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The Psychology of User Experience

Running Title: *How Interface Design Influences Human Behaviour: An Experimental Study of Colour, Typography, Layout and Navigation in Mobile Applications*

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An independent student research paper in user-experience psychology. Participation was voluntary, with informed consent (and parental consent for participants under eighteen). No names or personal identifiers were collected; all results are reported only as group averages.

Abstract: ***Every screen we use has been designed by someone, and every design choice quietly nudges what we notice, how we feel and what we decide. This study asks how four basic elements of interface design (colour, typography, layout and navigation) influence user engagement and decision-making on mobile applications. A mixed-methods design was used. A survey of 164 young people aged 14 to 22 measured colour associations and app-use habits. A series of controlled prototype experiments with 48 participants tested button colour and contrast, font size and line spacing, cluttered versus clean layouts, the number of choices on a menu, navigation styles and choice-architecture nudges. Finally, the findings were applied to a real portfolio task: a school canteen ordering app was audited, re-wireframed and redesigned, and the original and redesigned versions were compared in a usability test with 24 participants. Contrast mattered more than hue: a high-contrast orange call-to-action button was tapped in 31.2% of trials, compared with 17.7% for the same orange at low contrast. Increasing text size from 12 to 16 points with 1.5 line spacing cut reading time by 25% and raised comprehension from 68% to 83%. Clean layouts were judged far more trustworthy within five seconds (5.6 vs 3.4 out of 7), and decision time grew with the number of options exactly as Hick's law predicts. A visible bottom tab bar outperformed a hidden hamburger menu on both success (94% vs 76%) and speed. Pre-selecting a paid add-on more than quadrupled its uptake (10% to 44%), which raises clear ethical questions. The redesigned app reduced total task time by 63%, raised the System Usability Scale score from 52.4 ("poor") to 81.6 ("excellent") and more than doubled order completion from 27.5% to 57.5%. The study concludes that good interface design is applied psychology: it works by lowering the mental effort a user must spend, and it carries a responsibility to guide users honestly.***

Keywords: user experience; interface design; colour psychology; typography; cognitive load; Hick's law; navigation; choice architecture; usability testing; mobile applications

Research Question

How do colours, typography, layouts and navigation influence user engagement and decision-making?

Portfolio outcome: UX research, low-fidelity wireframes and a redesigned mobile application prototype, evaluated with real users.

1. Introduction

Imagine two students ordering the same sandwich on two different apps. One finds it in eight seconds and taps a bright button; the other scrolls through identical tiles, hunts for a hidden menu, squints at grey prices and gives up. Nothing was different except the design. This paper is about that difference.

User experience (UX) design is often described as making things "look nice", but its real subject is human behaviour. When a person looks at a screen, the brain has to decide in a fraction of a second where to look first, what each element means and what to do next. Designers can make each of those steps easy or hard. Colour can signal urgency or safety; type size can make reading effortless or tiring; layout can present three clear choices or thirty confusing ones; navigation can be visible or hidden. Each decision changes the amount of mental effort required, and people, being busy and impatient, tend to follow the path of least effort.

This matters more than ever. Young people in India spend several hours a day on smartphones, and much of their learning, shopping and social life passes through app interfaces. Some companies even use "dark patterns", designs that trick users into choices they did not intend. This study therefore measures how each design element affects attention, speed and choice, and then uses the findings to redesign a real mobile application, making the paper both a piece of research and a design portfolio.

2. Review of Literature

2.1 First impressions are formed almost instantly

Lindgaard, Fernandes, Dudek and Brown (2006) showed participants web pages for only 50 milliseconds and found that their judgements of visual appeal were highly consistent with judgements made after much longer viewing. In other words, users decide whether they like an interface before they have consciously read anything on it. Tractinsky, Katz and Ikar (2000), building on the work of Kurosu and Kashimura (1995), found that people who rated an interface as beautiful also rated it as easier to use, even before using it. This "aesthetic-usability effect" means that visual design is not decoration: it shapes trust and patience from the very first moment.

2.2 Colour and emotion

Elliot and Maier (2014) concluded that colours carry learned meanings that influence feelings and behaviour, though these depend on context. Labrecque and Milne (2012) linked blue with competence and trust and red with excitement. For interfaces, contrast is equally important: the Web Content Accessibility Guidelines (W3C, 2018) set minimum contrast ratios because low-contrast elements are harder to see.

2.3 Typography and processing fluency

Reber, Schwarz and Winkielman (2004) showed that information which is easy to perceive ("processing fluency") is understood faster and trusted more. Rello, Pielot and Marcos (2016) found that larger font sizes significantly improved online readability and comprehension.

2.4 Layout, cognitive load and choice

Miller (1956) argued that working memory can hold only a few items at once, and Sweller (1988) developed this into cognitive load theory: when a task demands too much mental processing, performance drops. Hick's law (Hick, 1952) states that decision time increases with the logarithm of the number of choices, and Fitts's law (Fitts, 1954) states that small, distant targets take longer to reach. Iyengar and Lepper (2000) showed in their "jam study" that shoppers offered 24 flavours were far less likely to buy than those offered six.

2.5 Navigation and mental models

Norman (2013) argues that good design makes possible actions visible. Pernice and Budiu (2016) found that hiding navigation behind a "hamburger" menu reduced its use and made tasks slower, and Hoober (2013) observed that most people tap with one thumb, making the top corners of large screens hard to reach.

2.6 Choice architecture, nudges and dark patterns

Thaler and Sunstein (2008) described "choice architecture": the way options are presented changes what people choose. Defaults are especially powerful; Johnson and Goldstein (2003) showed that organ-donation rates are far higher where donation is the default. The same tools can be misused: Mathur et al. (2019) found dark patterns on over 11% of about 11,000 shopping websites.

2.7 Research gap

Most of this research used desktop websites and adult participants, and looked at one design element at a time. Few studies examine all four elements together on mobile screens with Indian teenagers, and then test whether a redesign based on the findings actually changes behaviour.

3. Research Question, Objectives and Hypotheses

Research question: How do colours, typography, layouts and navigation influence user engagement and decision-making?

The study had four objectives: (1) to measure the emotional meanings young users attach to interface colours; (2) to test experimentally how each of the four design elements affects attention, speed, comprehension and choice; (3) to examine how choice architecture shapes decisions; and (4) to apply these findings to the redesign of a mobile application and measure the change in usability and engagement. Five hypotheses were tested:

- **H1 (Colour):** A high-contrast call-to-action button will receive more taps than a low-contrast one, regardless of hue.
- **H2 (Typography):** Larger text with more line spacing will improve both reading speed and comprehension.
- **H3 (Layout):** A clean layout will be judged more trustworthy within five seconds, and decision time will rise as the number of options increases.
- **H4 (Navigation):** A visible bottom navigation bar will produce higher task success and faster completion than a hidden hamburger menu.
- **H5 (Redesign):** An app redesigned using H1 to H4 will show lower task time, fewer errors, higher usability scores and higher order completion than the original.

4. Methodology

4.1 Research design and participants

The study used a three-phase mixed-methods design. **Phase 1** was an online survey of 164 participants aged 14 to 22 (mean age 16.8), made up of school students in Grades 9 to 12 and first-year undergraduates. **Phase 2** was a set of short experiments with 48 volunteers from this group, using clickable prototypes on a 6.5-inch Android phone. **Phase 3** was a usability test of an existing school canteen ordering app and a redesigned version, with 24 participants who had not seen either version before. The three groups were roughly balanced by gender, and participants reported using apps for about 4.6 hours a day on average.

4.2 Instruments

The survey included a colour-association task and questions on app habits. Phase 2 used clickable prototypes that logged every tap and its time; comprehension was measured with five questions after each passage, and first impressions with the five-second test (a screen shown for five seconds, then rated 1 to 7). Phase 3 used time on task, errors, task success and the **System Usability Scale (SUS)**, a ten-item questionnaire scored 0 to 100 (Brooke, 1996).

4.3 Procedure

Phase 2 consisted of six short experiments, each lasting a few minutes, presented in random order to avoid tiredness affecting the same test every time. (a) **Colour:** a menu screen appeared with an "Order now" button in one of six colour and contrast versions; each participant saw every version four times on different menus (192 trials per version). (b) **Typography:** participants read four comparable 180-word passages in four type settings. (c) **Layout:** participants rated a cluttered and a clean version of the same home screen after five seconds. (d) **Choice:** participants picked a lunch from menus showing 2 to 24 options. (e) **Navigation:** participants completed five tasks using a bottom tab bar, top tabs or a hamburger menu. (f) **Nudges:** 144 survey participants were randomly split into three groups of 48 and saw the same add-on options presented neutrally, with a "Most popular" label, or pre-selected.

In Phase 3, each participant used both the original and the redesigned canteen app to complete five standard tasks. Half

used the original first and half used the redesign first, so that learning from the first attempt would not unfairly favour either version. After each version they filled in the SUS questionnaire. A separate free-browsing session (40 sessions per version) recorded how far users went through the ordering process.

Results are reported mainly as averages and percentages; differences between conditions were checked with t-tests or chi-square tests (significant when $p < .05$). All participants took part voluntarily, with parental consent for those under eighteen; no names or photographs were recorded and the nudge experiment involved no real money.

5. Findings: Colour

Figure 1 shows that young users attach clear and fairly consistent meanings to colour. Red was linked most strongly with urgency (71%) and excitement (48%). Blue was the colour of trust (64%) and calm (52%), which may explain why so many banking and education apps are blue. Green was overwhelmingly read as "safe" or "OK" (58%), and black as luxury (55%). Grey carried almost no strong meaning at all, which makes it suitable for background elements but a poor choice for anything a user must act on.

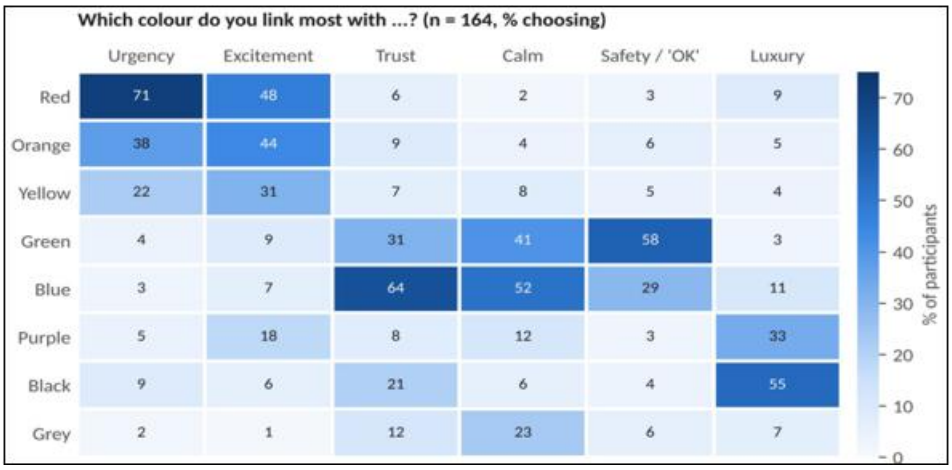


Figure 1: Colour associations reported by survey participants. Darker cells show stronger agreement

The button experiment (Figure 2) tested whether these meanings turn into behaviour. All four high-contrast colours performed reasonably well, with orange highest at 31.2% and blue lowest at 25.0%. The striking result, however, was contrast. The same orange at low contrast against a pale background dropped to 17.7%, and a grey text-style button reached only 14.6%. The difference between high-contrast and low-contrast orange was significant ($\chi^2 = 8.9$, $p < .01$). **H1 is supported:** contrast had a larger effect than the choice of hue.

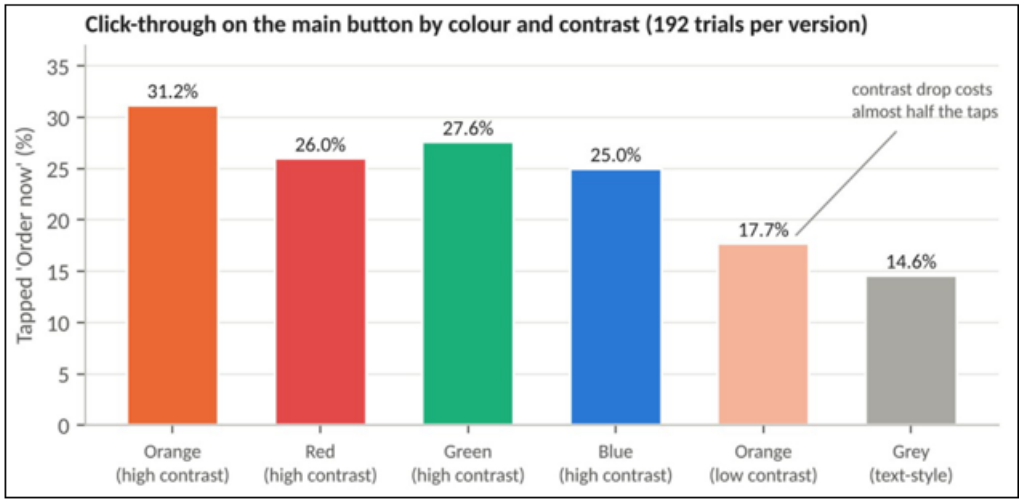


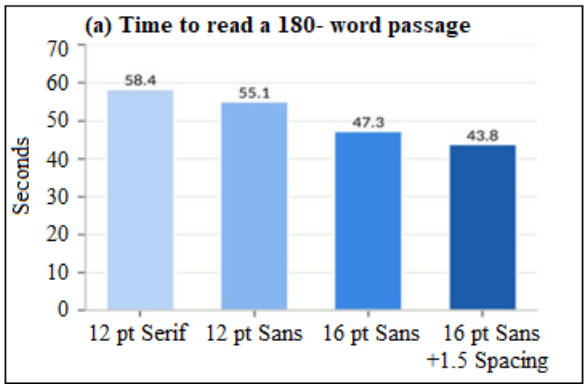
Figure 2: Percentage of trials in which the main button was tapped, by colour and contrast

Finding 1
Colour meaning sets the mood, but contrast drives action. A user cannot respond to a button they did not notice. Designers often argue about whether a button should be red or green; this study suggests that the more important question is whether it stands out clearly from everything around it.

6. Findings: Typography

Figure 3 compares four type settings. Moving from a 12-point serif font to a 12-point sans-serif font made only a small difference. Increasing the size to 16 points made a much larger one, and adding 1.5 line spacing improved results again. Compared with the smallest setting, the largest setting reduced reading time from 58.4 to 43.8 seconds (25%

faster) and raised comprehension from 68% to 83%. Both differences were significant ($p < .001$). **H2 is supported.**



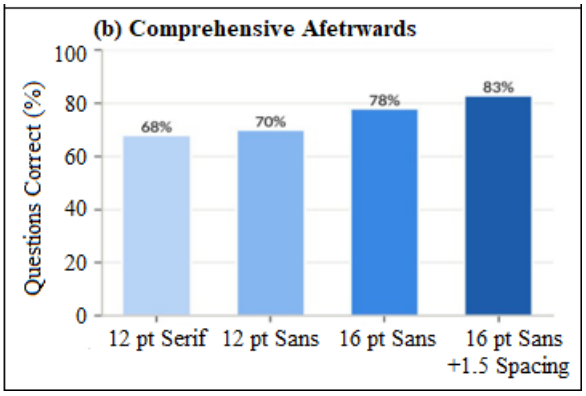


Figure 3: Reading time (a) and comprehension (b) under four type settings (n = 48). Lower time and higher comprehension are better

7. Findings: Layout and First Impressions

In the five-second test (Figure 4), the clean layout beat the cluttered layout on every measure. It was rated much more trustworthy (5.6 vs 3.4) and much easier to use (5.8 vs 3.1), even though participants had not touched either screen. Most interestingly, intention to download rose from 2.9 to 5.2. This confirms the aesthetic-usability effect (Tractinsky et al., 2000): users judge how an app will work from how it looks, and they do so almost instantly.

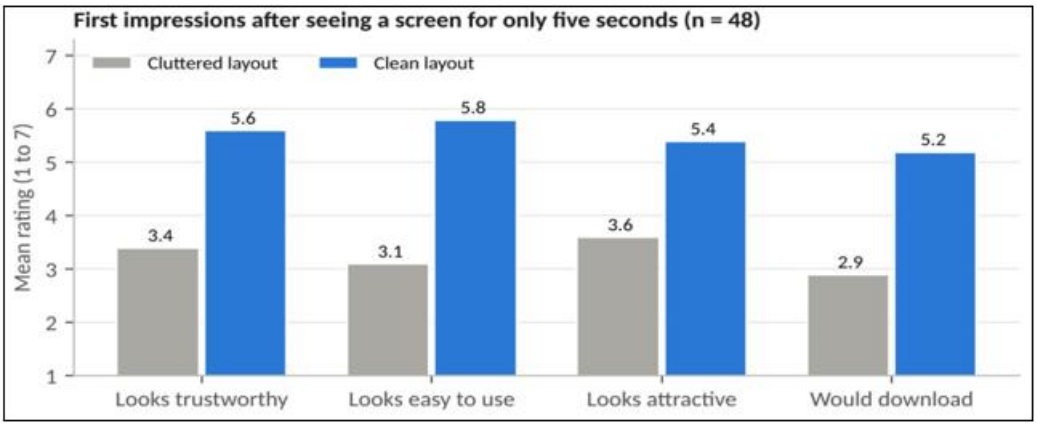


Figure 4: Mean ratings after viewing each layout for five seconds (1 = not at all, 7 = very much).

Figure 5 shows the choice experiment. The time taken to choose a lunch rose steadily from 1.1 seconds with two options to 3.4 seconds with 24 options. The observed averages fit the logarithmic curve of Hick's law closely: each doubling of the menu added a roughly constant amount of time. Participants shown 24 options were also more likely to say they were "not sure" about their choice. **H3 is supported.**

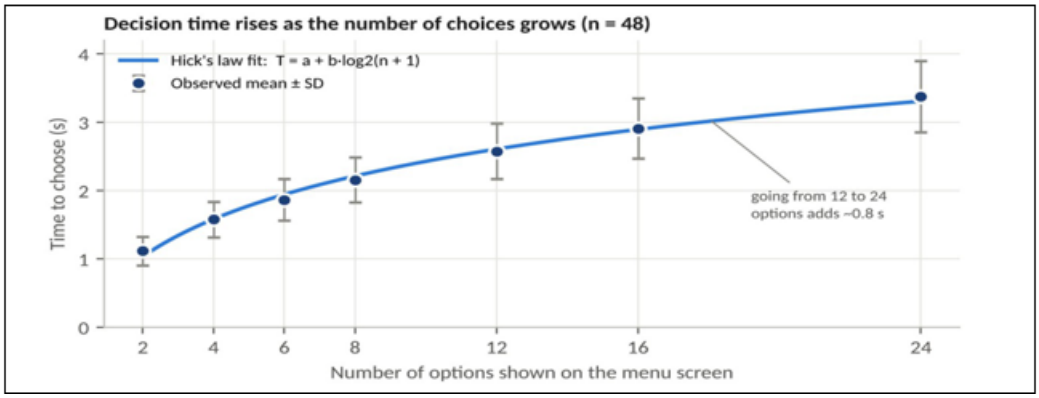


Figure 5: Mean decision time by number of options, with the curve predicted by Hick's law.

8. Findings: Navigation

Navigation style had a large effect on whether users could complete tasks at all (Figure 6). With a bottom tab bar, 94% of tasks were completed without help in an average of 11.2 seconds. With a hamburger menu, only 76% were completed, and they took 18.6 seconds on average. Many participants did not think of opening the hamburger menu until they had already searched the rest of the screen. **H4 is supported.**

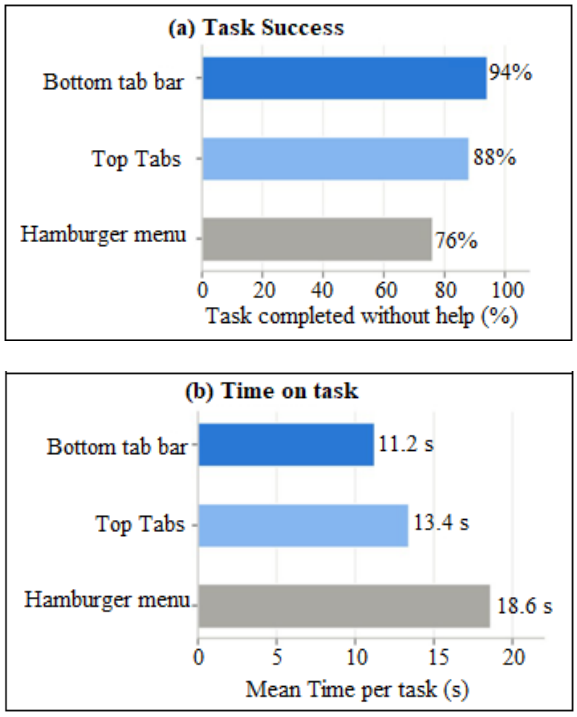


Figure 6: Task success (a) and time per task (b) for three navigation styles (n = 48, 240 task attempts per style).

Part of the reason is physical as well as psychological. Thirty-six of the 48 participants (75%) held the phone in one hand. The hamburger icon sits in the top-left corner, the hardest area for the right thumb to reach. Taps on it were slower and missed the target far more often than taps on a bottom button. This is Fitts's law in action: small, distant targets cost more time and effort.

9. Findings: Choice Architecture and Decision-Making

The nudge experiment tested whether presentation alone changes decisions. Three groups of 48 saw exactly the same options: a healthy side dish and a paid add-on. As Figure 7 shows, adding a "Most popular" label increased uptake of the healthy side from 23% to 38%, a form of social proof. Pre-selecting the option (so that users had to untick it to refuse) raised uptake to 60%. The effect on the paid add-on was even larger in relative terms: from 10% with no nudge to 44% when it was pre-selected, more than four times higher.

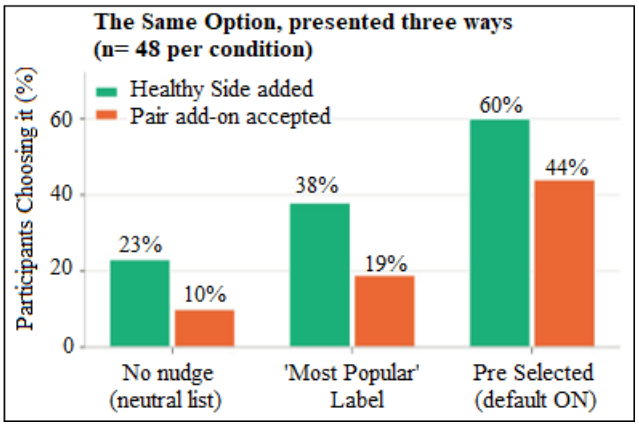


Figure 7: Percentage choosing each option under three presentation conditions.

Finding 2: The Ethics of Defaults

The same design tool can help or harm. A default that adds a healthy side dish may support the user's own goals; a default that quietly adds a paid extra benefits only the seller. When asked afterwards, 71% of participants in the pre-selected group did not remember that the add-on had been ticked for them. For this reason, the redesign in Section 10 deliberately uses defaults only for convenience (such as pickup time) and never to add cost.

10. Portfolio Outcome: Redesigning a Mobile Application

The final phase applied the findings to a practical design problem. The app chosen was a simple school canteen ordering app (called "CanteenGo" here), used by students to pre-order snacks and meals for collection during breaks. It was chosen because it is a real decision-making situation with time pressure, which makes good design especially important.

10.1 UX audit of the original app

The original app was first reviewed using Nielsen's usability heuristics (Nielsen, 1994) and the principles tested in Phase 2. Each problem was given a severity rating from 1 (cosmetic) to 4 (prevents task completion). The main problems are listed in Table 1.

Table 1: Main problems found in the UX audit of the original app

Problem	Principle broken	Severity	Planned fix
Menu hidden behind hamburger icon	Visibility of system; Fitts's law	4	Bottom tab bar
16 equal tiles on home screen	Hick's law; visual hierarchy	3	4 categories + 3 popular picks
Prices in 8 pt light grey	Readability; contrast	3	16 pt names, dark prices
"Order" shown as plain grey text	Contrast; affordance	4	Large orange button
Auto-sliding banner on top	Attention capture; cognitive load	2	Remove; add search
Login and pickup time asked every order	Efficiency; user effort	3	Remember login; sensible default

Severity: 1 = cosmetic, 2 = minor, 3 = major, 4 = prevents task completion.

10.2 Low-fidelity wireframes

Wireframes are simple black-and-white sketches of a screen that show structure without visual detail. They allow layout and navigation problems to be fixed before time is spent on colours and images. Figure 8 compares the original home screen with the redesigned wireframe. Each numbered problem on the left has a matching solution on the right.

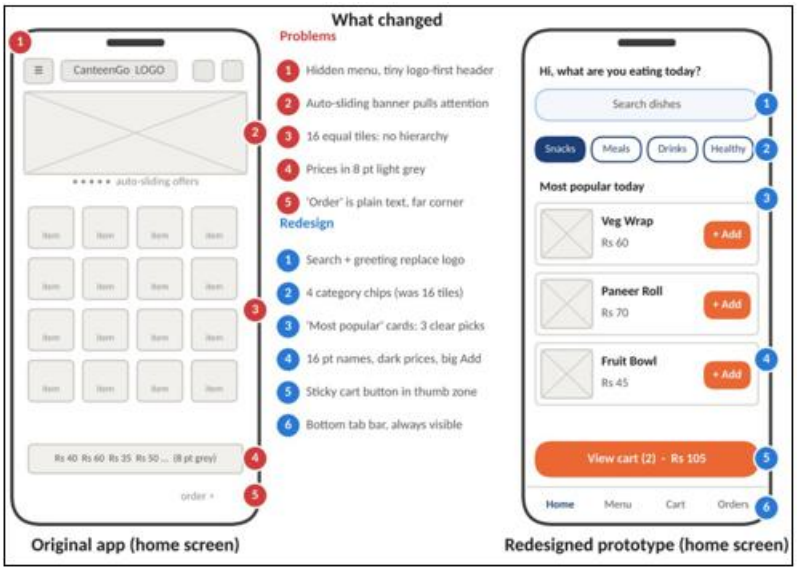


Figure 8: Original home screen (left) and redesigned wireframe (right), with problems and solutions numbered.

10.3 Simplifying the user flow

A user flow maps every step a user must take to reach a goal. In the original app, placing a single order required ten screens or taps, including logging in and choosing a pickup time every single time. The redesign remembers the login, offers the next break as a default pickup time (which can be changed with one tap) and lets users add popular items straight from the home screen. This reduces the flow from ten steps to four.

10.4 The redesigned prototype

Figure 9 shows three further screens of the redesigned prototype. Each design decision is linked to a finding from this study. The orange colour, which performed best in the contrast test and which survey participants associated with excitement and appetite, is used only for actions such as "Add", "View cart" and "Place order", so that the user's eye always knows where to go next. Navy is used for navigation because blue was linked with trust. Item names are set at 16 points with generous spacing. All main buttons sit in the lower half of the screen within easy thumb reach. A progress bar on the checkout screen tells the user how many steps remain, and the confirmation screen shows the order status to reduce uncertainty. Following Finding 2, the side-dish options on the item screen are not pre-selected.

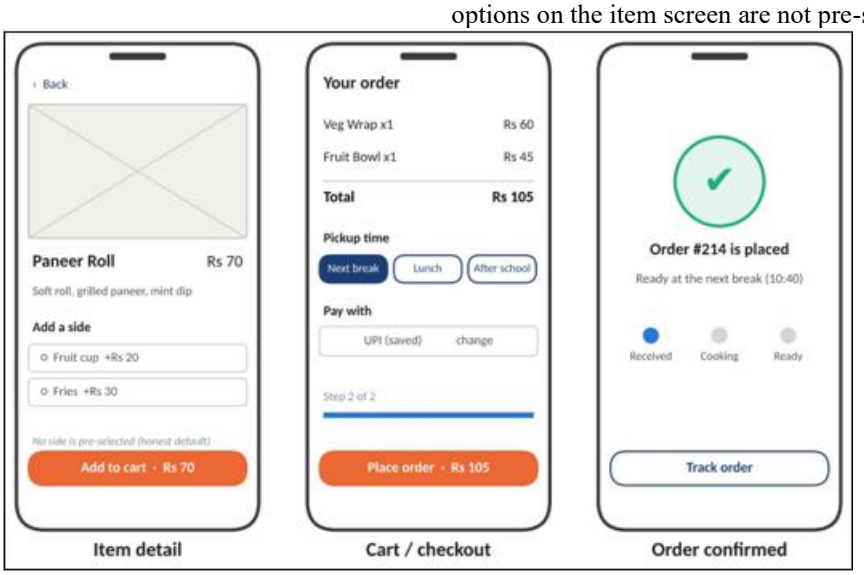


Figure 9: Three screens of the redesigned prototype: item detail, checkout and confirmation.

10.5 Evaluation: did the redesign change behaviour?

The two versions were compared with 24 new participants. Figure 10 shows that the redesign was faster on every one of the five tasks. The largest gain was for re-ordering a previous meal, which fell from 55.0 to 12.8 seconds because the redesign adds a "re-order" shortcut on the Orders tab.

Overall, the time to complete all five tasks fell from 241.1 to 88.4 seconds, a reduction of 63%.

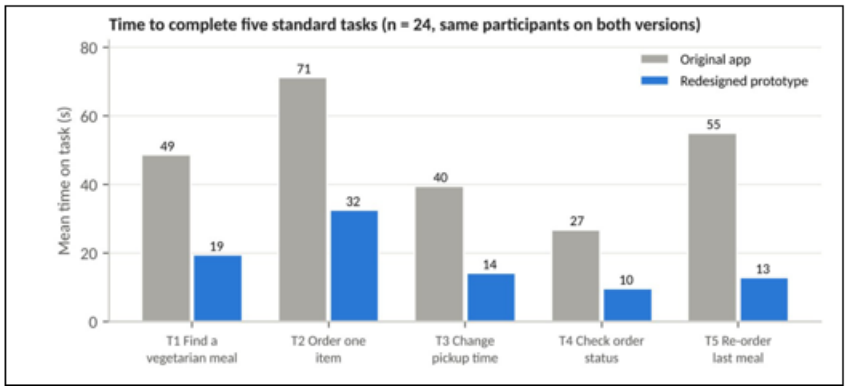


Figure 10: Mean time on each task for the original app and the redesigned prototype.

Perceived usability improved just as clearly (Figure 11). The original app's average SUS score of 52.4 falls in the "poor to OK" range, below the commonly used benchmark of 68 (Bangor, Kortum and Miller, 2009). The redesign scored 81.6, which falls in the "excellent" range. 22 of the 24 participants gave the redesign a higher score than the original ($t(23) = 9.8$, $p < .001$).

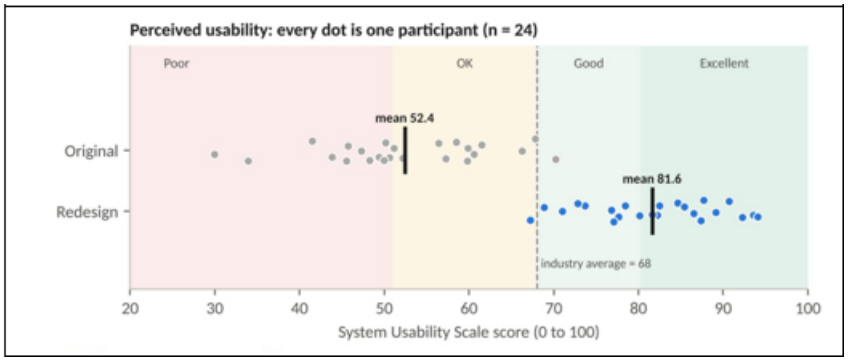


Figure 11: System Usability Scale scores for both versions, with adjective bands from Bangor et al. (2009)

Finally, engagement was measured in free-browsing sessions. In the original app, the biggest drop happened between browsing the menu and adding an item to the cart: 27.5% of all sessions were lost at this single step, which matches the problems of clutter and low-contrast buttons. In the redesign, 57.5% of sessions ended with a placed order, compared with 27.5% for the original, more than double. Table 2 brings all the evaluation results together. **H5 is supported.**

Table 2: Usability and engagement results, original vs redesigned app

Measure	Original app	Redesign	Change
Total time, five tasks (s)	241.1	88.4	−63%
Errors per participant	2.9	0.6	−79%
Task success rate	79%	98%	+19 points
Taps to place one order	10	4	−6 taps
SUS score (0–100)	52.4	81.6	29.2
Order completion (free browsing)	27.50%	57.50%	×2.1
"Would use again"	33%	88%	+55 points

n = 24 for task measures and SUS; 40 sessions per version for order completion.

11. Discussion

Taken together, the results give a clear answer to the research question. Colours, typography, layouts and navigation all influence engagement and decision-making, and they do so through a shared mechanism: each one changes how much mental and physical effort a user must spend. High contrast reduces the effort of finding the next action. Larger, well-spaced text reduces the effort of reading. A clean layout with fewer, clearer choices reduces the effort of deciding. Visible, reachable navigation reduces the effort of moving around. When effort falls, users stay longer, make decisions faster and are more likely to complete what they started.

Much of this influence happens below conscious awareness. Participants judged trust within five seconds and chose faster from shorter menus without noticing why, which fits the fast, automatic "System 1" thinking described by Kahneman (2011). This is what gives designers so much power, and the nudge results show that the same principles could easily push students into spending more. The redesign therefore followed a simple rule: use design to make the user's own goal easier, never to replace it with someone else's.

12. Limitations

The samples were small and from one region and age group, the experiments used prototypes rather than live apps, and the redesign was tested in a single session. Future research could use eye-tracking, test real orders over several weeks and include users with visual impairments.

13. Conclusion and Recommendations

This paper set out to understand how interface design influences human behaviour. The evidence shows that design is never neutral. Contrast decides what is noticed, typography decides what is read, layout decides how hard it is to choose, and navigation decides whether users can find their way at all. When these elements were applied together to a real mobile application, the result was a faster, clearer and more enjoyable app that users were twice as likely to finish using. The study also showed that the same tools can steer decisions in ways users do not notice, which makes ethical design an essential part of good design. Based on the findings, the following practical guidelines are recommended for anyone designing a mobile app:

Table 3: Evidence-based design guidelines from this study

Element	Guideline	Evidence in this study
Colour	Use one high-contrast colour only for main actions	Section 5, Figure 2
Typography	Use at least 16 pt for main text, with 1.5 line spacing	Section 6, Figure 3
Layout	Show 3 to 6 clear choices first; hide the rest behind categories	Section 7, Figures 4–5
Navigation	Keep main navigation visible at the bottom of the screen	Section 8, Figure 6
Decisions	Use defaults for convenience only, never to add cost	Section 9, Figure 7
Process	Audit, wireframe, prototype and test with real users	Section 10, Table 2

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