Biased Experiments and the Direction of Product Innovation

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Motivation & Research Question

Motivation

• Technology entrepreneurship eco-system dominated by men: not only innovators and venture capitalists, but also early adopters of new products are overwhelmingly male

• Online platforms increasingly relevant for user acquisition, feedback solicitation, and market creation for early-stage product innovations

Research Question

• Do female and male consumers prefer different products, and how can we robustly measure products’ gender orientation among consumers?

• Does preference aggregation affect real outcomes of startup companies and hence bias the direction of product innovation?
Preview of Results

• Product Hunt: important online platform for product launch and lead generation leveraged by technology startups; male-heavy (90% men)
  → users browse and upvote product posts, and traction on the platform affects real outcomes: e.g. user acquisition & venture funding

• Develops text-based product gender score: measures the product’s consumer gender orientation
  → robustly correlate with gender of entrepreneur and user preference

• Post-launch user acquisition and startup survival: biased against female-oriented products, but encouraging participation by women improves the real outcome of female-oriented innovations
  → exploit exogenous variation in the gender composition of web traffic induced by daily newsletter product suggestions
External Validity

- Gender composition of users on major commercialization platforms: Sep 2017 – Aug 2019 → low female share across most platforms
Roadmap

- **Product Hunt Platform & Data**

- Measuring Product Gender & User Preference

- Preference Aggregation & Startup Outcomes
<table>
<thead>
<tr>
<th>Product Name</th>
<th>Description</th>
<th>Score</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Todoist Foundations</td>
<td>A faster and more intuitive way to get things done</td>
<td>440</td>
<td>Android</td>
</tr>
<tr>
<td>HodlBot</td>
<td>Cryptocurrency investing on autopilot</td>
<td>328</td>
<td>Fintech</td>
</tr>
<tr>
<td>Document360</td>
<td>The knowledge base software that scales with your product</td>
<td>353</td>
<td>Customer communication</td>
</tr>
<tr>
<td>Morning Brew</td>
<td>The hottest news from Wall St. to Silicon Valley, daily</td>
<td>2654</td>
<td></td>
</tr>
<tr>
<td>Awesome Design Plugins</td>
<td>All design plugins for Sketch, AdobeXD, Figma.</td>
<td>233</td>
<td>Design Tools</td>
</tr>
<tr>
<td>Handoff</td>
<td>Declutter your Chrome extensions and manage them with ease</td>
<td>527</td>
<td>Chrome Extensions</td>
</tr>
<tr>
<td>Chrome Extension Manager by cloudHQ</td>
<td>Declutter your Chrome extensions and manage them with ease</td>
<td>192</td>
<td>Web App</td>
</tr>
</tbody>
</table>
Todoist Foundations
A faster and more intuitive way to get things done

Todoist Foundations is the fastest, most intuitive, most reliable Todoist yet. Stay organized with new features like Sections and Task View; Save time with improved Quick Add and Completed Tasks; And enjoy a snappier UX thanks to under-the-hood updates.

Have a question about this product? Ask the Makers

Cao, Koning, & Nanda
<table>
<thead>
<tr>
<th>#</th>
<th>Product Name</th>
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<th>Views</th>
<th>Category</th>
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<td>Chrome Extension Manager by cloudHQ</td>
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<td>50</td>
<td>Web App</td>
</tr>
<tr>
<td>8</td>
<td>Material Builder</td>
<td>Build a responsive &amp; intuitive website in few clicks</td>
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Today

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Todoist releases major update to simpl...
Bootstrapped tech company Doist, the comp...
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Hi Product Hunters 😊

Over the last two years, the Todoist team has been meticulously rebuilding Todoist's foundation to help people get things done in a faster, more intuitive, and more reliable way. And it's finally time to share this new chapter with everyone. Announcing Todoist Foundations. 🎉

Todoist Foundations is an inside-and-out update that introduces useful new features and adds polish to the ones you already use every day.

* Divide and conquer your projects with new Sections.
* See everything about your task at a glance with Task View.
* Keep track of the little things with the Sub-tasks View.
* Add tasks more easily with the redesigned Quick Add for mobile.
* Easily add tasks wherever you need them with the Dynamic Add Button for iOS (Android coming soon).

Todoist Foundations also introduce vital under-the-hood updates that make for the fastest, most reliable Todoist yet – and lay the groundwork for the more powerful features coming next, like Boards and Upcoming View.

This update will be rolling out over the next 24 hours to every platform. Keep a lookout for it!

Upvote (22) 3 Replies Share a day ago ...
Roadmap

- Product Hunt Platform & Data
- Measuring Product Gender & User Preference
- Preference Aggregation & Startup Outcomes
Refly is a smart editor for content writers who are trying to scale their content globally. Refly helps you improve your language, SEO and track your writing goals. Also, you can publish or schedule your publish to multiple blogs in a single click. And the best part, it's free!! The latest version is out in the AppStore.
Kevin William David  Hunter

Refly is a smart editor, specially made with content creators in mind. Refly will help you reduce your writing time by 10-20%. This is done by reducing the time for proofreading (which is average 40% in writing). Refly can help you with linguistic errors, SEO and publishing at this point. Also, Refly will help you stay on track with your writing goals by the habit feature.

Upvote (16)  Share  3 years ago

TONY TOM  Maker

@kwdinc Thanks for the Hunt.
Hello PH
Refly is a smart editor. Refly is made with a mission to make content creation easier for everyone. We designed Refly in such a way to make content creation just content creation. We intend to remove the other 80% work. Refly will help your reduce the proofreading time with extended grammar, spell and synonym support. Refly will help you with your SEO and publishing to Facebook, Medium and even a personal WordPress blog. We'll come up with solutions for research and topic suggestions. Thanks for the upvotes. Hope you'll love the app !! Open to comments or you can reach out to me on twitter(_tonytom)

Thanks.

Upvote (5)  Share  3 years ago
• Project product descriptive words onto the gender space: defined by nodal word-pairs, e.g. “man” v.s. “woman”
  → each word is represented by a pre-trained high-dimensional vector
  → descriptive words include nouns, verbs, and adjectives
  → measure **gender-orientation of each word**
Compute each product’s **gender-orientation** score

- **Texts:** name, tagline, description, hunter- & maker-initiated comments

- **Extract product descriptive words:** nouns, verbs, and adjectives

- **Based on a set of gender nodal word-pairs, compute the product’s** **gender-orientation** **scores from all WP in the set**
Compute each product’s gender-orientation based on nodal WP

- For each word appearing in the product texts
  → calculate its TF-IDF relative to the entire data set
  → calculate its gender-orientation score given WP

- Calculate overall gender-orientation of product texts
  → sum scores over descriptive words, weighted by TF-IDF
Compute each product’s **gender-orientation** score

- Texts: name, tagline, description, hunter- & maker-initiated comments
- Extract product descriptive words: nouns, verbs, and adjectives
- Based on a set of gender nodal word-pairs, compute the product’s **gender-orientation** scores from all $WP$ in the set
- Compute the *first principal component* of these scores, across the set of gender nodal word-pairs, and normalize the measure
Probability Distribution of Product Gender Orientation

- Higher score represents more feminine product.


Title: Product Gender Orientation v.s. Maker/Hunter Gender

- **Share of products with a female maker**
  - Y-axis: Share of products with a female maker
  - X-axis: Product Gender Score

- **Share of products hunted by a woman**
  - Y-axis: Share of products hunted by a woman
  - X-axis: Product Gender Score

Graphs show a positive correlation between product gender orientation and the share of products with a female maker or hunted by a woman, with higher scores associated with higher shares.
<table>
<thead>
<tr>
<th>%tile</th>
<th>Product Name</th>
<th>Tagline</th>
<th>Gender Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>ThxBro</td>
<td>Generate deliciously random, jargon-laced e-mails</td>
<td>-5.109</td>
</tr>
<tr>
<td></td>
<td>Ballmetric</td>
<td>Your favorite plays from the NBA</td>
<td>-3.711</td>
</tr>
<tr>
<td></td>
<td>Beard Bib 2.0</td>
<td>Hair clippings catcher from Beard King</td>
<td>-3.653</td>
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<tr>
<td>P5</td>
<td>SPECTRA</td>
<td>The most portable electric skateboard</td>
<td>-1.305</td>
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<tr>
<td></td>
<td>Segway Drift W1</td>
<td>The first self balancing e-skate</td>
<td>-1.294</td>
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<tr>
<td></td>
<td>Keyport Slide 3.0 &amp; Pivot</td>
<td>The swiss army knife of the future</td>
<td>-1.293</td>
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<tr>
<td>P10</td>
<td>SnapHunt</td>
<td>Product Hunt for Snapchat. Discover new people to follow</td>
<td>-0.903</td>
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<tr>
<td></td>
<td>Nikola</td>
<td>See your Tesla's battery percentage from your menubar</td>
<td>-0.900</td>
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<td>Hackuna</td>
<td>Secure yourself from all kinds of hackers</td>
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<td>P25</td>
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<td></td>
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<td>Anti-phishing platform powered by AI &amp; Computer Vision</td>
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<td></td>
<td>Sqreen API</td>
<td>A security toolbox for developers</td>
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<tr>
<td>P50</td>
<td>Cemtrex Smartdesk</td>
<td>The world's most advanced workstation</td>
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<td></td>
<td>Yomu</td>
<td>One place to read your favorite content from around the web</td>
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<td></td>
<td>Adzoola</td>
<td>Hyper-targeted advertising and outreach</td>
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<tr>
<td>P75</td>
<td>Borsch</td>
<td>The AI app that helps you discover the yummiest dishes</td>
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<tr>
<td></td>
<td>Cuddle Mattress</td>
<td>Hug your better half without the arm numbing</td>
<td>0.495</td>
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<td></td>
<td>Joonko</td>
<td>Personal diversity and inclusion AI-coach for managers</td>
<td>0.500</td>
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<tr>
<td>P90</td>
<td>The Silver Post</td>
<td>Do more for grandma or grandpa</td>
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<tr>
<td></td>
<td>Kindred</td>
<td>Friends for when you travel</td>
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<tr>
<td></td>
<td>Ropazi</td>
<td>Personal shopper for busy parents</td>
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<td>P95</td>
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<td>Curated collection of the world's best contemporary art</td>
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<td></td>
<td>Chairman Mom</td>
<td>A social, Q&amp;A platform for working moms</td>
<td>1.457</td>
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<tr>
<td></td>
<td>VINA</td>
<td>Connecting awesome women for fun, for work, for life</td>
<td>1.474</td>
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<tr>
<td>P99</td>
<td>Babee on Board</td>
<td>Pregnant? Request a seat on public transport</td>
<td>5.104</td>
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<tr>
<td></td>
<td>Flo Health</td>
<td>The #1 app for women's menstrual health</td>
<td>5.237</td>
</tr>
<tr>
<td></td>
<td>Wonder</td>
<td>An app for queer &amp; lesbian women to express their uniqueness</td>
<td>6.159</td>
</tr>
</tbody>
</table>
Active Users’ Preferences for Launched Products

- Left: without maker and hunter gender controls
- Right: with maker and hunter gender controls

![Graphs showing difference in residuals for product gender score with and without gender controls.](image-url)
Roadmap

- Product Hunt Platform & Data
- Measuring Product Gender & User Preference
- Preference Aggregation & Startup Outcomes
Startup user acquisition by product gender -6 to 12 months around launch

\[ Y_{i\tau} = \beta_0 + \beta_1 \times \text{ProductGenderScore}_i + \gamma_i + \xi_{\tau_i - \tau} + \epsilon_{i\tau}, \tau = -6, \ldots, 12 \]
Just kidding. Mother's Day is on Sunday.

If this email surprised you, then you probably need some gift recommendations. We got you:

- **Bouquet Bar** lets you mix & match candy, flowers & candles in custom gift boxes. Backed by Mark Cuban via Shark Tank.

- **Mahinarium Selfie Dolls** are dolls that look exactly like you. Empty Nest Syndrome won’t know what hit it. If dolls aren’t your mom’s thing, you can also get a custom lollipop in her likeness.

- **Miniature Mail** sends the cutest, teeny-tiny letters, or you can try **Felt**: they handwrite your words and deliver them on a beautiful card.

- **TokenArt** is an uber-powerful gifting service powered by Machine Learning. “This product makes me a gift-giving rockstar.”

- **Postmates Gift Cards** exist for late-night guilty pleasure. Yum-
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Treatment Effect on Product-Gender Gap in User Acquisition

Newsletter Shock: maximum gender score among products suggested by the daily newsletter → triple-differences specification

\[ Y_{i\tau} = \alpha_{0\tau} + \alpha_{1\tau} \times ProductGenderScore_i + \alpha_{2\tau} \times NewsletterShock_{T_i} + \alpha_{3\tau} \times NewsletterShock_{T_i} \times ProductGenderScore_i + \gamma_i + \xi_{T_i - \tau} + \epsilon_{i\tau} \]

- Median newsletter (max score)
- 95\%ile female newsletter shock

![Graph showing Log pageviews by product gender score](image1.png)

![Graph showing Log pageviews by product gender score](image2.png)
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