Redesigning Tapatap game
for learning Marathi typing and for improving speed and accuracy.

Interaction Design I Project 2 I Report

Sagar Sadashiv Yende
Interaction Design Student
M.Des 2014-2016

Guide
Prof. Anirudha Joshi

Industrial Design Center
Indian Institute of Technology Bombay, Mumbai
2015

Declaration

I declare that this written document represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources.
I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/ source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Sagar Yende
146330009
Industrial Design Center
Indian Institute of Technology Bombay,Mumbai

Approval Sheet

The project titled 'Redesign of Text Input Game' by Sagar Sadashiv Yende, is approved for partial fulfillment of the requirement for the degree of 'Master of Design' in Interaction Design.

Guide 

Chairperson 

Internal Examiner 

External Examiner

Date 06 - 07 - 2016 .

Acknowledgment

I would like to express my sincere gratitude to Prof. Anirudha Joshi for his support and guidance throughout.
Thanks to Prof. Ravi Poovaiah, Prof. Venkat R , Prof. Girish Dalvi and Prof. Athavankar, for their valuable inputs during the stage presentations and guidance
Faculty at Industrial Design Centre (IDC) for their support.

My classmates at IDC Prasad Ghone, Indrajeet Roy, Jayati B., Akshay Kore, Dileep, Sanket Kulkarni for their help in customizing keyboards for each level in game, suggestions and comments during various discussions. Ganesh Munge, Ravikiran Jondhale & Pooja Kulkarni for their help in evaluation and Spriha Biswas for her help in prototyping of the Game.

Thanks to the Swarachakra Team, IDC for all the resources and support.

Most importantly, my family for constant support, motivation and inspiration.

Sagar Yende

Abstract

Text Input in Indian languages is harder than in English for even those users who are used to virtual keyboards on touchscreen devices. Reasons include comparatively difficult structure and rules of the languages, large number of alphabets,conjuncts, lack of standard layout, and users being new to regional language virtual keyboards. Users believe that typing Indian language is complex than English as there is significant entry level barrier in Indian language virtual keyboards for novice and first time users.

Even though text input in Indian languages has significantly increased, the typing speed for Indian languages(40-60 CPM) is significantly lower than that standard roman keyboard (~200 CPM).This project tries to address speed issues and learning barriers of Marathi text input.

In users studies, learnability barriers for first time user are identified from observation and interviews of participants in typing game. I tried to understand motivation for typing and pain points of user while typing on different Marathi keyboards. These observed learning steps can be gamified and made interesting enough that user can overcome learnability barriers while playing. A typing game can help improve typing speed and accuracy to a level and make the user feel comfortable typing in regional language for text communication such as SMS, chat & social media posts

In this project, a text input game is redesigned to improve typing for Swarachakra Marathi keyboard.
Game focuses on providing help in overcoming learnability barriers and encouraging fast and accurate typing by making typing fun. It starts from the basics of typing such as memorizing letter positions on keyboard, practicing typing words and then a whole sentences with an increase in typing speed and accuracy.

The game contains both single player and multiplayer tracks. Single player tracks are 'blindfold' and 'speed' challenge. Memorizing key positions is the first step of getting used to a keyboard, to achieve this in 'blindfold' user practices to remember key positions and layout of the keyboard. After getting familiar with keyboard, practice plays important role in increasing typing speed. In speed challenge users type given sentences in a limited time. Users are provided with hints if they are stuck somewhere in the play. Hints are based on common problems faced by users while typing on Swarachakra Marathi keyboard. Multi-player tracks include gamified chat and multiplayer typing challenge that can be sent to one or more friends. Gamified chat tries to Incorporate typing regional language in daily activity of chatting and help improve speed and accuracy in typing.

Index

1. Introduction 1
-Game design based on social network
-Tapatap (previous version)

2. Background and User studies 5
-Design implication

3. Secondary research 7
-Type Racer
-Type It !
-Type as Fast as You Can!
-Typing crush
-Typing Fish
-Type racer and Easy type

4. Conclusion and Implications of Secondary research 14

5. Design brief 15

6. Initial Design Ideas 16
-Design Idea 1
-Design Idea 2
-Design Idea 3

7. Typing Parameters 20

8. Design ideas 21
-flippy text
-Yaad Rakhna
-Chatter type

9. Final Concept 25
-Tapatap v2
-Blindfold challenge
-Help
-Speed challenge
-Friends Challenge
-Chat+Play

10. Evaluation 38
- Inferences

11. Changes after Evaluation 44

12. References 46

Introduction

Text input in Indian languages on virtual keyboard for mobile devices is less adopted for several reasons that include complex structure of Indian languages, larger number of alphabets compared to roman script and complex conjuncts, matras, visarga & anuswara. Users perform better on universal quarty keyboard. Also typing regional language in English is commonly observed practice among users[1]

Unavailability of standard keyboard for Indian language is also one of the problem. In order to perform user testing of various keyboard layouts available for Marathi text input a user testing tool is developed at IDC (Industrial Design Center) by Swarachakra team. User testing is conducted using this tool in controlled environment which produce high internal validity results.

The testing tool was converted in to typing game called Tapatap by Kaustubh Limaye in 2015[2]. Gamified user testing application attempt to ease user testing and remove learnability barriers. The process gamification was constrained by user testing protocol and it puts limitations on design of text input game.

In this project a typing game is extended to learn and encourage speed and accuracy in typing,following a user testing protocol was not a constraint in this. Game aims to make users to type in regional language and overcome the learnability barriers and to develop proficiency in typing. So Indian language keyboards will not be considered as difficult to type in future.

This encouraged me to make a typing game for Marathi. So that people will try to type in Marathi and the interest developed in game will not allow them to give up. It will also encourage typing practice and use of Marathi typing in chat and other form of text communication.

This project aims to remove learnability barriers in adoption of Marathi keyboards for typing and make typing interesting and fun activity so that users practice typing in regional languages and use it in daily activities like chatting. Detail steps in learning and pain points of users while typing are different for different keyboards. The game includes ‘help’ and ‘modified keyboards’ for different levels therefore scope of game is limited to Swarachakra Marathi keyboard even if gameplay can be adopted for other available keyboards for Marathi. Learning and developing proficiency in typing is longitudinal process. It needs regular practice of typing on same keyboard. Making typing interesting and fun activity can help to overcome learnability barriers and make the user practice typing in regional languages.

Game design based on social network

Online social networks and chatting apps such as facebook and whatsapp have become popular.[8] 86% of Indian web users visit social networking sites.[1] Because if it, online games based on these social media applications are also becoming popular for example Criminal case have monthly 3,729,488 active users. Facebook, whatsapp and hike are now available in 8 Indian languages on mobile to reach out to users who prefers consuming content in their native languages over English. [12] Hamari et al. (2013) describes the target behavior of the use of gamification as to motivate oneself. The paper says, network of users create a chance of meaningful interaction and facilitate reciprocal activity. Feedback from other users positively affects users attitude towards gamified service. It conclude that social elements are essential for creating engaging gamification.[9]

A game designer Amy Jo Kim has promoted 'Putting fun into functional". According to her incorporating players journey with social actions creates social engagement loop. In this loop user is called for action or to compete, it leads to task and output of tasks as awards, score & social searing of achievements motivate users.[10] Such social games generally implement features like Asynchronous gameplay which allows players to play at different time. Example - Farmvile, Parking wars. It can also be used in gamification of activity like chat. Another distinct feature in social games is public player statistics that can be in form of global/local high scores and leaderboard within friends list. Example - Mafia Wars, Icy Tower. This feature can be used in multiplayer gameplays as social sharing of leaderboard and sending invites/challenge in community.[13] Details of its use in final design is discussed letter.

Tapatap (previous version)

Tapatap is agamified tool for user testing of text input, designed by Kaustubh Limaye.[2] Game play for Tapatap was based on user testing protocol. Tapatap was constrained by user testing protocol which does not allow users to get distracted with visual elements, cognitive load and does not allow selection of words and phrases other than mentioned in the protocol and the flexibility of its sequence. Users have to type given sentences as fast and accurately as they can . Gamification is achieved by using various game design elements.

At first, user selects a Marathi keyboard for typing. After practice session of ten words the user will get a sentence to type. As the user submits typed sentence, a virtual character named Tappoji (a typing master), gives a feedback using a chat metaphor.

Player gets ranking in form of stars for typing speed. Feedback from Tappoji includes motivational comments, typing speed in CPM (characters per minute) and some special badges for high speed and accuracy. In testing, speed achieved by users were not very high (~40 CPM) [2]

Game elements used : virtual character Tappoji, star ratings, badges and leaderboard.

External motivation: Comments from Tappoji, display of CPM and star rating for speed.

Feedback from Tappoji is limited and is in the form of text. Minimum accuracy level is not considered in allotment of star rating. Feedback includes the count of errors in typed sentence, but even after typing random text user will get stars for good typing speed

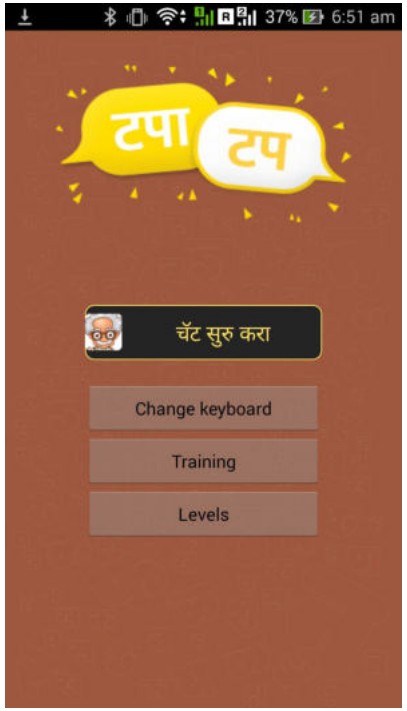


Figure 1. Screen from previous Tapatap app

Tapatap (previous version)

Tappoji : a virtual type master

Feedback from tappoji
Number of errors in typing
Star Rating for typing speed

User can get 5 star rating for speed even for random text input.

Figure 2. Feedback from Tappoji in Tapatap previous version

Background and User studies

A Physical typing competition (also called Tapatap) was held at IDC for typing in Marathi by Swarachakra team as a part of gamified user testing for leading Marathi keyboards. The competition included prize money for winners and participatory certificates for all participants. Users from range of novices to experts, children to adults, students and working people participated in this. During this competition, participants were observed in typing sessions and few participants were interviewed after typing session. Insights from observation and interviews are as follows.

Many users find difficulty in typing initial phrases as most of them were not used to typing in Marathi on their phone and some of them were new to Marathi typing. Hence, it can be concluded that first time or novice users need to have some motivation to overcome initial difficulties and continue typing in Marathi. In this case, motivation for most of the users was to win a prize money and learn a new skill.

Leaderboard displayed on screen at the venue of competition helped users to see their comparative position in competition and get motivated to put more efforts to do better than their previous performance. Social display of performance can motivate user to improve their performance.

Many participants asked for help when they are stuck and didn't know how to type the given word, these words were fairly common to many users which gives us a general insight of where user will need hints to continue typing in absence of any person to help or teach. According to identified pain points in typing on Swarachakra, tutorials for typing using Swarachakra were designed using examples. These tutorials helped in forming and including hints for typing in the final game design.

Another user testing was conducted for an ongoing DIT project at IDC - standardization of virtual keyboards in Indic scripts, specifically for Marathi. From Interviews of the people involved in this project who taught how to type in Marathi to school students and from my personal experience of participation in expert user testing for above project, following steps were identified for learning typing on Swarachakra.

- Understand layout and letters position on keyboard
- Use of chakra for typing matras.
- Typing conjuncts using Halant & chakra.
- Memorizing layout (letters positions) and patterns (for typing matras using chakra)

Above Steps can be generalized for all other Marathi keyboards. Steps in learning typing on any Marathi keyboard.
-Hunting for key locations
-Typing Matras
-Typing conjunct words
-Memorizing layout and patterns. (Achieved through practice)

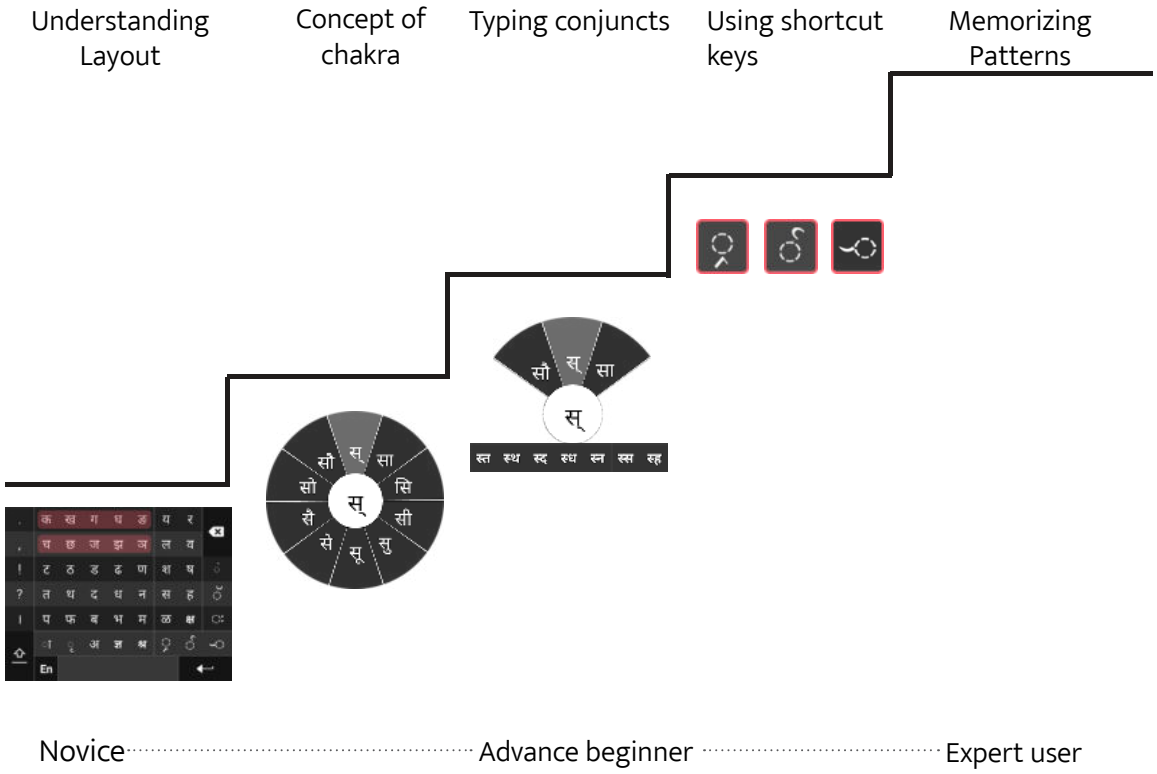


Figure 3. Steps in learning typing
on Swarachakra Marathi keyboard

Design implication

Steps in learning typing can be gamified and made interesting and user will overcome learning barriers through the game. With a game which can make typing fun enough to practice, the user can become proficient in typing.

As discussed letter, Understanding keyboard layout is achieved with blindfold level in final game. It also helps in locating and memorizing character locations on the keyboard. A gamified chat can help in achieving ‘practice’ part of developing proficiency in typing.

Steps in learning typing and need for keyboard specific help and hints to type particular words without external help is identified from users and instructors interviews and is implemented in the design.

Secondary research

Some of the top downloaded typing games from Play-store were studied in order to understand the use of game design element in a typing game context and to study engagement level, retention in game and methods of gamification for virtual keyboards.

Currently, there is no Marathi typing game on play-store. Selected games for secondary research are specifically for English qwerty keyboards.

Type Racer

Typeracer is a multiplayer Online browser-based typing game. It was launched in 2008 and claims to be the first multi-player typing game on the web[5]

Users race against unknown network user while typing. Typing speed is modulated with the speed of car on the screen hence user can see its relative position in game. Errors in typing are highlighted in red. Points are needed to unlock the next level in the game and also the game is integrated with social media (facebook) where users can share their points and highest typing speed. Motivation to play is to win the race and the sense of competition through relative position of cars.

Limitations
Errors are not allowed. User have to go back and correct the text to move forward.

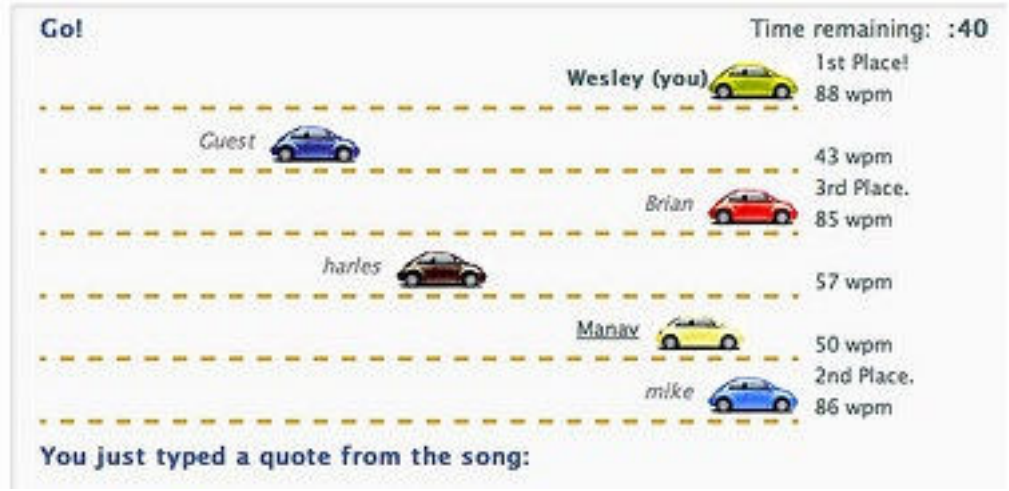


Figure 4. Screenshot from Type Racer

Type It !

This free game is part of research about the touch performance on mobile devices.
A running out timer is shown around every given word. User have to type those words before the timer runs out. It support both single player and multiplayer modes. The game has multiple levels of same gameplay with increasing difficulty.

Maximum three words appear at a time and there is uncertainty about the position of words appearing. Points need to be earned to unlock new levels and high scores are presented in global and local leaderboard. Motivation to type faster is the running out timer. Leaderboard motivate user to a achieve high score.[6]

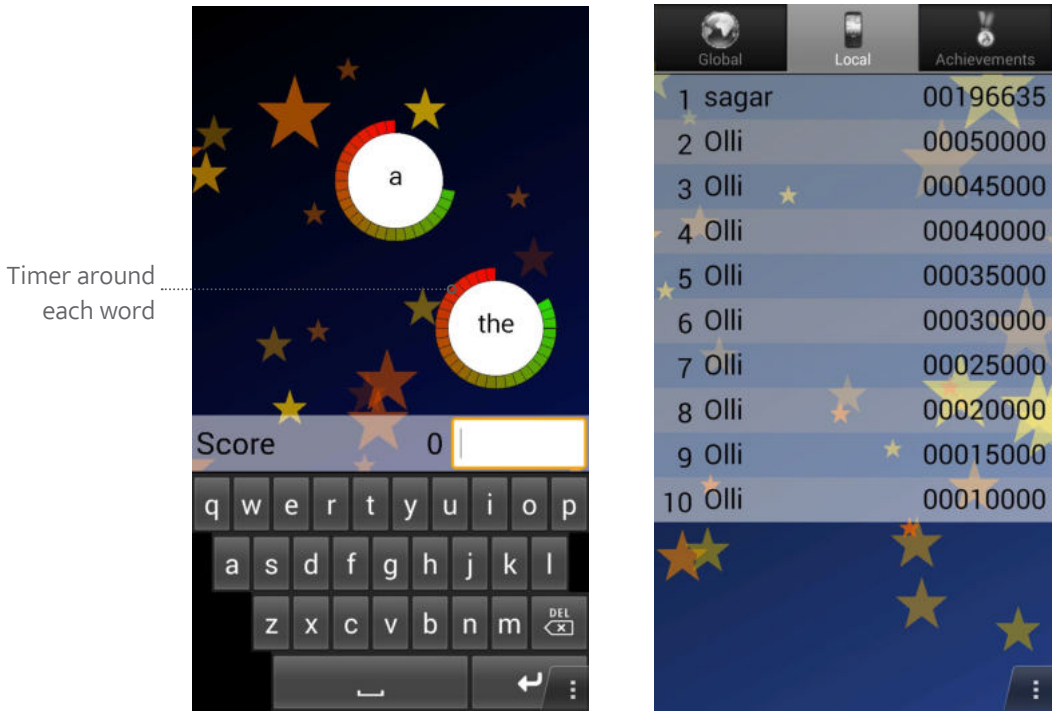


Figure 6. Gameplay and Leaderboard of Type it!

Type as Fast as You Can!

An android game designed to improve the accuracy and speed of typing on smartphone. It is a single player typing game with only one level. Points gained by user depends on both speed and accuracy. Errors in typing are highlighted in red with instant sound feedback. Words given for typing scroll down one after another. Uncertainty about next word and its position is reduced as words gradually become visible.

Timer is used to motivate user to type fast and errors can not be corrected as the word disappears in case of wrong input. Special characters are never typed.[7]

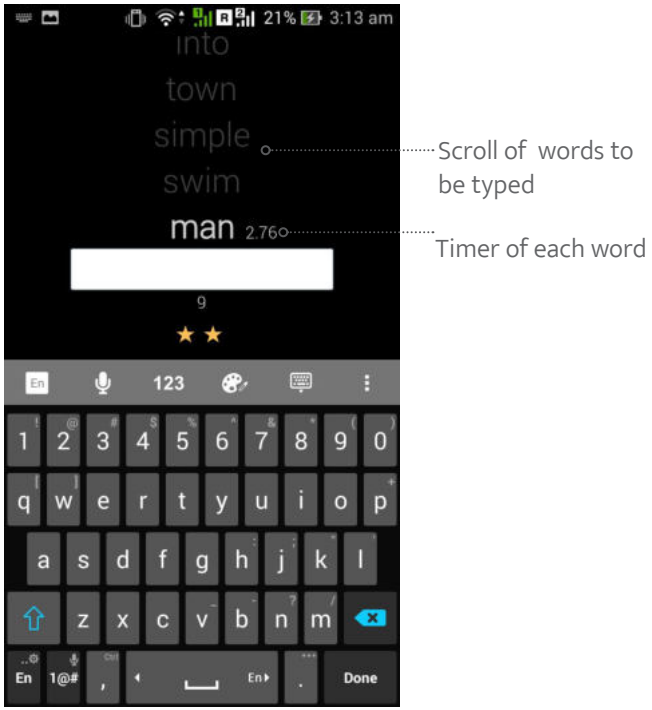


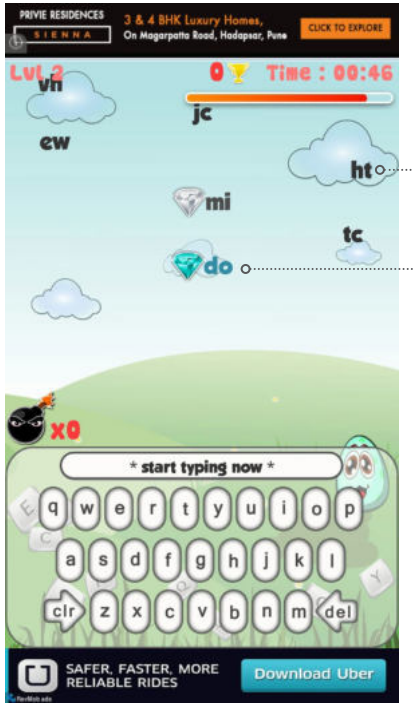
Figure 6. A screen from Type as Fast as You Can!

Typing crush

It is an android typing game with its integrated keyboard for text entry. It is a single player game with fifteen levels arranged according to the difficulty.

Game is based on incremental typing. It starts with typing individual characters then a combination of two letters and then three and so on. Some characters are given high weightage in terms of points. Multiple incoming characters can be distorted by typing some special words that come in between. Same as block game strategy.

Random combination of letters keeps appearing to type. Accuracy is not considered in pointing system. Running out timer is used as motivation or challenge. User can share their high scores on facebook wall.[8]



Random combination of letters to be typed

Words with extra points

Figure 6. A screen from Typing crush

Typing Fish

It is a game on android platform where typing is used to control movement of an animated object, a submarine. Game play includes typing letters to move submarine up, down and forward. Words to be typed for these movements keeps on changing. Users have to move the submarine in order to keep it safe from piranhas. Deciding the movement of ship includes some strategy. Use of strategy differentiates this game from previously studied games. Users gain points for every fish passed. Animated game play gives a sense of continuity and flow.[9]

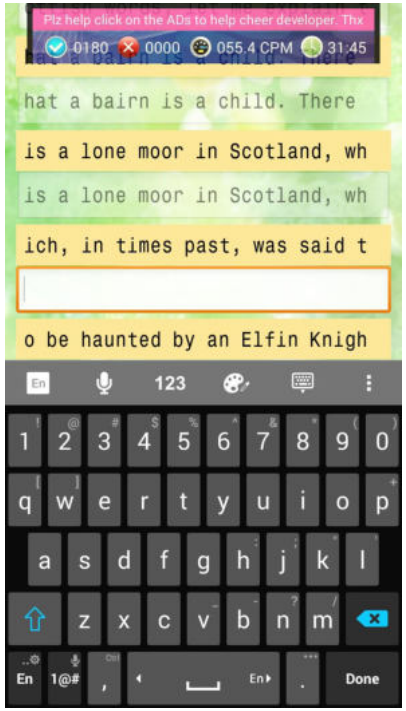
Navigation of submarine is mapped to words

Figure 6. A screen of typing Fish

Type racer and Easy type

Type racer and Easy type games have a different gameplay than previously studied games. Easy type is storytelling app that shows a story line-by-line. User have to type those lines in order to know next part of the story. User reads and types a full story in each level. Whereas in type racer. The app shows fun facts and quotes from famous personalities. To read next fact or quote user have to type given fact/quote.

Theme is to use user's curiosity to know interesting facts or a next part of story, as driving force to type given text. There is no time limit but both of these games show users typing speed in CPM or WPM (words per minute)



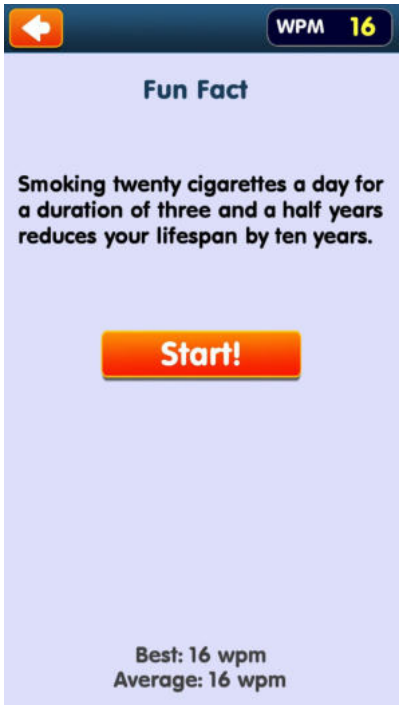


Figure 6. Type racer and Easy type

Conclusion &Implications of Secondary research

Most of typing games on playstore studied in the secondary research have more or less same basic structure or concept. Time constraint (timer) is most common gamification tool used to increase the level of challenge, motivationg the user to increase their typing speed. This is Implimented in the Speed challenge of the final design.

Modulation of typing speed to the movement of an object or character, is a visual representation of user's typing speed. This helps the game to get closer visuals as racing games which are fairly popular among users. Same modulation is observed in typing fish and typeracer where typing speed is visually presented as movement of submarine and cars' speed respectively. Concept of modulating typing speed to another object/motion is not used in final design as it is common in most of previous games, it divides user attention on typing due to the visuals.

Most of the games do not consider accuracy as a criteria for points gained by user. Incorrect words are either discarded or the users have to correct the text in order to move forward. Minimum level of accuracy should be defined. In real life scenario users prefer speed but accuracy is not their major concern[1], but in a game to improve typing speed and accuracy, minimum 80% accuracy is expected to be achieved while typing a given sentence in a given time.

Game design elements such as leaderboard, sharing their high score on social media helps in motivating user to perform well in games. Existing games are more focused on practice of typing and not on learnability of keyboard for novice users, it is assuming that users are familiar with virtual qwerty keyboard, while designing regional language typing game one has to consider both learnability and typing practice as most of the users will be novice users or advanced beginners.

Design brief

Typing game should help to improve speed and accuracy of typing by making typing fun and engaging.

The Game should help the user overcome learnability barriers of typing on Swarachakra Marathi keyboard.

The game should make typing interesting and engaging enough to practice it daily.

Initial Design Ideas

Design Idea 1

First design idea is based on block game strategy

Game play
Letters enclosed in circle/baubles will be falling from the top of screen. User can burst those bubbles by typing these letters. If a bubble touches the ground before typing, it will remain there and other untyped text bubbles will start accumulating upon it
If accumulating bubbles' stack touches the top of screen, user have to replay that level.
Game play is same for all levels but text will progressively become difficult to type
Level 1- only alphabets.
Level 2- alphabets with matra
Level 3- conjunct letters
Level 4- small and simple words (2-3 characters)
Level 5- long and difficult words (conjuncts and 4-5 characters)

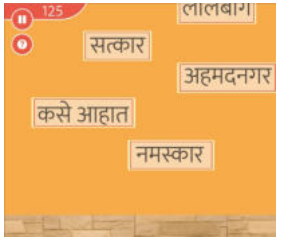
Limitations
- Idea was not novel.
- Learnability barriers are not addressed properly.
- Given text is continuously moving, visual distraction may hamper typing speed.
- User will never get to type a full sentence.

Gameplay of design idea 1

Level 2

Level 3

Level 4



Level 5

Figure 7. Design idea 1

Design Idea 2

Game play
A virtual character is walking towards its' destination and it has to cross a water body with the help of floating stones. Each stone has some text written on it. In order to help this character, users have to type the text on stones.

Every stone will have a letter or word written on it. As users type that text its' color darkens and it will continue floating on water so our character can walk over it. Letters on stone are to be typed before a charterer reaches to it, otherwise the character will step on the stone and drown in water.

Limitations
-Idea was not novel.
-Learnability barrier are not addressed properly.
-Visual distraction may hamper typing speed.
-User will never get to type a full sentence.
-Monotonous game-play for all levels.

Figure 8. Design idea 2

Design Idea 3

A two player Online game, using a metaphor of Tug of war between two players.

Game play
Both users have their animated avatar on screen. These avatars are pulling the rope from both ends. Both users will get the same sentence to type. They have to type as fast as they can and there typing speed and accuracy will represent the force with which their avatar pulling the rope. As the user is typing the given sentence, those characters will move according to typing speed and avatar of fast typing user will pull the other to center of screen. The user to pull the competitors avatar to the center of the screen wins the game. The difficulty level of the sentences increases progressively.

Figure 9. Design idea 3

Limitations.
- Typing speed of user is modulated to the force applied by its' avatar on rope. It uses the same basic concept of type racer.
- Need to be connected to network as it is two player game.
- Maximum participants for play is also limited to two users.

Typing Parameters

In order to design typing game, we need parameters on which game play can be developed. In case of typing, we can consider two parameters for text entry

1.accuracy
2.speed

Ideally typing game should consider both these parameters. But for ideation we can consider them as separate parameters and combination of both. If we take only speed as a parameter for game then user can enter random text to get a high score, hence speed only can not be parameter for typing games. Whereas accuracy alone can be a parameter for primary levels of game, till user becomes familiar to keyboard.

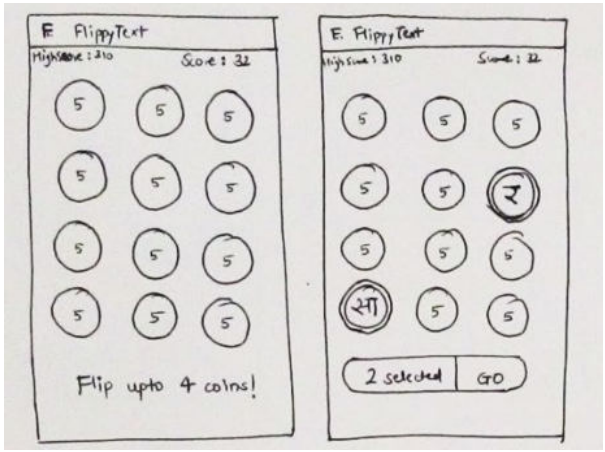
All of existing games studied in secondary research are racing games and typing is mapped with some activity or object movement. As we introduce typing speed as a parameter in a game, it becomes race against time. Along with race typing can be combined with some extra parameters, commonly used in game design. Few of these combinations are tried to develop a new set of design ideas.

Design ideas

1.flippy Text

It is a combination of typing and vocabulary
Game play
Here user will be shown array of coins. Each coin is of five points like currency coins. User can flip 3-4 coins at a time, every flipped coin gives a letter. Arranging these letters with 2-3 addition of letters, user have to form a valid word. If a word is valid then user will get points equal to total number of points on the coin they flipped.

Limitation
-Validation of typed word is valid or not is difficult in case of regional languages.
-Score depends on vocabulary and cognition
Accuracy is the only parameter.



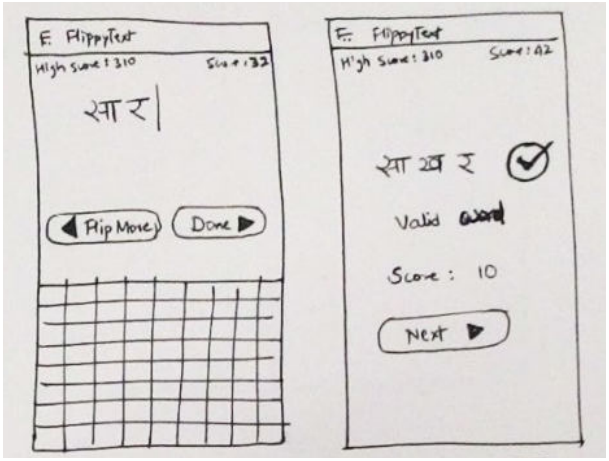


Figure 10. Design idea Flippy text

2.Yaad Rakhna

It is a combination of typing and memory.

Game play

User will be shown a set of images for a limited time and instructed to remember those objects in image and sequence in which they are shown. Now user has to recall and type names of the objects shown earlier. With increasing number of objects to remember difficulty level of game will increase.

Limitation
-Remembering becomes major parameter of game, instead of typing speed or accuracy.
-Retention in game will be low, as gameplay is same for every level.

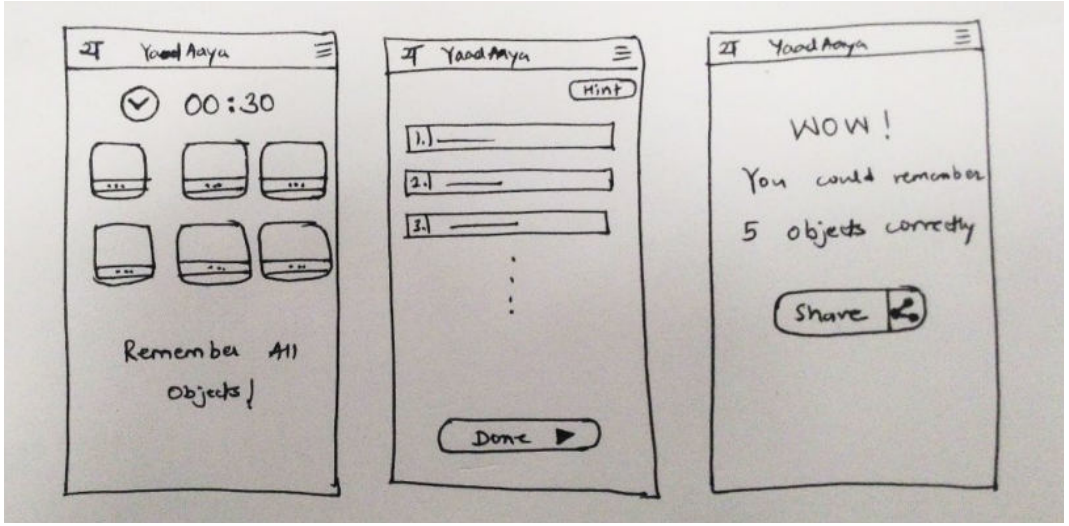


Figure 10. Design idea Flippy text

3.Chatter type

Chatter type is gamified chatting application. Gamification of chat can make chatting in regional language an enjoyable experience.

Game play

Functionality of chatting app is almost same as any chatting application except few modifications. Here user have to type in regional language. With every massage a tag of speed at which it is typed will be shown. Users can see average CPM of the persons in chat. At end of chatting session, winner will be announced with popup. Score is based on average CPM throughout the chat.

Limitations

-Learnability of keyboard is not considered.
-Accuracy of typed text can not be measured as user is not typing standard given text.
-Game play does not accommodate single player game.

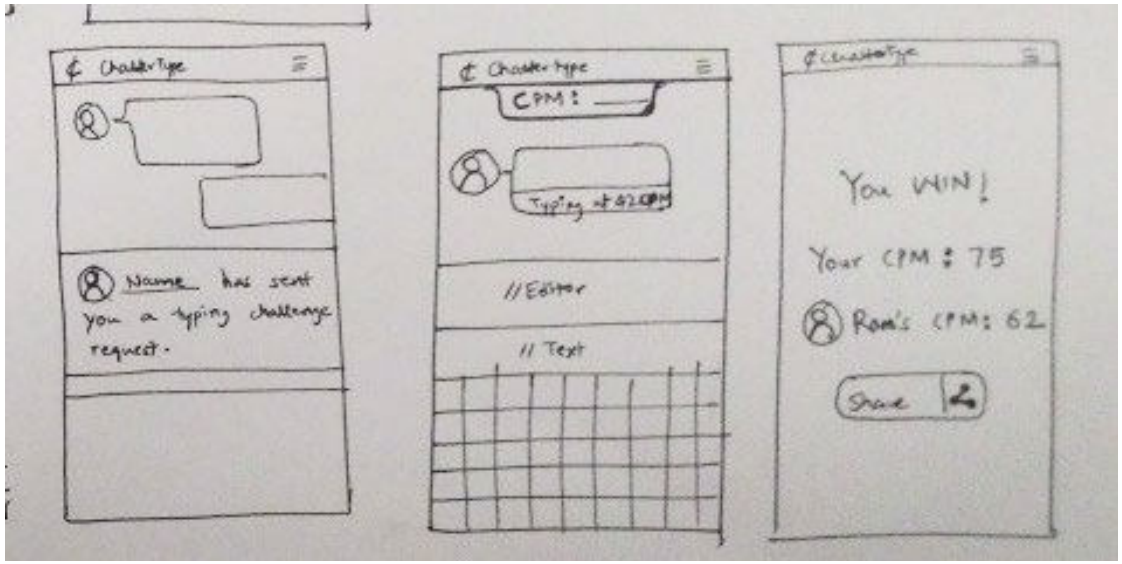


Figure 10. Design idea Chatter type

Final Concept

Tapatap v2

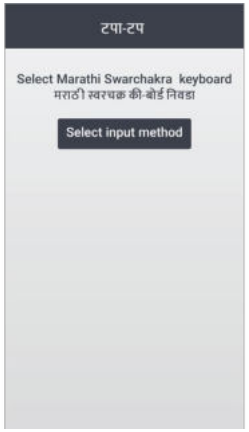
Final Concept is integration of many ideas and game elements from found useful in secondary research and initial design ideas. It includes four different tracks of game. Two for single player and two for multi-player typing game.

Assuming that user will first try and play a single player game track. If they find it interesting they can invite friends from contacts and social media to join the multi-player game.

Single player game track is designed for novice user. It assists learning of new keyboard, practice typing and develop proficiency in typing in Marathi Multi-player tracks includes gamified chat and multiplayer typing challenge to be played on network. User can invite friends from contacts list and social media platforms to download application and join the game.. Overall structure of game and gameplay is shown by a flow diagram of wire-frames.

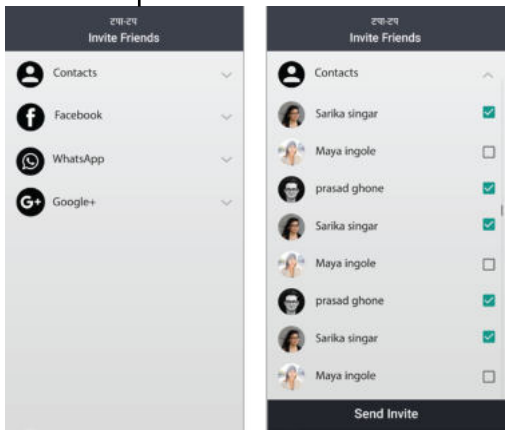
Figure 10. Final Design

Splash screen

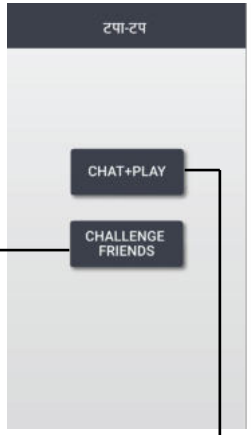


Select input (Swarachakra Marathi)

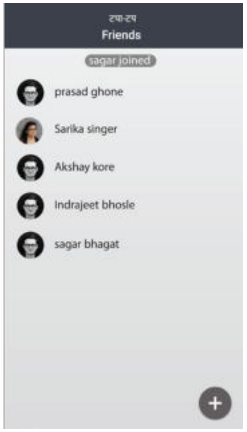
Main menu



Invite friends (First time)

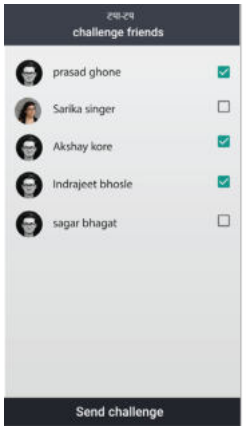


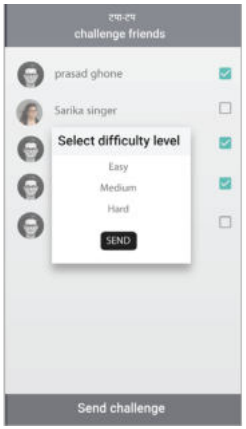
Multi-player menu

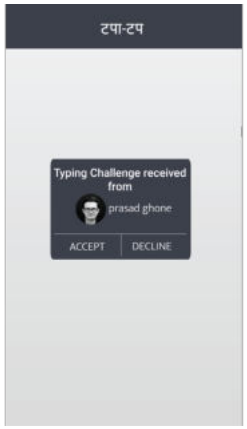


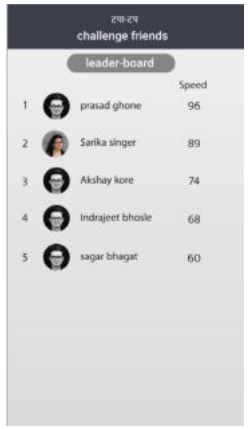
Friends list of Application

Friends Challenge

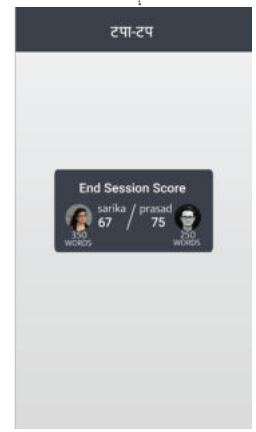




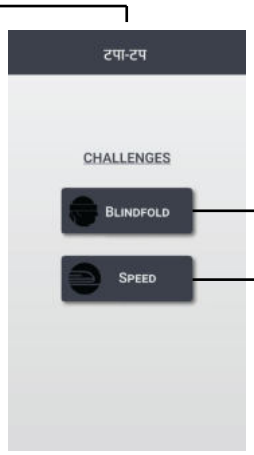




Chat And Play

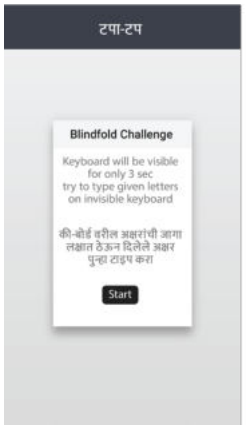


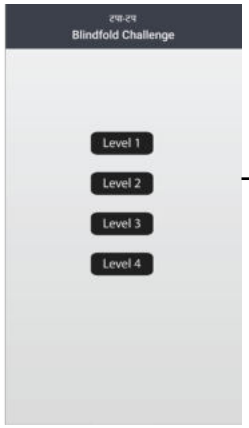
Main menu

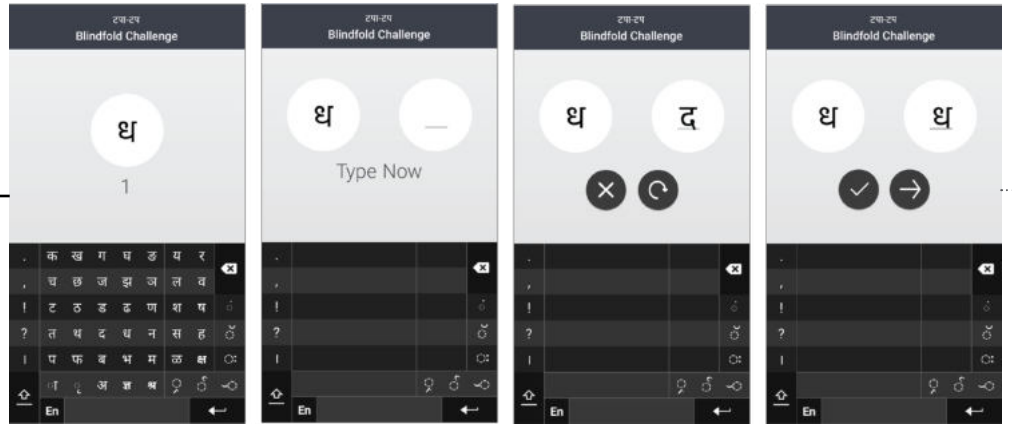


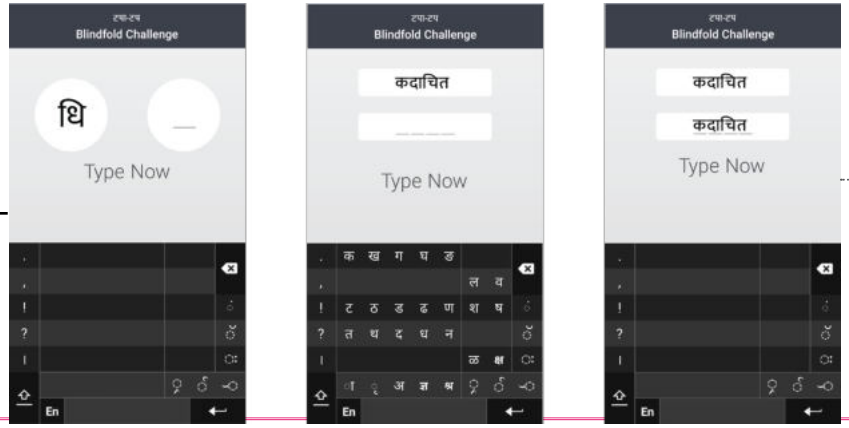
Play menu
(Single player)

Speed
Challenge









Blindfold
Challenge

Important features

Blindfold challenge

First stage of learning a new keyboard is to understand layout of the keyboard. Usually first time user hunt and pick characters while typing it takes practice to remember position of letters on keyboard.

Blindfold level is a gamification of the basics of learning a keyboard. It is memory based game which can eventually help user know and remember position of letters on keyboard. User will be shown a character with inactive keyboard for three seconds. Now the user has to type given letter with the blank keyboard.

In these three seconds the user has to find its position on keyboard for typing. Each word is level in the game and unless the user types correct letter he/she can't go to the next level. As there is no time limit to enter given text using blank keyboard user can use hints given in help to figure out the correct position of a letter.

Level 1

In level one, challenge is to remember position of given charterer on keyboard and then type it using blank keyboard.

Sequence of characters selected for this level includes only alphabets. Letters that are available directly on single touch on keyboard, in case of Swarachakra all alphabets have separate key on a keyboard. A random sequence of hundred letters from Marathi alphabets is selected for blindfold level one.

छ	ए	ज्ञ	छ	व	ण	ख	ष	ज	ळ
झ	झ	भ	ग	भ	ज्ञ	ध	ङ	र	द
घ	ण	स	श	न	म	क्ष	क	ष	अ
भ	फ	म	ल	व	अ	अ	य	श्र	ब
क्ष	ण	श	ट	अ	ट	ब	ळ	ज	घ
ल	ल	छ	फ	च	छ	ध	ड	ख	ड
क्ष	न	झ	ज	ढ	ज	श्र	ख	ण	र
ह	श	ख	ग	ड	प	घ	ह	स	व
त	ज	स	म	थ	व	य	स	ख	ल
ड	उ	इ	अ	य	ज	ल	व	ह	ण

Table 1. List of letters for blindfold level1

Level 2

Game play for level one and level two is same. It is more challenging because characters which the users have to type in this level are with matras. This level aims user to understand concept of chakra, positions of matras in chakra. In case of keyboards other than Swarachakra user will learn to add matras to the characters.

There are nine matras except halant in chakra of each character in Swarachakra. Sequence of characters with matra is selected such as every form of matra will appear for ten times till the level is completed, for memorizing position of matras, 2-3 letters with same matra appears consecutively in earlier stage of the level.

हा	फी	ये	भो	घू	टे	नै	तो	फा
आ	सी	दे	खो	बे	शै	वो	थौ	गौ
हा	बु	ढे	सौ	थै	जो	कौ	हौ	शो
सा	मु	से	तौ	टो	चौ	टा	यो	ठै
णि	टु	पै	लौ	नौ	का	धि	कै	भे
थि	झु	दै	धौ	रा	हि	धि	थे	ळू
वि	कू	खै	पा	ति	मी	धु	षू	यु
बि	ढू	लै	कि	गी	कु	सू	छु	ती
दी	बू	लो	ची	दु	तू	ते	जी	लि
श्री	टू	घो	जु	फु	शे	धै	ढि	दा

Table 2. List of words for blindfold level2

Level 3 & 4

Level three and four are meant for practice of typing and to test if the user does remember the positions of the letters and matras.

Level three includes a sequence of words to be typed using partially blank keyboard. Partially blank keyboard will help user to find locations of the missing keys with help of visible keys and users' understanding of layout till this level.

In level four user have to type given words with fully blank keyboard. Given words for typing includes words with matra and conjunct. At this stage users already have completed a level based on matras. In level 3 and 4 if user is stuck with a conjunct word, help option shows how to type conjunct words and shortcuts for conjunct of characters 'र'.

Words to type for level 3 are selected from list of most frequent words from corpus of Swarachakra Marathi so that practice typing these words can help user increasing typing speed. In level four words are selected from sentences used in user-evaluation of Marathi keyboards. Difficulty level of words gradually increases towards the end of level.

Help

As blindfold level is aimed to overcome learnability barriers and to assist novice user to learn typing stepwise. Help and hints are included in each level. Content is based on user study and understanding of pain points of user while typing on Swarachakra.

Help in level one explains the layout and alphabetical order of letters on Swarachakra keyboard.
Help in level two explains the concept of chakra and how to type matras using Swarachakra.
Help in level three and four have two hints, one is about how to type general conjunct words explained with example and second is about shortcut keys for conjunct of letter 'र' . It will help in increasing typing speed.

It explains layout of Swarachakra keyboard to help user to understand the positions and sequence of letters

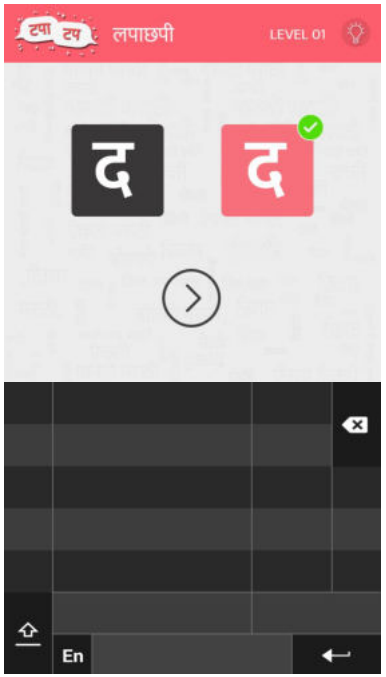
Hint in second level explains the concept of chakra and how to type matras using Swarachakra

Hints for third and fourth level includes instructions to type conjunct words and use of shortcut keys for typing conjunct of 'र'

Blindfold gameplay

User is given a character ‘द’ and three seconds to locate it on visible keyboard

After three seconds a blank keyboard appears and now user have to type given letter



Correct answerer allow user to play for next charterer.

In case of wrong character input user have to retry

1st Level of Blindfold Track

Blindfold levels

Level 2
Letters with matra and full keybord is visible for 3 sec. and totally blank after it.

Level 3
User has to type given words. In this level key-board is always partially vis-ible and visible keys keeps on changing.

Level 4
In level 4 user have to type given words with fully invisible keyboard after it is shown for 3 seconds

Help and Hints

It explains layout of Swara-chakra keyboard to help user understand positions and sequence of letters

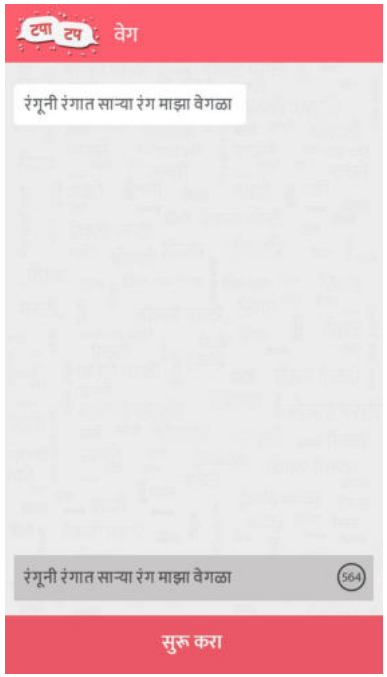
Hint in second level explains concept of chakra and how to type matras using Swarachakra

Hints for third and fourth level includes instructions to type con-joined words and use of shortcut keys for typing conjoint of 'र'

Speed challenge

'Speed' is another single player track in this game. As name suggests it is race against time. In speed challenge user tries to type with gradually increasing CPM. Here user can see his progress in terms of his/her typing speed.

Game play
Challenges start with typing given sentence. As soon as user starts typing, timer starts. Timer's value is based on target typing speed for given sentence. To complete the challenge along with speed, accuracy also need to be considered because minimum accuracy level is defined to 80%.
If user is not able to type a sentence in a given time or accuracy is lower than 80%. That level fails and user can retry typing same sentence. Target CPM for each given sentence increases gradually. It starts with 5 CPM and goes to 150 till the last sentence. Instead of giving irrelevant lines for typing, user will be given the lines from famous Marathi poems so that user can relate to it and text will be familiar to users.



Given sentence to be typed before timer ends

If typing speed is low or accuracy is less than 80%, user have to retry.

if typed accurately within given time user can go to next sentence.

Friends challenge

Once user is comfortable with typing in Marathi, user can send a typing challenge among to their friends. It's a short challenge of typing five sentences, all users in challenge start typing at same time and they can see their position in race according to their typing speed. Friends can be invited through the application using contacts list, facebook and friends list on other social media. Application will maintain the list of friends same as whatsapp contact list. If someone from your contacts have the game installed they will be added to your friends list in game.

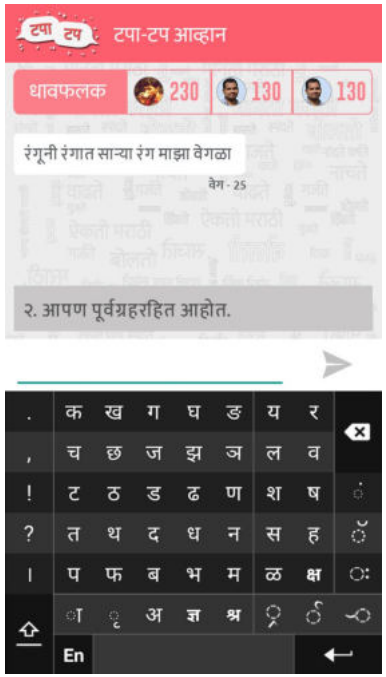
Game Play

Friends challenge is a multi-player typing challenge (race). User can invite friends using friends list and select difficulty level from easy, medium, and hard. For every level, there are hundred sentences out of which a set of 5 sentence is used for every challenge. User can see first three positions on scoreboard in game. After completion a leaderboard will appear with details of typing speed of each participant.

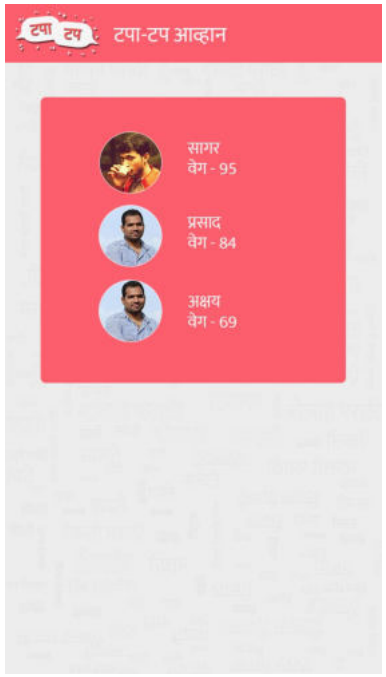
Friends challenge

Invite friends from contact and social media

Select difficulty level of challenge



Type a set of five sentence



Leaderboard

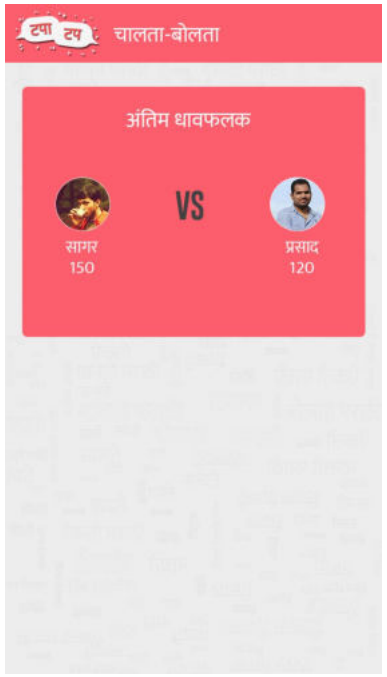
Chat+Play

Chat+play is gamified chat application. Same as any chat application user can select contact from friends list and start chatting. Typing speed of every massage is counted and average typing speed is shown as score of that player on scoreboard. At the end of each chatting session the overall typing speed of both players is shown as the end-session scoreboard.

Number of words typed by each player is also shown on screen but it does not affect their score. Score is based on average typing speed. In case of random text input by the player to increase score, other player in conversation is there to validate entered text.

Gamification of chat is meant to encourage users to type in regional language for daily typing activity like chat, messages and posts on social media. If practiced daily user can develop proficiency in typing on regional language keyboards.

Chat with Scoreboard showing average speed and number of words typed.



End session score

Evaluation

Goal

Game is evaluated for users experience, fun and engagement of the game and if game helps learning in overcoming learnability barriers and improve typing speed on virtual keyboard without any external help.

Key questions
Does user understands the game mechanics and connect with it?
Are there any usability issues in Speed and Blindfold challenge track of the game?
Is game play fun and engaging?
Does it effects the typing speed of user in short duration of playing?

Method

User
Target user of this game is novice and advanced beginner who has never or hardly typed Marathi using Swarachakra on their smartphones. So the user satisfying following criteria are recruited for the game testing.
User should be able to fluently read and write in Marathi.
User should have considerable experience of using smartphone, at least 1 year.
User should be from novice to advanced beginner category of typing on Marathi on their smartphone. Recruited users had never or hardly typed Marathi using Swarachakra.

Evaluation 1
To answer key questions about game UI, user's understanding of game mechanics and engagement and fun elements in game, users were given game to play on their own without any brief. Users were supposed to read instruction and understand the gameplay as they are playing it for first time. Users were observed while playing game and interviewed after they finished playing for a while to understand pain points in UI. Reviews from users, observations while they are playing and feedback and suggestions from users were used in qualitative evaluation of games engagement level and UI issue related to it.
Game engagement is evaluated on the basis of three main elements of engagement Concentration, Challenge and Immersion.

Results and inferences

Concentration : game provides visual and sound stimuli to grab user's attention. User statements such as "Game was very intriguing with the features very simple to understand and use" and observation that one of the user said "मी खेळतोय रे थाबं जरा "(wait for a while i am playing) when asked for headphones by one of his friend It suggests that the game demands certain level of concentration while playing.

Immersion : users were told that next level in blindfold category unlocks after typing 10 correct letters but almost all users played for more than 20 letters before they checked for next level. Sentences used in speed level are lines from famous Marathi poems and It is observed that the users started humming the songs from those lines. One of the user statement in feedback was " i forgot about all other things while playing the game."

Challenge : almost all users found blindfold level challenging in the first play and speed level becomes challenging after initial 5-6 sentences. In feedback user said that every level in game is different and that is why it is challenging. User need to stretch their limits to achieve given target CPM. It is observed that in blindfold level users tried to type all letters to find correct position of given letter and In speed level challenge some users tried typing same sentence for 8-9 times to achieve target speed.

UI Issues
Help option in blindfold level went unrecognized by many of the users. A need limit the chances to locate character in Blindfold because users try all the keys to find given character Progress in game is not visible. In each level user should know how many words/letters/ sentences are remaining to complete the level and to unlock next level of game.
Scoring system was not included in both Blindfold and Speed tracks of game. It is observed that after playing for a while users tend to see what their scores. Score is important as motivation to do better next time,users also tend to compare their highest scores among themselves.

Evaluation 2

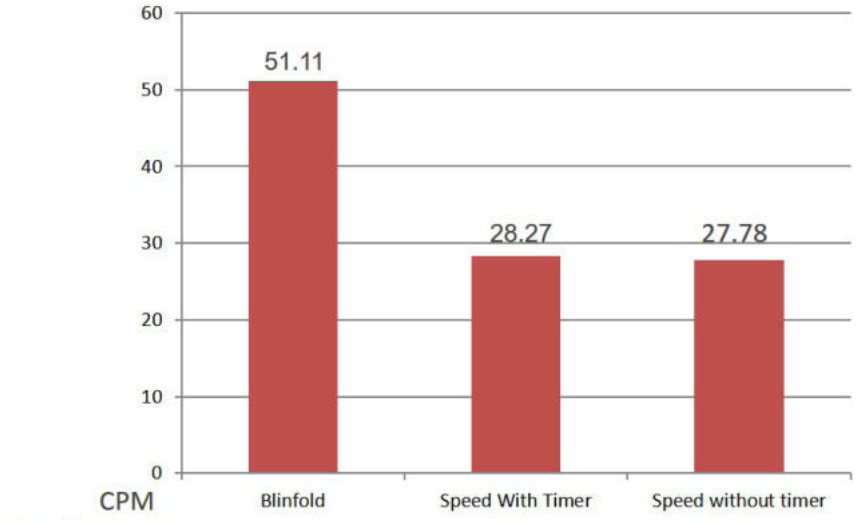
Method

To understand effect of gameplay on typing speed of the user. Users are divided into three group. All three groups were first given five sentences to type before playing the game. First group was give five sentences to type and then a sequence of ten sentences was given to these users to practice typing. Practicing typing ten sentences without timer running out is non gamified way to improve typing speed. Second group played Speed Challenge of the game and third group played Blindfold Challenge of the game for approximately same time. After playing for a while all groups were given another set of five sentences to type and average CPM of each group is measured.

Set of first five sentences given to the users.

ओळखलंत का सर मला
पावसात आला कोणी
येरे येरे पावसा
तुला देतो पैस
आकाशी झेप घे रे पाखरा

Set of last five sentences given
ऐरणिच्या देवा तुला
ठिणगी ठिणगी वाहु दे
तुझ्या गळा माझ्या गळा
गुंफू मोत्यांच्या माळा
लाजून हासणे अन् हासून हे पहाणे



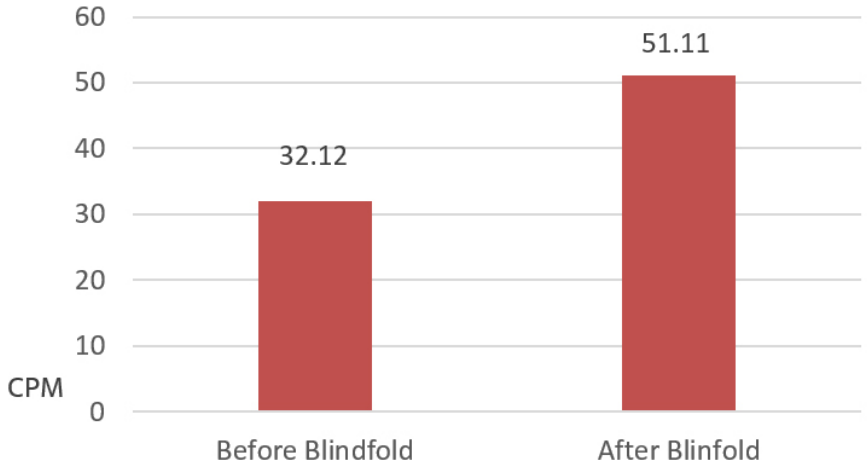
The graph shows the average CPM (characters per minute) at which last set of sentences are typed by users in three different groups. It is evident from results that users who played blindfold have higher average typing speed than other users who played Speed and who practiced typing without timer. Difference of typing speed in remaining two groups is not significant.

.

For Blindfold
Mean (Average) 51.09115
Standard deviation 15.70365
Confidence Interval (95%) : ±10.88
Range for the true mean: 40.21 to 61.97

For Speed with timer
Mean (Average) 28.26888
Standard deviation 5.09024
Confidence Interval (95%) : ±4.46
Range for the true population mean: 23.81 to 32.73

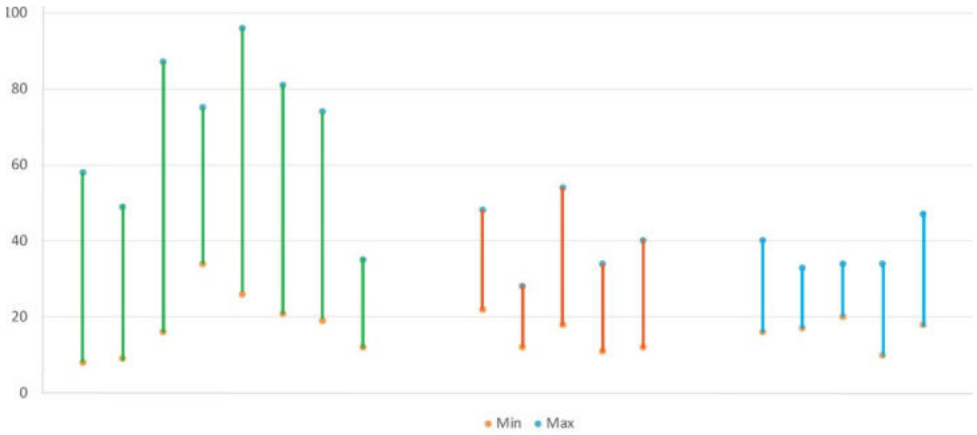
For Speed without timer
Mean (Average) 27.78093
Standard deviation 5.94167
Confidence Interval (95%): ±5.21
Range for the true population mean: 22.57 to 32.99



Graph shows average typing speed of users group before and after playing blindfold. Different set of six sentences was given to users for typing before and after Blindfold.

Before Blindfold
Mean (Average) 32.02552
Standard deviation 10.79345
Confidence Interval (95%) : ±7.48
Range for the true population mean: 24.55 to 39.5

After Blindfold
Mean (Average) 51.09115
Standard deviation 15.70365
Confidence Interval (95%) : ±10.88
Range for the true mean: 40.21 to 61.97



This graph shows the range of individual user from lowest CPM before playing and Highest CPM after playing game for a while. There is a significant increase in range (max - min) of CPM for the users who played blindfold than the users who played Speed and who practiced typing sentences without timer.

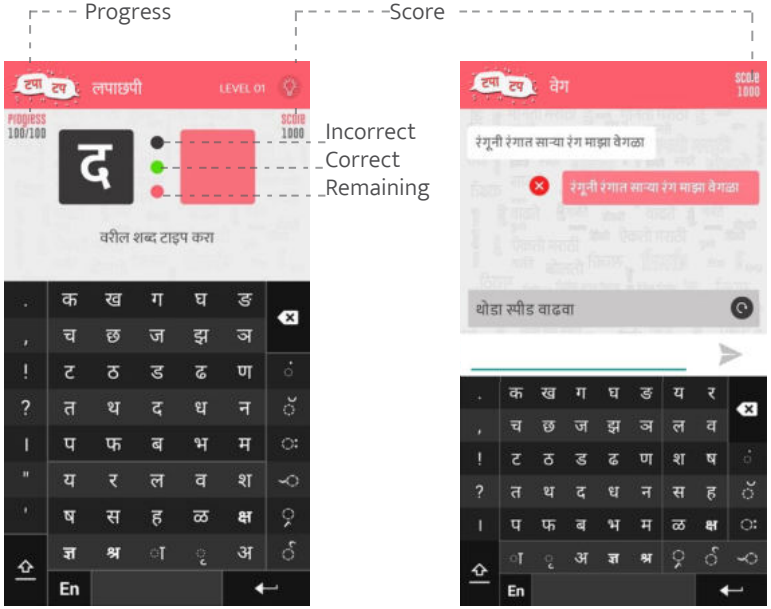
Inferences

Blindfold helped improve typing speed in short session of practice. It shows significant increase in typing speed.
Speed level succeed in achieving certain immersion level and engaging users and made users strive for several times to complete higher levels but it does not seem to be helping in improving typing speed of user.

Changes after Evaluation

Help
If the user is typing an incorrect answer for three consecutive times in Blindfold system, the help option will pop up. The help will be discreet and will be used only when necessary.

Progress indication and **Scoring system** is added in both Blindfold and Speed gameplay
In blindfold every level have 100 tasks and each correctly completed task will give 10 points
Chance of typing the correct answer is limited to three so if user gets it in first chance it adds 10 to the score , 2nd chance will get 7 points and third chance will get 5 points. Maximum score in each level is 1000 and 100 tasks in each of the level. For Speed level every sentence typed faster than target typing speed will earn 10 points to user and each error will cost user -1 from earned points.



Future

Game play is designed and developed for Swarachakra. It can be adopted to other regional language keyboards. Learning process for other keyboards is similar to Swarachakra except the concept of the Chakra. Speed Challenge and other two multiplayer gameplay is independent of keyboard these tracks can be directly used for other keyboards. Visual design of game can be reconsidered to make it more playful.

References

1. Sanjay Ghosh & Anirudha Joshi. (2014). Text Entry in Indian Languages on Mobile: User Perspectives. In Proceedings IHCI '14, December 07 - 09 2014, New Delhi, India

2. Gamified Usability Testing tool for virtual Marathi keyboards on Android platform Interaction Design Project III by Kaustubh Limaye
Guided by Prof. Anirudha Joshi
Industrial Design Centre, Indian Institute of Technology Bombay 2015

3. Hamari, J., & Koivisto, J. (2013). Social motivations to use gamification: an empirical study of gamifying exercise. In Proceedings of the 21st European Conference on Information Systems, Utrecht, Netherlands, June 5–8, 2013.

4. Applying Engaging, Interactive Game Design Approaches to Everyday Applications.
https://uxi16.uie.com/workshops/applying-engaging-interactive-game-design-approaches-to-everyday-applications

5. https://en.wikipedia.org/wiki/TypeRacer

6. https://play.google.com/store/apps/details?id=net.nhenze.game.typeit

7. https://play.google.com/store/apps/details?id=com.MikePowroznik.tafayc&hl=en

8. Game Design for Social Networks: Interaction Design for Playful Dispositions
Aki Järvinen1 IT University of Copenhagen, Denmark / mygamestudies.com

9. Hamari, J., & Koivisto, J. (2013). Social motivations to use gamification: an empirical study of gamifying exercise. In Proceedings of the 21st European Conference on Information Systems, Utrecht, Netherlands, June 5–8, 2013

10. http://www.slideshare.net/amyjokim/gamification-workshop-2010/140-Social_Engagement_LoopMotivating_EmotionFun_Delight

11. http://timesofindia.indiatimes.com/tech/social/Facebook-available-in-8-Indian-languages-on-mobile/articleshow/12521131.cmsw

12. http://www.smartearningmethods.com/most-played-facebook-games-in-india/

13. https://en.wikipedia.org/wiki/Social_network_game