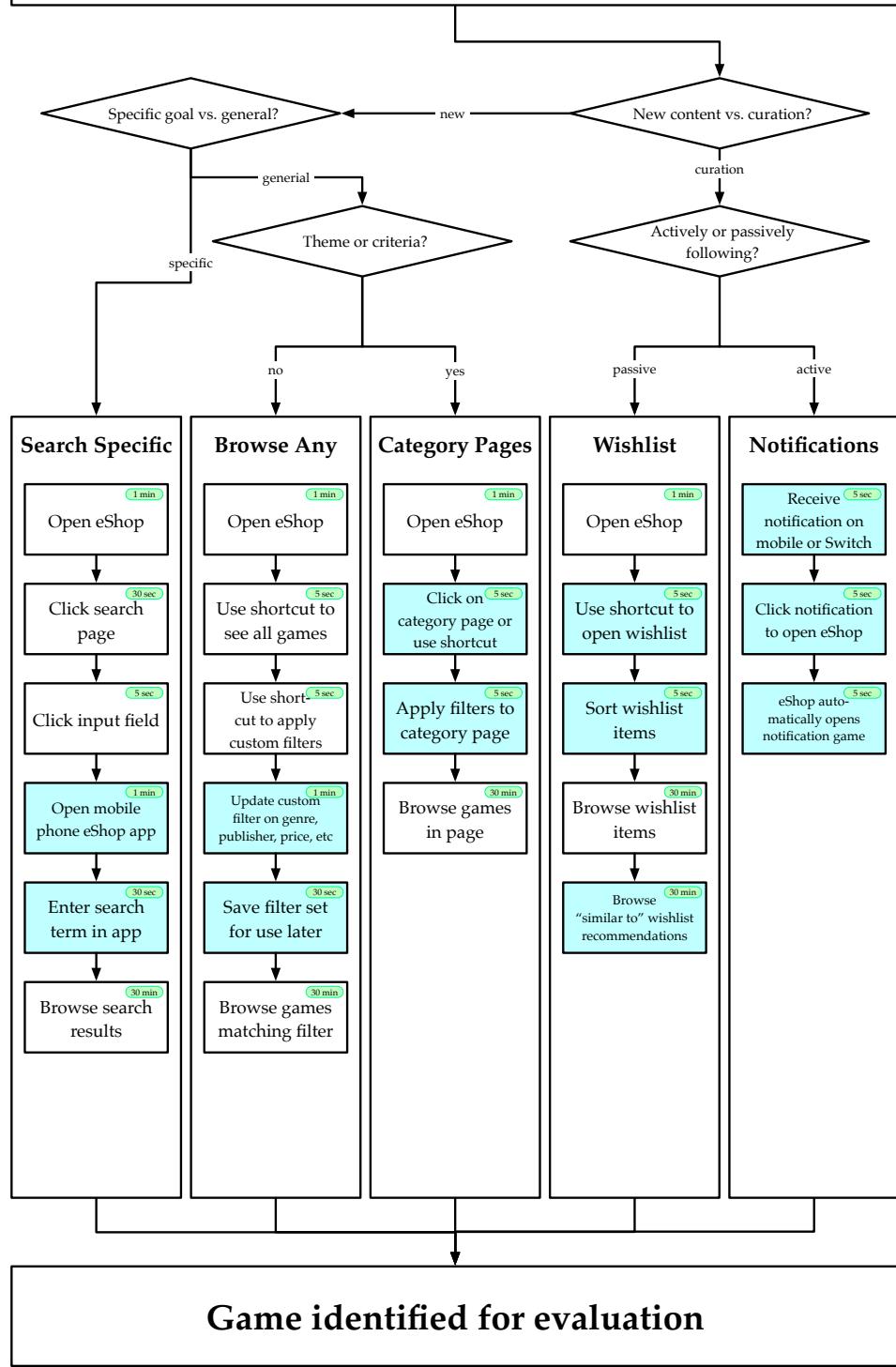


Figure 47—Discovery subtask. Source: author.

Evaluate—specific game identified

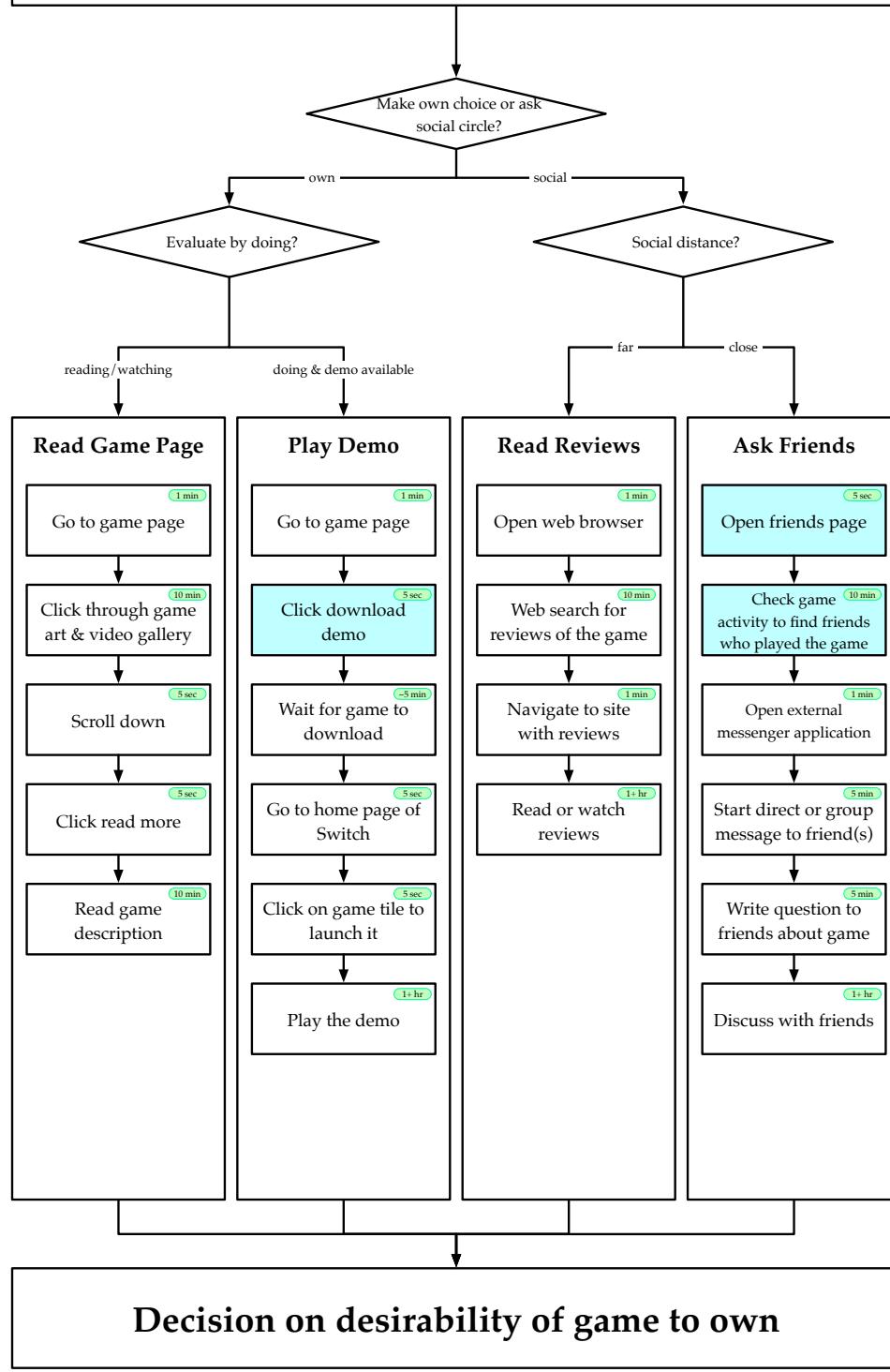


Figure 48—Evaluation subtask. Source: author.

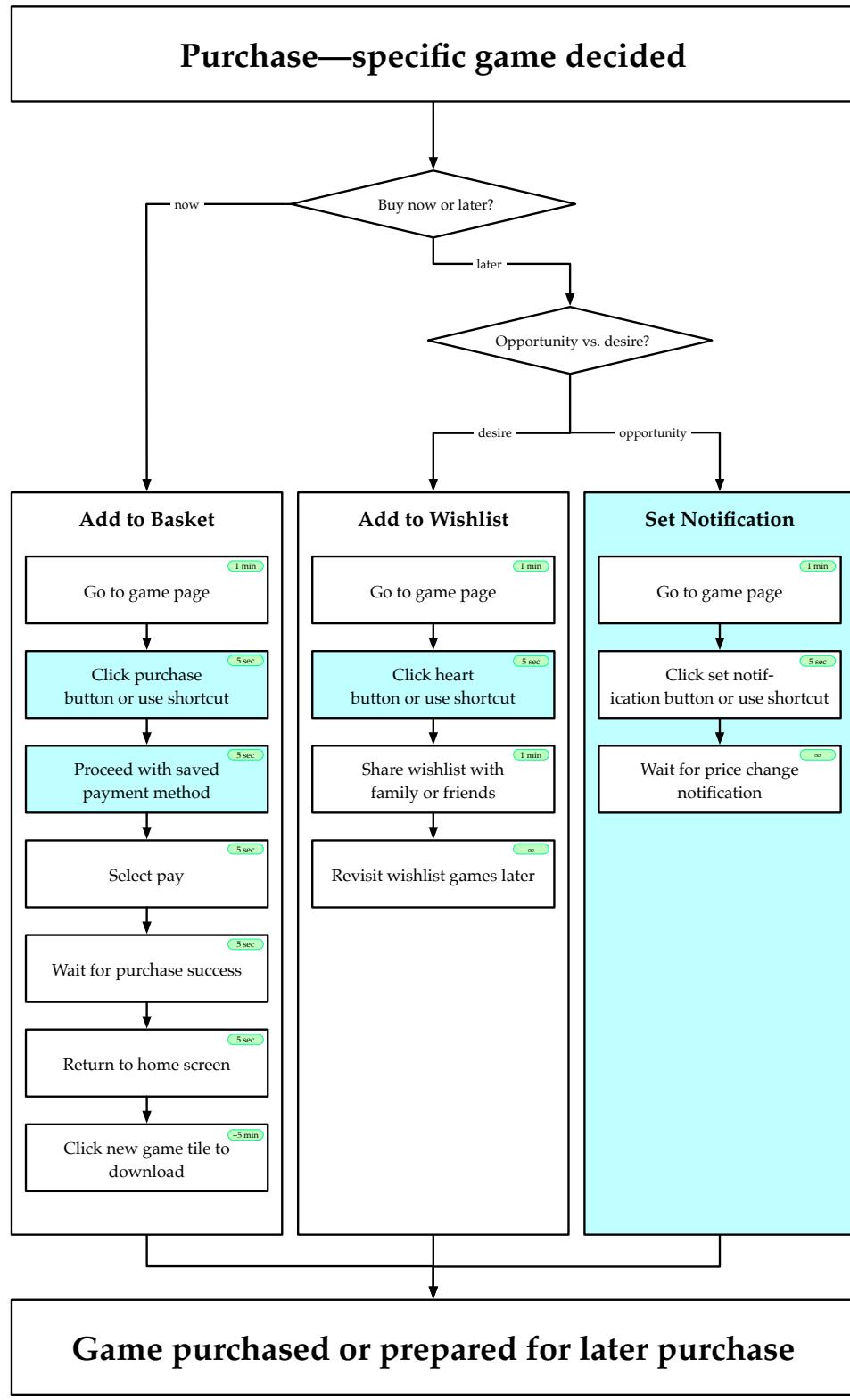


Figure 49—Purchase subtask. Source: author.