

INCLUSIVE UI DESIGN: SOLVING ACCESSIBILITY CHALLENGES FOR LEFT-HANDED VS. RIGHT-HANDED MOBILE USERS

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Анотація

Оскільки мобільні пристрої слугують основним середовищем для цифрової взаємодії, забезпечення рівної доступності для всіх користувачів є надзвичайно важливим. Однак сучасні мобільні інтерфейси користувача (UI) переважно орієнтовані на правшів, часто нехтуючи ергономічними потребами лівшів, які складають приблизно 10% населення світу. Ця нерівність створює помітні труднощі у зручності використання, включаючи незручні пози для хвату, обмежену доступність та вищі показники випадкового дотику, особливо враховуючи, що екрани смартфонів продовжують збільшуватися в розмірах. У цій статті розглядаються критичні проблеми доступності, що виникають через упередженість використання рук у дизайні мобільних інтерфейсів. Аналізуючи механіку «зони великого пальця» як для лівшів, так і для правшів, дослідження визначає ключові точки тертя у стандартних шаблонах навігації, таких як розміщення основних інтерактивних елементів (наприклад, плаваючих кнопок дій) та жестів свайпу у напрямку. Крім того, воно пропонує дієві, інклюзивні стратегії дизайну, пропагуючи адаптивні інтерфейси, дзеркальні варіанти макета та налаштовуване керування жестами. Зрештою, у цій статті стверджується, що інтеграція практик, що враховують використання рук, не лише вирішує нагальні ергономічні проблеми, але й значно підвищує загальну задоволеність користувачів, цифрову доступність та утримання продукту.

Ключові слова: інклюзивний дизайн, мобільний інтерфейс/користувацький досвід, доступність для лівшів, ергономіка зони великого пальця, адаптивні інтерфейси, упередженість до руки, дизайн, орієнтований на користувача.

Abstract

As mobile devices serve as the primary medium for digital interaction, ensuring equitable accessibility for all users is paramount. However, contemporary mobile user interfaces (UI) predominantly cater to right-handed individuals, often neglecting the ergonomic needs of the left-handed minority, which comprises approximately 10% of the global population. This disparity creates notable usability friction, including awkward grip postures, restricted reachability, and higher rates of accidental touch inputs, particularly as smartphone screens continue to increase in size. This paper examines the critical accessibility challenges arising from handedness bias in mobile UI design. By analysing the "thumb zone" mechanics for both left- and right-handed users, the research identifies key friction points in standard navigation patterns, such as the placement of essential interactive elements (e.g., floating action buttons) and directional swipe gestures. Furthermore, it proposes actionable, inclusive design strategies, advocating for adaptive interfaces, mirrored layout options, and customizable gesture controls. Ultimately, this paper argues that integrating handedness-inclusive practices not only resolves immediate ergonomic issues but also significantly enhances overall user satisfaction, digital accessibility, and product retention.

Keywords: inclusive design, mobile UI/UX, left-handed accessibility, thumb zone ergonomics, adaptive interfaces, handedness bias, user-centred design.

Introduction

In the modern digital landscape, smartphones function as extensions of the human hand. Consequently, the physical interaction between the user and the device is a foundational element of user experience (UX). Despite the universal adoption of mobile technology, contemporary user interface (UI) design predominantly defaults to a right-handed paradigm. With approximately 10% of the global population identifying as left-handed, millions of users routinely encounter micro-frictions that hinder seamless digital navigation.

As smartphone screens have progressively increased in size, one-handed usability has become a critical design challenge. This paper explores the biomechanical realities of mobile interaction, identifies the specific usability barriers faced by left-handed users, and proposes actionable strategies for implementing handedness-inclusive UI design. The core premise is that accessibility should not be an afterthought but a default standard that accommodates the physical realities of all users.

The biomechanics of mobile interaction

To understand the friction in current UI patterns, it is essential to analyse how users physically hold and interact with their devices. The concept of the **"Thumb Zone"**, originally coined by Steven Hoober, maps the screen area that a user can easily reach with their thumb while holding the phone in one hand.

The Thumb Zone is generally divided into three areas:

1. **The natural area:** the most comfortable region for tapping and swiping, requiring no hand shifting.
2. **The stretch area:** requires extending the thumb, causing slight physical strain.
3. **The "ow" area:** out of direct reach, requiring the user to shift their grip or use a second hand.

Because the natural arc of the thumb mirrors itself depending on which hand is used, a layout optimized for a right-handed user's natural area often places essential functions directly into a left-handed user's stretch or "ow" area.

Common UI friction points

The assumption of right-handedness in digital design manifests in several standard UI patterns that inadvertently create accessibility barriers:

- **Placement of the floating action button (FAB).** In material design and many modern applications, the FAB (such as "compose email" or "add post") is traditionally anchored to the bottom-right corner of the screen. While ergonomically perfect for right-handed thumbs, it forces left-handed users to stretch across the entire width of the screen, often leading to accidental palm touches on the lower-left edge.

- **Horizontal swipe gestures.** Navigation often relies on swiping from the edge of the screen. For example, swiping left-to-right to "go back" is physically intuitive for a left thumb but requires a right-handed user to reach across the screen. Conversely, specific swipe-to-delete or archive actions are often calibrated for the natural motion of a right thumb.

- **Asymmetrical menu lists and toggles.** Checkboxes, toggle switches, and list icons are frequently aligned to the right edge of the screen for visual cleanliness. This alignment favours right-handed reachability while forcing left-handed users to stretch.

- **The "Hamburger" menu placement.** Traditionally placed in the top-left corner, this icon is notoriously difficult to reach for one-handed right-handed users on large screens, yet surprisingly accessible for left-handed users. This highlights that poor ergonomic placement can inadvertently affect the majority, underscoring the need for universal design.

Strategies for inclusive adaptation

To resolve these accessibility challenges, UI designers must transition from static, one-size-fits-all layouts to dynamic, user-centred interfaces. Key strategies include:

1. **Ambidextrous design patterns.** Critical interactive elements (like search bars, primary navigation tabs, and core call-to-action buttons) should be centralized at the bottom of the screen. A bottom-navigation bar is equally accessible to both left- and right-handed users.

2. **Mirrored layout options.** Applications should offer a "left-handed mode" within their accessibility settings. This mode would dynamically mirror the interface, shifting right-aligned FABs, scrollbars, and toggles to the left side of the screen.

3. **Customizable gesture controls.** Allowing users to map specific swipe directions to preferred actions (e.g., choosing whether a left-to-right swipe archives or deletes an item) ensures the UI adapts to the user's natural physical biomechanics rather than forcing the user to adapt to the software.

4. **Responsive element placement.** Leveraging device sensors and machine learning to detect which hand is currently holding the phone, allowing the UI to subtly shift interactive elements toward the active thumb zone in real-time.

Conclusion

Handedness bias in mobile UI design is a subtle but pervasive accessibility issue. When interfaces are designed exclusively for right-handed use, they degrade the user experience for a significant portion of the population, leading to ergonomic strain and decreased digital efficiency.

By analysing the mechanics of the thumb zone and addressing specific UI friction points, developers and designers can create far more equitable digital environments. Implementing ambidextrous layouts, offering mirrored interfaces, and allowing for gesture customization are not merely supplementary features – they are fundamental components of modern, inclusive digital design. Ultimately, solving accessibility challenges for left-handed users drives innovation that creates more flexible, comfortable, and intuitive interfaces for everyone.

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