How People with Visual Impairment Shop: Behaviors, Challenges, and Technology Adoption

15th January 2026

Introduction

Purpose & Scope

Presenting insights from a contextual inquiry and observational study on how visually impaired users shop in both offline (in-store) and online environments.

Key Focus Areas

- Shopping behaviors and decision-making strategies
- Challenges encountered during shopping
- User preferences in online and offline shopping
- Use of digital technologies to support shopping activities

Observations and interviews grounded in real-world scenarios. Findings aim to inform the design of inclusive and accessible immersive virtual shopping experiences.

Study Details

Study Objectives

To examine challenges encountered in online and offline shopping contexts

To understand category-specific shopping challenges

To analyze shopping behaviors and decision-making strategies

To explore user preferences across online and physical retail environments

To study the role of digital technologies in supporting shopping activities

Study Methodology

Contextual Inquiry

In-situ Observations

Semi-structured interviews and post study discussions

Study Procedure

Participants

The study included thirteen participants with visual impairment, with reported impairment levels ranging from 65% to 90%

Contextual Inquiry

Contextual inquiry with semi-structured interviews, in-situ observation and shadowing during shopping activities, and post-observation discussions

Data Collection

Data collection through audio-visual recordings and handwritten field notes, conducted with the informed consent of all participants

Analysis

Key themes were identified through affinity analysis across shopping behaviors, challenges, technology adoption & use, and user preferences

Study Participants

A total of 13 participants (9 male, 4 female) were selected using a structured screening process

User	Gender	Age	% of Impairment
User 1	Male	33	75
User 2	Male	19	75
User 3	Female	22	90
User 4	Female	23	90
User 5	Female	21	70
User 6	Male	19	65
User 7	Male	20	90
User 8	Female	25	75
User 9	Male	20	90
User 10	Male	24	75
User 11	Male	20	80
User 12	Male	33	75
User 13	Male	27	75

Insights and Findings - At a Glance

Findings at a Glance

Mobility & Navigation

- Difficulty locating stores, aisles, and products during shopping tasks
- Challenges amplified in crowded spaces, unfamiliar layouts, and low-visibility conditions
- Frequent reliance on shopkeepers or sighted companions for navigation support

Information Accessibility Gap

- Product information (price, expiry date, size, details) is present but not easily perceivable
- Small fonts, poor color contrast, distance from shelves, and visual clutter limit readability
- Leads to errors in product identification and final selection

Compensatory Tool Use

- Use of mobile camera zoom, OCR tools, and screen readers to access information
- Reliance on memory, known brands, and habitual purchasing to reduce effort
- Seeking human assistance when tools are insufficient or unreliable

Findings at a Glance

Trust & Risk Management

- Fear of selecting incorrect or defective products influences shopping decisions
- Preference for cash-on-delivery and verification at delivery
- Reliance on reviews, ratings, and unboxing videos before purchase

Social & Environmental Factors

- Discomfort with slow or repeated inspection in public spaces
- Fear of being judged or inconveniencing others
- Negative interactions with shopkeepers reduce confidence and independence

Insights and Findings - Offline Shopping Behaviours

Locating The Offline Store

Wayfinding Challenges

- Difficulty locating specific stores within malls or markets due to
  - Crowded environments and unfamiliar layouts
  - Limited ability to read or notice store signage
  - Reliance on assistance when the intended store is missed.
- Frequent need to ask shopkeepers or bystanders for directions

Environmental Constraints

- Poor signage/product visibility due to small fonts and low contrast makes it difficult for users to identify product categories, often resulting in missed products and reliance on assistance or known items
- Difficulty navigating multi-floor spaces without clear cues increases reliance on assistance and limits independent exploration

A participant trying to find school bags walking past the bag store because the bags and background color were in low contrast

Locating The Offline Store

Navigation Aids

- Reliance on tactile references such as railings and stair edges
- Use of memory, prior visits, or assistance to reach known stores

A participant asking sighted individuals for assistance in locating the bag store

A participant using the railing to climb the stairs

Locating Items of Interest

Shelf-Level Exploration Patterns

- **Item search** is primarily **restricted to eye-level shelves**, consequently causing users to overlook products situated above or below their direct line of sight
- Crowded and densely packed shelves increase search difficulty

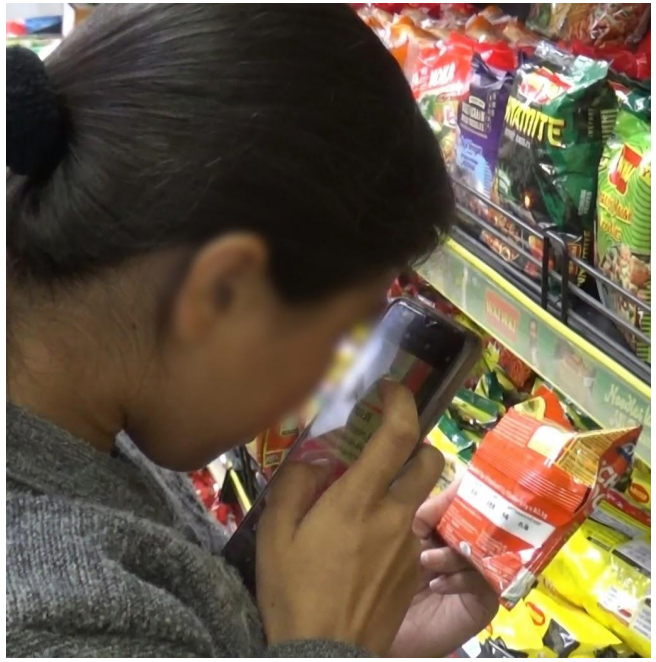
Visual Similarity and Packaging Issues

- Users often **rely on color or general shape** rather than text
- Visually similar products (color, shape, size) cause confusion, leading to incorrect product selections or repeated searching efforts to find the correct item
- Packaging changes lead to missed recognition of familiar brands

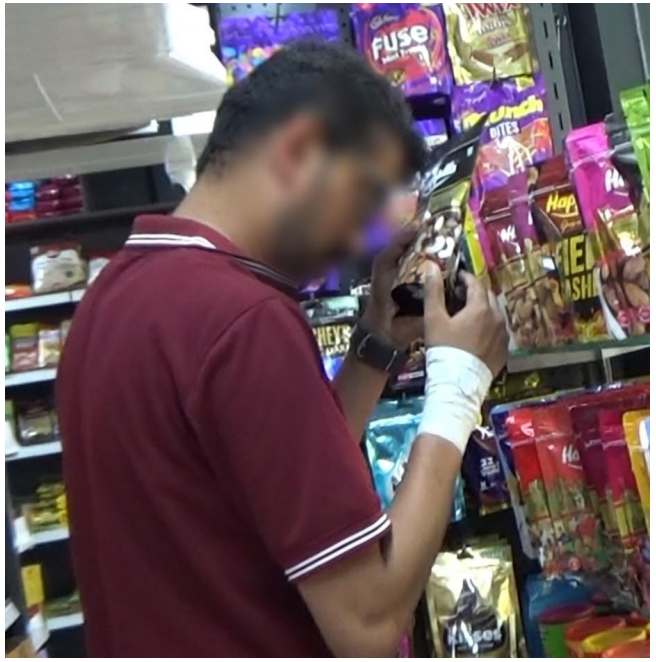
A participant checking the products on the eye-level shelf

A participant mistakenly picking up a different brand of perfume, thinking it was the one he was looking for due to color similarity

Locating Items of Interest



A participant using her phone camera to zoom in on the product information



A participant inspecting products by bringing them close to their eyes

Information Visibility Constraints

- Difficulty reading price tags, labels, and expiry dates due to: small font sizes, poor color contrast and distance between shelf labels and products
- Users often bring products very close or use mobile camera zoom

Product Inspection and Selection

Primary Inspection & Selection Strategies

- Touch is the dominant sense for inspection for clothing and accessories (fabric texture, shape, weight)
- Smell is used to assess products such as oil, moisturizer cream, powder, and perfume
- Vegetable quality is checked by pressing or feeling the produce
- Products are often held very close to the face (approximately 5-15 cm) for inspection

A participant touching a fabric to evaluate it

A participant inspecting vegetables by touching and pressing preferred vegetables

A participant assessing the moisturizer cream by smelling it

Product Inspection and Selection

Barriers in Inspection & Selection

- Close inspection discouraged by shopkeepers, increasing risk of bruised/unripe purchases
- Accidental selection of adjacent items, requiring time-consuming corrections
- Fear of dropping/damaging products increases anxiety and reduces independent inspection
- Hesitation to touch multiple items due to fear of social judgment
- Difficulty validating technical specs (electronics) → reliance on shopkeepers/trusted persons
- Difficulty reading/remembering medicine names → reliance on pharmacy staff

A participant seeking constant assistance from the shopkeeper for locating products

Challenge-coping Behaviors

- Use of known brands to reduce inspection effort and uncertainty
- Avoid exploratory inspection to minimize social discomfort

Purchase and Payment

Checkout Verification Challenges

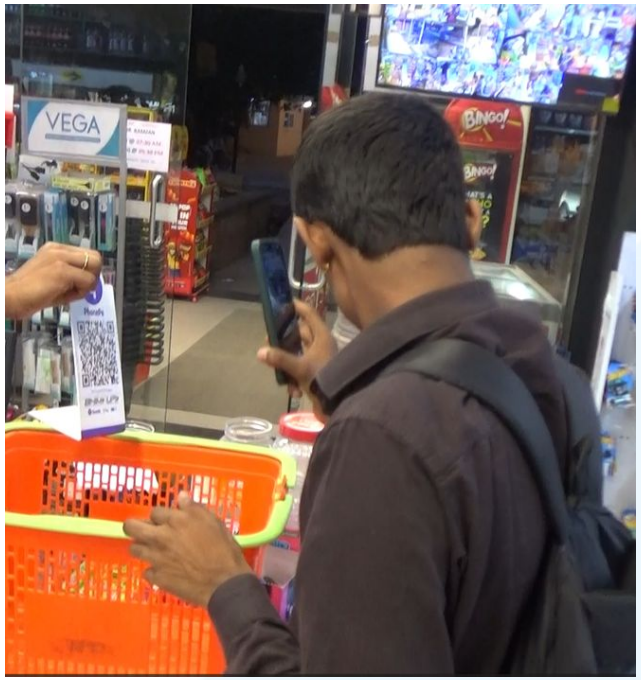
- Difficulty reading bills, subtotals, discounts, and final prices due to small font sizes and time pressure at checkout counters - increases **anxiety about payment errors** and often leads to unnoticed overcharges
- Users often postpone verification to avoid holding up queues or drawing attention

Payment Method Preferences

- Strong **preference for UPI and QR based digital payments** to avoid handling cash
- Digital payments perceived as faster, safer, and easier to manage independently

Challenges with Cash Handling

- Difficulty identifying damaged, torn, or old currency notes
- Risk of receiving incorrect change during busy checkout moments



A participant making QR based digital payment

Purchase and Payment

Post-Checkout Verification Behaviors

- Bills are frequently verified after payment using camera zoom or photographs
- Errors in pricing or discounts are sometimes detected only after leaving the store

Use and Limitations of Assistive Tools

- Use of mobile OCR apps like google lookout and smart glasses to identify currency and read bills
- Tool performance is unreliable in crowded or fast-paced checkout environments

User Preferences

Shopping Environment Preferences

- Preference for **familiar and nearby stores** with predictable layouts
- **Shopping malls preferred for clothing** due to better lighting and space for independent inspection
- Less crowded stores are favored to reduce stress and navigation difficulty

Store Layout and Infrastructure Preferences

- Preference for good lighting and high visual contrast in shelves and price displays
- Wider aisles and organized product placement improve comfort and confidence

Staff Interaction Preferences

- Preference for supportive and respectful shopkeeper behavior
- Users value assistance when needed but **prefer minimal questioning**
- **Dismissive or impatient behavior** discourages exploration and repeat visits

User Preferences

Product and Brand Preferences

- Strong preference for **known and previously used brands** to reduce identification effort
- Willingness to try new products when recommended by trusted shopkeepers

Technology and Tool Preferences

- Frequent use of **mobile camera zoom and OCR apps** to read prices and labels
- Limited reliance on voice-based tools due to noise and privacy concerns
- Preference for **simple, quick tools that do not interrupt shopping flow**

Other Findings

Trust and Dependency Dynamics

- Shopkeepers who are **familiar, demonstrate patience, allow close inspection, and clearly communicate** product and price information are more readily trusted
- Users sometimes **accept products without verification** to avoid repeated questioning

Environmental and Sensory Factors

- Store organization and staff responsiveness shape overall shopping experience
- Bright lighting and high glare negatively affect visibility and inspection
- Same colored steps in the shopping mall cause difficulty in walking on stairs, making it hard to distinguish the edges and increasing the risk of missteps or falls
- Crowded and noisy environments increase cognitive load and stress

Insights and Findings - Online Shopping Behaviours

Locating Items of Interest

Search-Centric Discovery

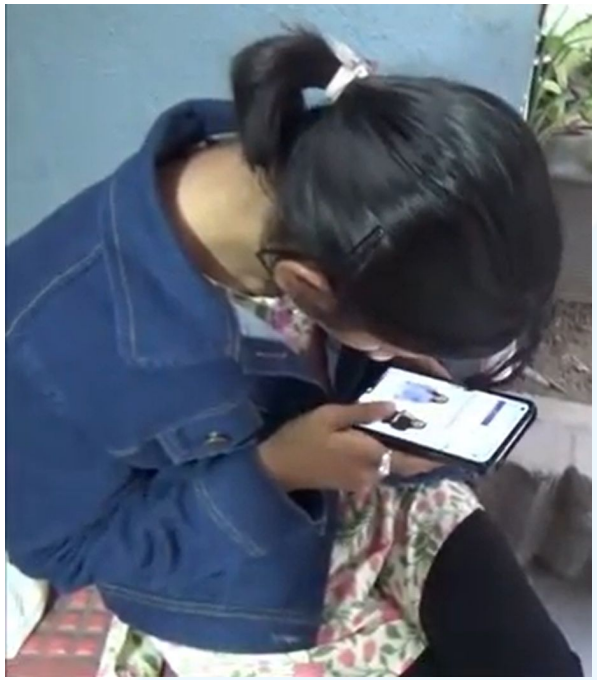
- Users primarily rely on the search bar to find items
- Searches are often **brand-driven or pre-decided, not exploratory**
- Auto-suggestions and search recommendations reduce typing effort

Navigation and Browsing Limitations

- Filter options are often unnoticed or unused, forcing users to manually scroll through extensive product lists, increasing the time and effort required to find items

Visual Cues for Discovery

- **Product images** are the primary cue for recognizing items
- Users check whether images align with their mental model of the product
- Visually similar thumbnails cause confusion or misselection



A participant searching for t-shirt during online shopping

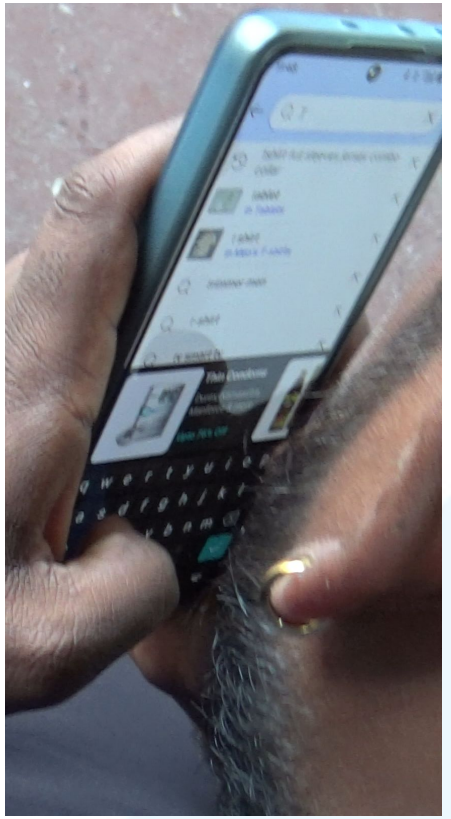
Product Inspection and Selection

Inspection Through Visual Content

- Users rely heavily on **product images and zoomable photos**
- **User-uploaded images** are considered more trustworthy than seller images

Textual Information Challenges

- Difficulty reading **long descriptions** due to small font sizes increases cognitive load and eye strain, forcing users to abandon the effort to learn about the product's features
- Users focus on short highlights rather than full descriptions
- Switching between **images, highlights, and reviews** to infer quality
- Limited or absent zoom for text-based product details



A participant holding his phone closer to his eyes to type the product name on the search bar

Product Inspection and Selection

Brand and Familiarity-Based Identification

- **Known brands** are preferred for faster recognition and confidence
- '**Previously Purchased**' feature is used as a primary strategy to bypass the cognitive load and visual strain associated with searching and filtering for products from scratch
- Users **compare product images** with remembered appearance

Misinterpretation Risks

- Similar product images lead to confusion between variants
- Users may incorrectly assume **mandatory add-ons** or bundled items, leading to unexpected cost increases that are only discovered at the checkout stage

Decision-Making Before Purchase

- Strong reliance on **ratings and reviews** (preference for 4+ stars)
- Users often consult **unboxing and review videos** before buying

Purchase, Payment & Delivery

Payment Preferences

- Preference for **Cash-on-Delivery** to allow verification
- Prepaid payments avoided due to fear of incorrect or defective items
- **Clear pricing and return information** increase willingness to proceed

Delivery-Time Inspection Preferences

- Users prefer to open and inspect the product in front of the delivery person
- Immediate verification helps confirm: Correct product, Physical condition and Size or variant accuracy

Return and Refund Considerations

- Delayed refunds after returns reduce trust and satisfaction, often discouraging users from making future purchases or leading them to switch to Cash on Delivery modes

User Preferences

Platform and App Preference

- Users prefer familiar platforms they have used previously (e.g., Flipkart, Amazon, Meesho)
- Familiarity reduces confusion and effort during navigation and checkout

Product and Brand Preference

- Strong preference for known and previously used brands
- Brand familiarity is used to reduce uncertainty and decision effort
- **Users often decide on the product or brand before starting online shopping**

Information and Accessibility Preferences

- Preference for platforms that allow zooming into images and text, use of screen readers (TalkBack)
- Users prefer larger fonts and better contrast, especially for prices and descriptions
- User-uploaded images and clear product visuals are preferred over text-heavy descriptions

Interaction Preferences

- Preference for typing over voice input due to: Slower text entry, Voice recognition errors, Privacy concerns in shared or public spaces
- Filters are often unused; users prefer scrolling or search-based navigation

Other Findings

Tool Reliability and Breakdown

- Screen readers, OCR, and magnification tools work inconsistently across platforms
- OCR sometimes reads background or irrelevant content instead of target information
- Users selectively abandon tools when reliability is low

Digital Accessibility Limitations

- Inconsistent or missing semantic labels prevent screen readers from correctly identifying interface elements
- Some buttons and options are not announced properly, leading to misinterpretation or missed actions
- Mandatory vs optional elements (e.g., add-ons) are not always distinguishable via assistive technologies

Transfer of Offline Coping Strategies

- Users apply offline strategies online, such as:
  - Relying on known brands
  - Avoiding exploration
  - Seeking external confirmation (reviews, videos)

Insights and Findings - Adoption & Use of Digital Technologies

Adoption & Usage of Digital Technologies

Mobile Camera-based Tools

- **Camera zoom** used to read distant or small text (prices, expiry dates, offers, bills)
- Preferred because it is: **Instantly available**, does not require learning a new app and **works across contexts** (shopping, receipts, signboards)

OCR and Reading Applications

- Apps such as InstaReader, Kibo Scanner, and built-in OCR used to read: Printed labels, Bills and receipts, Documents and books
- Preferred for structured reading tasks where zoom alone is insufficient
- Limitations observed:
  - OCR errors in cluttered environments
  - Background text sometimes misread as target content
  - OCR reads all the irrelevant data written in the product package

A participant using google lookout to know about the product

Adoption & Usage of Digital Technologies

Screen Readers and Text-to-Speech

- TalkBack used selectively, mainly for: Reading long text (e.g., messages, product details, documents)
- Not always used during shopping due to:
  - Inconsistent labeling of interface elements
  - Difficulty distinguishing mandatory vs optional actions

Navigation and Orientation Tools

- Google Maps, Lazarillo, and cane-assisted navigation used for: Reaching stores and navigating unfamiliar environments
- Digital navigation tools preferred outdoors over asking strangers

Note-Taking and Memory Support Tools

- WhatsApp drafts, Keep Notes, and message apps used to maintain shopping lists and reminders
- Preferred over specialized apps due to familiarity and low cognitive overhead

Social and Emotional Factors Influencing Shopping Behaviours

Exclusion

- Some participants feel excluded when sighted people do not include them in groups

Performance Pressure

- Exploratory shopping can feel uncomfortable: fear of judgment, slowing others down, or being ignored

Valued Independence

- Participants balance self-reliance with asking for help strategically

Study Visuals

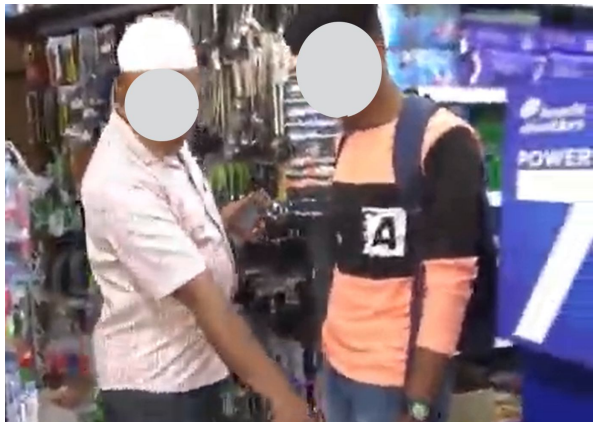
A participant examining a bottle of fabric conditioner.

A participant using his phone camera to identify a product on an upper shelf

A participant trying to complete payment with her phone

A participant inspecting a packet of noodles

During post session interview with a participant

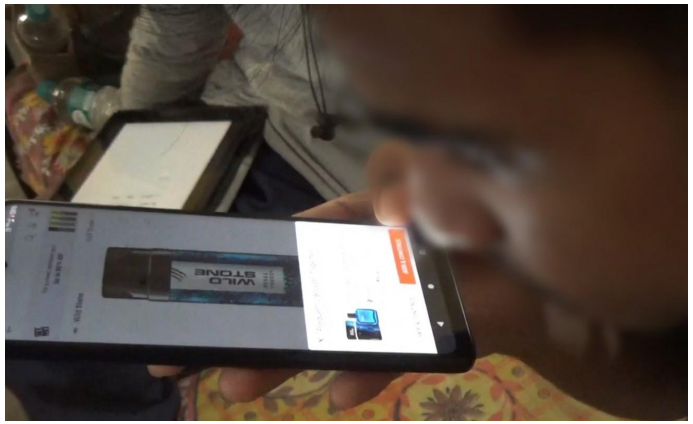


A participant taking help from the shopkeeper to locate a product

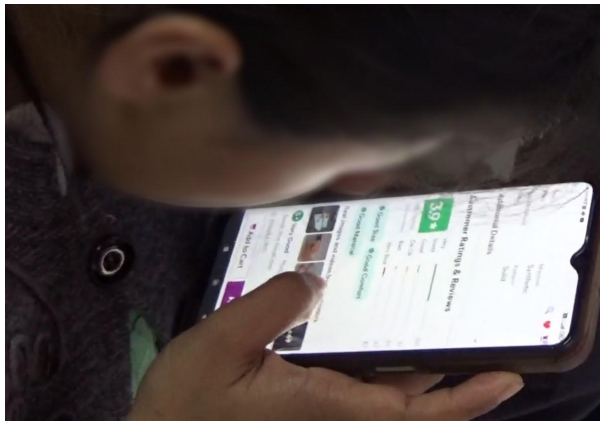
A participant inspecting vegetables by pressing them

A participant trying to explain to the shopkeeper the type of outfit he wants to purchase

Study Visuals



A participant mistakenly adding a frequently bought item, thinking it is a mandatory purchase along with the main product, not seeing the skip button



A participant checking product reviews before buying the product

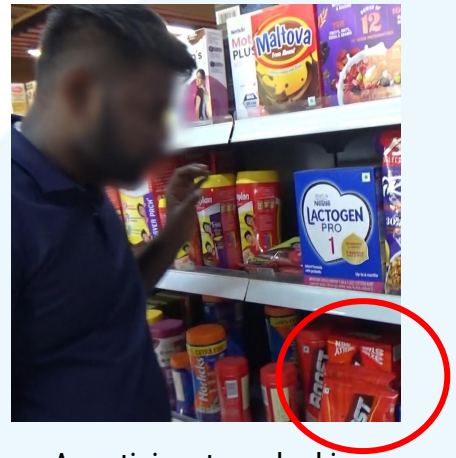
A participant unable to identify a product because of the changed package color

A participant checking the fit of a piece of clothing by trying it on

A participant checking the fragrance of a shampoo bottle

A participant trying to identify the soap brand by its shape

A participant completing the checkout process



A participant overlooking the item as placed on a lower shelf

Thank You

[Project Website]

Study Media Repository

- Google Drive (videos, images, study artifacts): https://drive.google.com/drive/folders/13xvJ1hm4cnXdJGTX1CIJZ7naHANFaEAf?usp=sharing

Submitted Research Article

- Submitted manuscript (Google Drive): https://drive.google.com/file/d/1yuv40Uof10vsNlgyxFw00QcdsJRb2rJd/view?usp=sharing

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