Beyond the pink tax: Are Amazon toy shoppers disadvantaged when searching by gender?

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ABSTRACT

Inspired by recent legislation addressing gender bias in the retailing of children's products, this exploratory research delves into the marketing and online retailing of the toy category. The current study investigates online toy search for 'gendered' vs. 'nongendered' toys on Amazon to determine if price discrimination or price steering are present. Despite previous findings of a 'pink tax' indicating higher prices for products marketed to girls and women, no average price difference was found across genders; instead, a clear difference in the categories of toys displayed (and the average prices within these categories) was found. Variation in the presentation of toy categories by gender is noteworthy as the types of toys a child is exposed to can affect the development of skill sets and interests which contribute to human capital development. The results for non-gender-specified toy search depict higher prices on average (evidence of price steering), and can be referred to as a 'yellow tax.' There was also variation in the categories of toys displayed for non-gender-specified vs. gender-specified searches.

Keywords: nongendered toy search, price discrimination, price steering, pink tax

INTRODUCTION

California's Assembly Bill 1084, passed in late 2021, requires retailers to create gender-neutral retail departments for children's toys and other childcare items (leginfo.legislature.ca.gov, 2021). The law goes into effect in January of 2024 and will apply to retailers with 500 or more employees across their California locations. The bill aspires to give consumers greater ability to compare products as well as to reduce signaling to consumers that some toys are only suitable for one gender due to their placement in gender-labeled aisles (leginfo.legislature.ca.gov, 2021, p. 2). 'Gendered' refers to the intended user of toys and other products, and the California law has brought renewed attention to the concept of gendered toys and issues surrounding them (Stanaland and Farhat, 2023). In fact, the marketplace has had some significant shifts on this topic in recent years, with a trend toward gender-neutral retailing and product lines.

Two key equity issues appear when analyzing toys and gender: equity in skill development and equity in price. Toys impart skills, knowledge, attitudes and cultural norms through play. Boys and girls may develop different competencies if they are directed to distinct categories of toys, producing inequality in skill development. The main pricing-related equity issue for gendered products is the 'pink tax,' i.e., the phenomenon of finding higher prices on highly similar products when marketed to female vs. male consumers. Pink taxes can be specific (the pink truck costs more than the blue truck) or general (girl toys cost more on average than boy toys) and often result from price discrimination or price steering. There is overlap in these two equity issues when gendered toy marketing ultimately results in different types of skills having different 'price tags.' California Assembly Bill 1084 attempts to address some of these equity issues at brick-and-mortar shops and has various impacts on consumers and firms (Stanaland & Farhat, 2023). Merchandising approaches in the traditional store (including gender-labeled sections) can affect how many aisles customers view as relevant to their shopping needs, and it is known that the number of aisles shopped impacts unplanned purchases (Inman, Winer & Ferraro, 2009). Of course, modern shoppers have an alternative to in-person shopping: online stores. Online retailing obviously relies on search functions rather than the traditional store merchandising approach of grouping products in labeled aisles. You tell the online store what you want by performing a keyword search, and an algorithm provides you with a listing of the best matches. How might the search terms a consumer uses (gender-specified vs. non-specified) influence the product choices presented to that consumer?

This research examines online toy shopping and how gender-specified vs. non-specified search might illustrate the pink tax as well as produce variations in product results. This paper will review the gendering of toys, online price discrimination and steering, and then take an exploratory look at how gender-specified search queries influence results in the toy product category.

BACKGROUND RESEARCH

'Gendered' toys

Recent attempts among legislatures as well as the marketplace to enhance opportunities for nongendered toy selection have called renewed attention to the possible issues surrounding the gendering of toys to begin with. Toy 'gendering' has been widely practiced since the latter

half of the 20th century when the toy industry hit upon the realization that families might be persuaded to buy a second set of toys for their household if toys were marketed as being explicitly for either girls or boys (Maas, 2019). But delineating particular toys for a single gender can limit the skillsets developed by children through play. Certain types of toys encourage development of specific skills and interests (Hogenboom, 2021), such as construction toys to improve spatial skills or dolls to encourage socio-emotional skills (Luna, 2021). 'Girl toys' have traditionally been associated with appearance and domestic tasks, while 'boy toys' are more likely to develop physical and cognitive abilities (NAEYC, n.d.).

In fact, toys that do *not* have a strong gender-type are claimed to better develop academic, cognitive, physical, and artistic skills in children; this is especially impactful as 90% of play among preschoolers in the United States involves toys (NAEYC, n.d.). A broader range of toys could thus help children develop the broadest range of skill sets and interests. As an illustration of that idea, Shoaib and Cardella (2020) found that adults more often buy STEM toys for boys compared to girls, positing that this practice contributes to the underrepresentation of women in engineering career fields. As mentioned, another potential issue with gendered products is the possibility of price discrimination in the form of a pink tax.

Price discrimination, the pink tax, and online environments

Price discrimination happens when different customers are charged different prices for the same product. Essentially, consumers who are less price sensitive will be offered higher prices depending on the highest price (known as the reservation price) that each buyer is willing to pay (Mikians et al., 2012). Traditional variables used for price discrimination include personal data (such as variables indicating economic status), geographic location (designating affluent areas), buying history (such as responsiveness to promotions), and demographic variables such as age or gender.

When 'female versions' of a product are priced higher than equivalent male versions (e.g., Target selling a pink Radio Flyer scooter for $49.99 for girls vs. the original red version for $24.99 for boys), this is a form of price discrimination known as the 'pink tax.' The pink tax costs the average woman over $1,300 per year, with products marketed to them costing an average of seven percent more than those marketed to men (Hoffman, 2021). In fact, a study of the pink tax across 17 product categories found the largest price differential based on gender to be in children's toys (Joint Economic Committee, 2016).

Much attention has been focused on traditional retailing where the labeling and merchandising of toys can influence shopper behavior, but how do these effects translate to online retailing? In theory, online retailers can offer each customer a different price based on that customer's characteristics or behavior (information that has been collected or assumed), which is sometimes referred to as personalized pricing (Poort and Borgesius, 2019). Geographic location is a variable often used for such price discrimination. For example, office supply store Staples charged higher prices to customers from more affluent areas (indicated by IP address) than customers from less affluent areas, and also charged more for customers in the outskirts of cities compared to within cities; likewise, Amazon has been known to charge more for Kindle books for customers who download from outside the United States vs. within (Mikians et al., 2012). Device/browser of choice has also been used to price discriminate, with retailers such as Travelocity and Home Depot charging lower prices to buyers shopping via mobile devices (Hindermann, 2018).

The product search process, an integral part of online shopping, provides unique opportunities for online retailers to practice a variation of price discrimination that relates to the selection of products produced by search. It is typically easy to compare prices online if a customer is willing to visit multiple sites or a site that aggregates offers. But if the selection of goods offered leads to higher average prices, that might be harder for consumers to detect. This is a subtle alternative to price discrimination called price steering.

Price Steering

Although online shopping is thought to generally make price comparison easier, the heavy reliance on search makes the results of search algorithms critical to consumer choice. Another way to discriminate among customers with different willingness to pay is with 'price steering' (also called search discrimination), which varies the set of products those customers are shown when they search (Mikians et al., 2012). Buyers who are less price sensitive are steered toward a more expensive selection of products. Such individualization in results is harder for consumers to detect because price doesn't change per item, but the selection of products offered steers them to pay more. The concept of online retailers customizing results for individual consumers is a double-edged sword—customers generally like relevant search results until that individualization disadvantages them.

Price steering can be based on a variety of variables such as technology differences (device, browser), user variables (member/nonmember, demographics), and shopper behavior (search terms, clicks, search histories, purchase histories). For example, the travel site Orbitz looked at what device customers searched from, offering Mac users more expensive hotel options than PC users based on their discovery that Apple users were spending 30% more on average per room night (Mattioli, 2012); in fact, tablet users are known to place bigger online orders than users of laptop or desktop computers, as are iPhone shoppers compared to Android (Chapuis, 2021). Hannak et al. (2014) found that the travel site Priceline altered hotel search results based on the user history of clicks and purchases, with more expensive prior choices increasing the chances of higher-end options in future searches. Also, similar to previous findings related to price discrimination, Travelocity and Home Depot price steered shoppers based on what browser or device was used in their search (Hannak et al., 2014).

The truth is, consumers unintentionally divulge information that an online retailer might use to price steer (geographical location, browser, device, etc.). But their behavior while online, such as how they browse and search, can also substantively influence search results (Ahmed et al., 2022). Do the specific search terms/queries used by shoppers potentially serve as a means for price steering? How does this relate to gender-neutral search and pricing?

The case of Amazon

Reportedly, 74% of online shoppers in the United States begin their product search on Amazon.com (Berthiaume, 2021). Despite documented examples of Amazon manipulating search results to punish merchants who offer lower prices on competing platforms (McLaughlin, 2021), Amazon has long maintained that it doesn't price discriminate based on buyer characteristics, with CEO Jeff Bezos famously announcing "We have never tested and never will test prices based on customer demographics" (Poort and Borgesius, 2012). Research into individualization practices on Amazon would seem to support that statement, concluding that

shopper characteristics are not the basis for individualized search results (Ahmed et al., 2022). Given the marketplace interest in nongendered toys and the possibility of a pink tax, how do specific search terms influence product results offered for toys that are gendered or not? Is there a pink tax when searching online for toys by gender, and is that resolved by non-gender-specified search?

This research will take an exploratory look at these questions within the toy category (boys vs. girls vs. non-specified) to see how Amazon might be using price steering based on gender-specified search terms.

DATA AND METHODS

Data collection

A series of keyword searches on Amazon.com each day over a 7-day period were conducted. A late January time frame was chosen to reflect typical rather than seasonal pricing and avoid inflated and/or promotional pricing during the holiday season. Three specific phrases were typed into the search bar:

Girls: "girls toys age 8-10 best seller"
Boys: "boys toys age 8-10 best seller"
Non: "toys age 8-10 best seller"

Each search was performed on a different computer in a large computer lab, with 21 computers used. Before each search was performed, the browser data was cleared (history, cookies, cache, etc.) to limit any possibility of previous online activity affecting results. The goal was to record what the buyer would see when they search. Prices were logged for the first 150 toys in each search in order from the top of the page to the bottom. Duplicate items (the same toy from different sellers) were treated as separate entries so as not to remove the marketing effect of popular toys. The prices are what the consumer pays (which may be different from the original price due to discounts). Only items with a single price were considered; products with a price range shown were excluded as were products with "click and see price". Toys were included that appeared in all parts of the page ('recommended' sections, banner sections). The following were omitted: items that were not toys, toys with extreme prices (a $100 cap was applied to prevent high-priced toys from excessively skewing the price distribution), and books.

Toy categories

Toys were categorized into groups as they were recorded. When a toy appeared to fall into multiple categories the categorization choice was made based on the skills that the toys were primarily intended to develop. These categories are as follows:

1. Arts and Crafts
    a. Art supplies included paints, crayons, clay, tracing paper, electronic drawing tables. These toys generally have no instructions and develop free-thinking aesthetics.
    b. The crafts included toys with instructions for creating a specific aesthetic object. These toys included friendship bracelet kits, paper airplane kits, paint-by-number,

coloring books, etc. These toys tend to develop guided aesthetics (aesthetics with instructions).

2. STEM and Construction
    a. STEM toys focus on programming, coding, logic toys involving motion, and construction toys that involve electronic components. These toys tend to develop guided engineering competency.
    b. Construction toys included blocks, non-mechanical construction sets and LEGO. Some of these toys have instructions (and develop guided engineering competencies) while others do not (and develop free-thinking engineering skills).
3. Educational Toys-- these included science kits, microscopes, binoculars, crystal growing kits, and chemistry sets. These toys teach specific knowledge about the world.
4. Vehicles-- this category includes electric and non-electric cars, drones, remote-controlled robots/animals, etc. These toys develop competencies related to motion through space.
5. Electronic Toys-- this category included microphones, watches, lights, walkie-talkies and electronic games. These toys encourage engagement with technology.
6. Fashion-- these included make-up, jewelry, bead sets, dress-up sets, and hair toys. These toys develop a sense of self-identity and expression.
7. Physical and Fidget Toys
    a. Physical toys included darts, shooters, punching bags, dance mats and laser tag sets. These toys develop strength, hand-eye coordination, balance or outside play.
    b. Fidget toys included flying orbs and pop toys. These toys have a physical sensory effect and using them can develop concentration and coordination.
8. Games-- this category included card and dice games. Not many toys in this category appeared, and none were board games or video games. These toys typically teach strategy and social skills.
9. Figures, Dolls and Plush-- these toys included action figures, dolls, blankets and soft toys. Note that some of these toys were electronic (in that they talk or play music), but their main function was in their form. These toys can develop a variety of competencies, but the items shown were mostly hero action figures, mermaids, and magical creatures. As such, the key competency that seemed to be shown related to fantasy.

Assigning toys to categories is of course a subjective task with multiple possibilities. The categories developed here are intended to illustrate potential differences in human capital development across genders depending on toy exposure. Toy-competency mapping is depicted in the Appendix.

ANALYSES AND RESULTS

Price Trends

A precursory exploration of the data shows that a small number of higher-priced items skew the distribution of prices. For example, Figure 1a (Appendix) shows the price distribution for the boys search conducted on 1/27 where a few toys priced above $50 lengthen the right-side tail. This skew affects our analysis of average prices. To account for a distribution with this shape, we work with the natural log (LN) of prices. The logged data has a more normal distribution which allows us to conduct more effective hypothesis tests.

Prices were examined to see if they changed significantly from one day to another for the same keywords. Figure 2 (Appendix) shows average log prices across days of the week. Differences across days appeared to be small. With relatively consistent prices, daily data were merged together into a single weekly dataset with 1050 advertised toys (7 days at 150 toys/day). Descriptive statistics for the combined data appear in Table 1 (Appendix).

Hypothesis testing

Table 1 and Figure 2 (Appendix), show that prices from the gender-specified searches seemed similar, while prices from the non-specified search were notably higher. Higher prices for non-specified search results will be referred to as a 'yellow tax': you choose from more expensive options if you omit reference to gender. Formal tests were performed to confirm the presence of 'pink taxes' and 'yellow taxes.'

First, evidence of a pink tax was explored in overall toy search results. The pink tax hypothesis tested is: Girls toy search produces a more expensive selection of toys as compared to boys toy search. This statement can be transformed into a set of statistical hypotheses:

H0: (Average log price of girls search – Average log price of boys search) ≤ 0
HA: (Average log price of girls search – Average log price of boys search) > 0

The null hypothesis (H0) assumes no pink tax is present (i.e., that girls prices are less than or equal to boys prices on average). A one-tailed test of equal means was conducted using the merged data set. Rejecting the null at the 5% significance level involves finding a test statistic that is sufficiently positive, with a p-value less than 0.05. The test static found is negative suggesting the null hypothesis can be rejected. No evidence was found to support that average girls prices are greater than average boys prices in the data set. This result does *not* necessarily imply that pink taxes by toy category or by individual item are not present, only that average prices from the two pools of toys shown when gender is specified seem equal.

Figure 2 suggests prices in boys and girls searches are both lower than prices in non-specified search. This is the first glimpse of a broad 'yellow tax': Non-specified toy search produces a more expensive set of toys compared to specifying gender in search. This statement can be transformed into a set of statistical hypotheses:

H0: (Avg. log price of non-specified search – Avg. log price of gender-specified search) ≤ 0
HA: (Avg. log price of non-specified search – Avg. log price of gender-specified search) > 0

The null hypothesis (H0) above assumes no yellow tax-- non-specified search prices are equal to or lower than gender-specified search prices. The merged data set was used to conduct two separate one-tailed tests of equal means (one comparing non-specified search to boys search and another comparing non-specified search to girls search). Rejecting the null at the 5% significance level again involves finding a test statistic that is sufficiently positive, with a p-value less than 0.05. A positive test statistic with a p-value < 0.0001 was found when the test was conducted using the boys search data. This same result appeared in the test using the girls search data (positive test statistic, p-value < 0.0001). The null hypothesis (H0) can be rejected at the 5% significance level for both. In other words, there is evidence that people who do not specify gender in their search are shown higher priced toys on average: a broad 'yellow tax' is present.

One reason for overall average price differences may be the types of toys shown. Here is where toy categorization is useful. For example, if non-specified searches result in more electronics (which tend to be expensive) and fewer crafts (which tend to be cheaper) then non-specified toy prices will be higher on average. Since toy categories were previously connected with skills/competencies (see Appendix), this can also relate to potential differences in learning. Figure 3 (Appendix) shows the number of toys in each category displayed for each search. A considerable number of Arts and Crafts toys (related to the skillset of aesthetics) appeared in the girls searches while Physical and Fidget toys (related to the skillset of physical ability) abounded in the boys searches. STEM and Construction (associated with the engineering skillset) were more dominant in the non-specified searches.

Table 3 (Appendix) shows the average log price of toys by category for each type of search. It is particularly interesting to look at cases where groups are shown many (30+) similar toys, but prices appear to be substantially different. The same hypotheses above (for pink and yellow taxes) were tested, except by category for each toy group with 30+ toys. A series of one-tailed tests of equal means were conducted to evaluate the following hypotheses:

Pink tax: girls toy prices are greater than boys toy prices.
H0: (Average log price of girls search – Average log price of boys search) ≤ 0
HA: (Average log price of girls search – Average log price of boys search) > 0

Yellow tax: non-specified toy prices are greater than gender-specified toy prices.
H0: (Avg. log price of non-specified search – Avg. log price of gender-specified search) ≤ 0
HA: (Avg. log price of non-specified search – Avg. log price of gender-specified search) > 0

As above, the null hypotheses assume no pink or yellow tax. The tests were conducted at the 5% significance level to look for positive test statistics with p-values less than 0.05. “Yes” is reported in Table 3 if there was evidence of a pink tax (girls prices are greater than boys prices) and the gender group with the lower prices is specified if there was evidence of a yellow tax. “No” is reported if the hypothesis of no pink/yellow tax cannot be rejected.

Table 3 shows that while there is no broad pink tax for toys in general, there are specific pink taxes for some toy categories. What is of note is that there is a pink tax observed for Arts and Crafts (which is the dominant category for the girls search) and a pink tax in both Electronics and STEM/Construction (which are associated with modern competencies related to engineering and technology). Table 3 shows frequent yellow taxes across categories (which result in the overall broad yellow tax findings above). All dominant categories for the non-specified search exhibit higher prices. Notably, average prices of products shown in non-specified search tend to be higher in categories which dominated the boys search (Physical/Fidget, STEM/Construction, Vehicles). Some large categories from the girls search (Physical/Fidget and Fashion) also show higher average prices for the non-specified search.

Again, conclusions cannot be drawn about item-specific pink or yellow taxes in these results (i.e., are prices different between a pink truck, a blue truck or a yellow truck). What is evident is that the products that appear in toy search results differ depending on if the customer includes the gender in their search query, and that customers are not offered similar prices for broad categories of toys.

DISCUSSION AND CONCLUSIONS

Overall findings

The previous analyses sought to uncover differences in toys shown to consumers in an online shopping environment where keyword search is used to shop. It was found that the inclusion of a reference to gender affects the types of toys shown with observable differences in arts/crafts, physical/fidget, STEM/construction and vehicles. These categories connect to various competencies which can result in differences in skill development in children. Further, there were differences in prices at different levels of results (full search results vs. toy categories). There was no evidence of a general pink tax when considering all toys in all categories as a group, but there was evidence of a general yellow tax: not specifying gender exposes the customer to higher prices on average. There were both pink and yellow taxes within categories of toys, meaning that customers are exposed to more expensive options for the same 'competency group' of toys when they include a reference to gender in their search.

The above findings may result from retailers making assumptions about shoppers' willingness to pay and marketing their products accordingly. For example, a retailer may intentionally describe the toy as 'for girls' in the product description and set the price to be high so that keyword searches containing 'girls' drive customers to their toy. Alternatively, the findings might be a product of the search algorithm trying to meet customer needs by adapting to consumer behavior over time. For example, as more customers search for 'girl toys' and make purchases, those purchases are the first to be seen by new customers who also include 'girls' in their keywords. We know that algorithms 'learn' demand patterns to optimize search results (Ahmed et al., 2022) to improve the customer experience. If this is the case, it is plausible that Amazon is not intentionally price steering or discriminating, but rather these are a product of gender bias in previous shoppers' behavior (i.e., price steering and discrimination are endogenous to the system).

While an argument can be made that price steering merely offers shoppers more relevant results based on relevant factors (technology, user characteristics, user behavior, etc.), Chapius (2021) found that the increased prices paid by consumers due to price steering were not in fact due to differences in purchasing power, but discrimination of information. In other words, the selection of products offered, regardless of consumer ability or willingness to pay, determined whether customers paid more. Applied to the current findings, this would show that customers searching in a non-gender-specified way will pay more simply because the results steer them to do so, rather than some innate willingness to pay more. The same study also concluded that consumer awareness of such practices leads to a decrease in trust in the provider as a perceived violation of fairness (Chapius, 2021).

Limitations and future research

This study provides a starting point for investigating price steering in online search for gendered vs nongendered products. Limitations of this exploratory study include one target product category (toys), one dominant online retailer (Amazon) and one set of search terms. These could be expanded to look for differences in other categories (such as toiletries, personal care, clothing, etc.) as well as alternate wording in search queries (e.g., would specifying a category of toy steer toward traditionally girl vs boy toys?). Further, the data was collected from

one location in the eastern United States as a control, but given that geographic location is often used for price discrimination and price steering, it would be interesting to expand this study to compare to other locations to explore differences relating to region, country, urban/suburban/rural density, etc.

Continuing that line of thinking, there are many avenues for future inquiry to broaden the scope of this topic. This study looked at the first 150 products in search results, but did not analyze order of results. Since people often don't scroll beyond the first page or two, it would be useful to examine differences in ranking/order of results as top results are more influential (Mikians et al., 2012). Interaction effects with other buyer characteristics known to the seller (demographics, previous purchase and search history, etc.) would also add avenues of inquiry into a topic that is rife with possibilities.

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APPENDIX

Toy-competency mapping

Category	Competency
Arts and Crafts	Aesthetics
STEM and Construction	Engineering
Educational Toys	Specific Knowledge
Vehicles	Motion in Space
Electronic Toys	Engaging Technology
Fashion	Self-expression
Physical and Fidget Toys	Physical Abilities
Games	Strategy and Social Skill
Figures, Dolls and Plush	Fantasy

Figure 1

Price Distribution, 'boys' search

a. Prices ($) *b. Log of Prices*

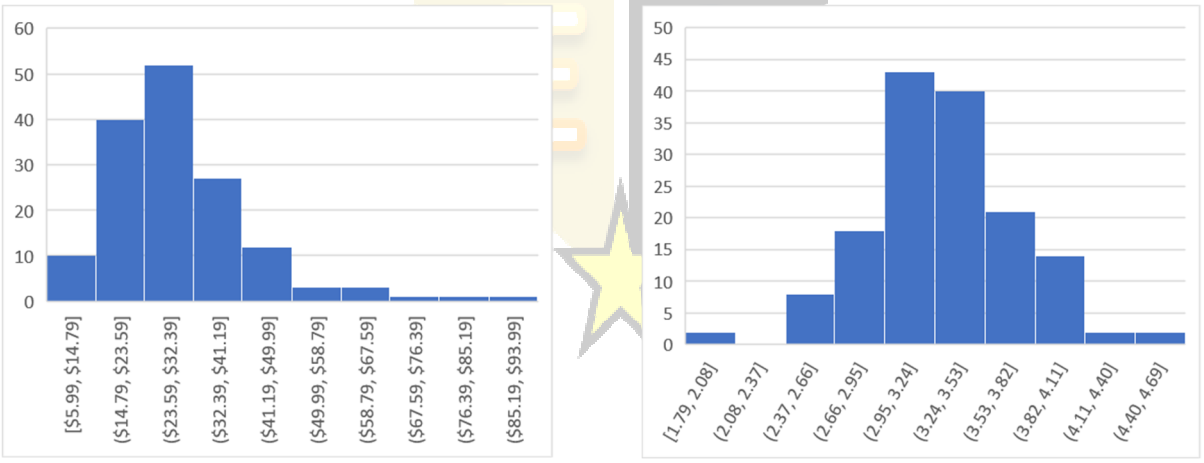

Figure 2

Average log prices across days of the week

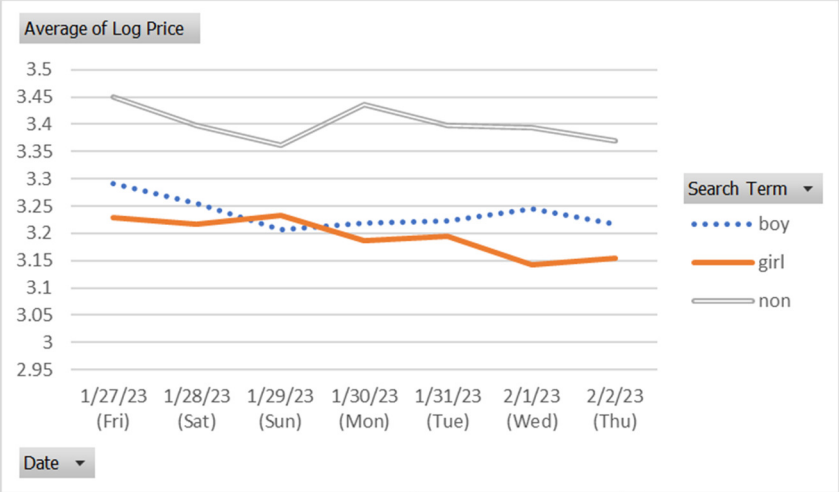

Table 1

Descriptive statistics for combined price data

	'Boys'	'Girls'	'Non'
Median Price	$24.99	$23.99	$29.97
Average LN Price	3.24	3.19	3.40
Standard Deviation LN Price	0.42	0.46	0.50
Standard Error LN Price	0.013	0.014	0.015
Number of Observations	1050	1050	1050
95% Confidence Interval for LN Price	3.21 – 3.26	3.17 – 3.22	3.37 – 3.43

Figure 3

Number of toys shown by category

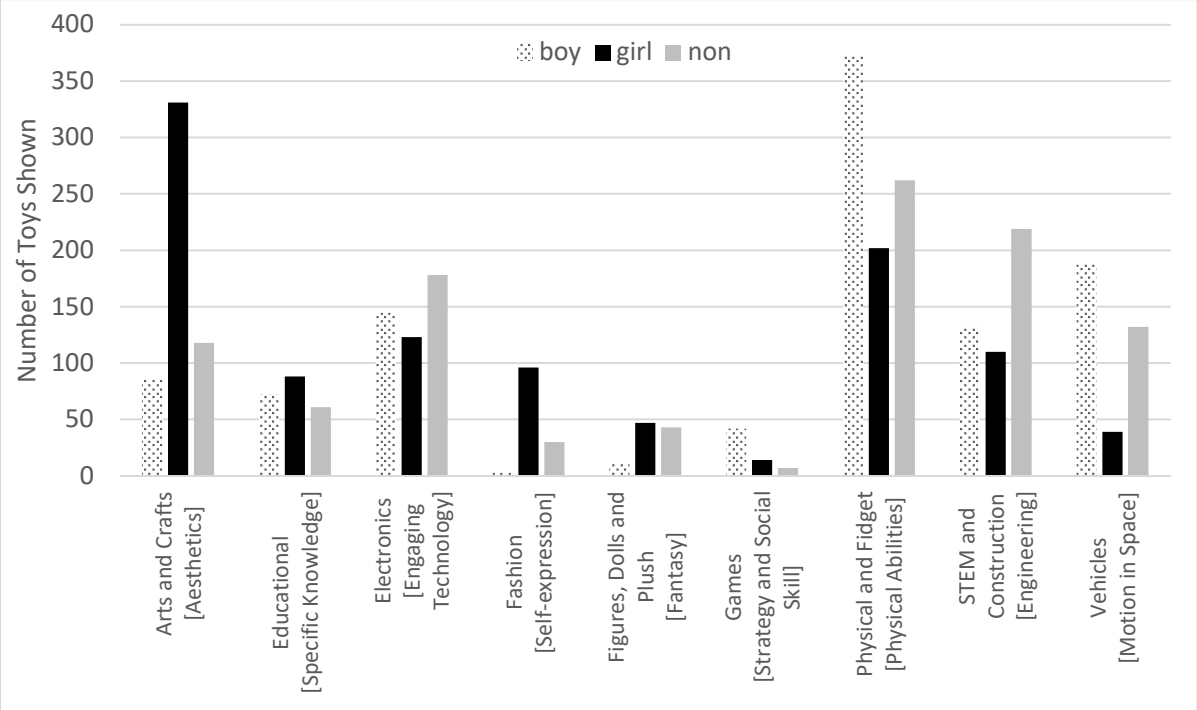

Table 3

Average log price of toys shown by category

Toy Category	Avg Log Price			Results from hypothesis tests	
	boy	girl	non	Pink tax?	Yellow tax?
Arts and Crafts	2.88	3.00	2.96	Yes	No
Educational	3.23	3.32	3.37	No	No
Electronics	3.23	3.38	3.46	Yes	Boy
Fashion	3.13	2.96	3.22	---	Girl
Figures, Dolls and Plush	2.90	3.34	3.65	---	Girl
Games	2.83	2.99	2.92	---	---

Physical and Fidget	3.31	3.29	3.50	No	Boy, Girl
STEM and Construction	3.24	3.43	3.43	Yes	Boy
Vehicles	3.37	3.30	3.47	---	Boy