Carnegie Mellon University

A Parrot Gone Viral

Speech-based Viral Entertainment for Low Literate Telephone Users in the Developing World

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Information & Communication Technologies for Development (ICT4D)

A new field with lots of interest

Much more than just technology development

- Anthropology
- Sociology
- Public Policy
- Business
- Politics
- …

ICT4D Landscape

	Healthcare	Education	Agriculture	Governance & Civil Society	Economic Dev
Mobile (GUI-based)	CommCare E-IMCI AED-Satellife	MILLEE		Ushahidi	M-Pesa Babajob CAM Goog@frica
Speech	HealthLine HIV Info Line	Kane	Tamil Market Banana Line Avaaj Otalo	FreedomFone	VoiceSites
Desktop		MultiMouse	aAQUA		e-Choupal
Other	Aravind Telemedicine	Dig Study Hall Braille Tutor	Digital Green		
Cross-cutting	WiLD (Long Distance WiFi), OpenPhone (Speech Platform), Salaam (Resource-Scarce ASR)				

Very partial list – there are dozens more

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Mobile (GUI-based)	CommCare E-IMCI AED-Satellife	MILLEE		Ushahidi	M-Pesa Babajob CAM Goog@frica
Speech	**Spoken Language Technologies for Development (SLT4D)**				
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The Case for SLT4D

PCs are not feasible for low-literate masses

- Non-affluent cannot afford them
- Unskilled cannot operate them
- Stable electricity, Internet etc. cannot be relied upon
- **Low cost phones may be a feasible solution**

Low-cost phones often only support voice & SMS

- Video not feasible
- Graphical interactions not always possible

Text is problematic for low literate users

- **Speech may be the only viable interaction paradigm**

User Interface Hurdle

Most ICTD projects focus on core development areas

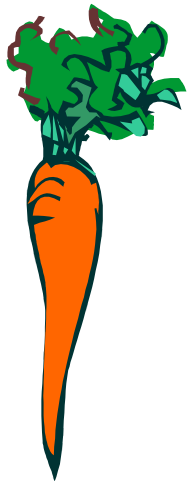
- Health
- Agriculture
- Education

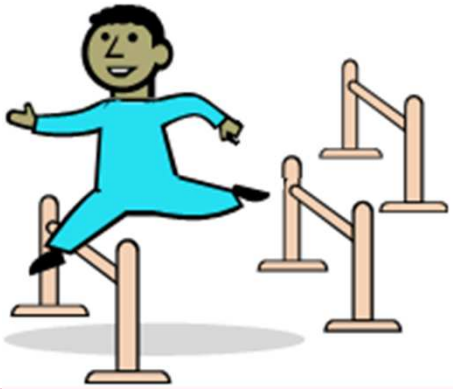
But the low-literate audience is often inexperienced with technology and speech/textual user interfaces

How to train the general population to use Speech Interfaces???

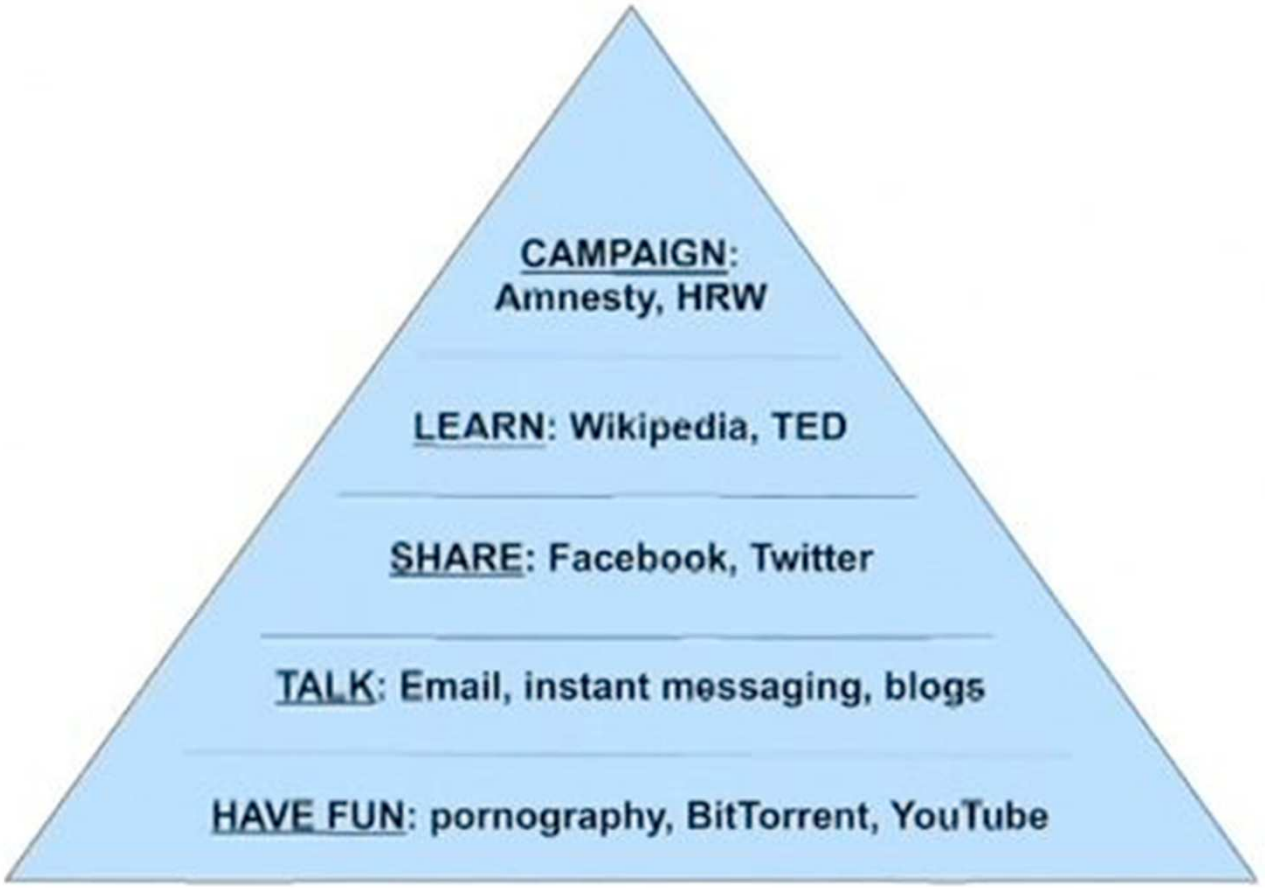
Solution

Smyth et al. [2010] described the remarkable ingenuity exhibited by low-literate users when they are motivated by the desire to be **entertained**, and concluded that such powerful motivation **“turns UI barriers into mere speed bumps”**





Hierarchy of Cyber-Needs



Some Right Reserved, Evgeny Morozov

Our Goal

Systematically develop *Viral Entertainment* as a vehicle for dissemination of development related telephone based services (e.g. healthcare , education, agriculture, education)

- **Introduce and popularize** speech interfaces
- Use Entertainment as a **Viral Conduit** for delivering core development services **(Payload)**
- Setup an **Experimental Testbed** for testing speech interface choices
- *and* , provide **Entertainment**

Geographical Region

Our Team…

Lahore University of Management Sciences (LUMS)
Punjab, Pakistan

(Left to right) Umar Saif, Mansoor Pervaiz,and Samia Razaq

Carnegie Mellon University (CMU)
Pittsburgh, PA

(Front to back) Agha Ali Raza and Roni Rosenfeld
(Not pictured) Tina Milo, Hao Yee Chan, Guy Alster

Polly

Polly is a telephone-based, voice-based application which allows users to make a short recording of their voice, modify it and send the modified version to friends.

Voice Effects

Original Voice: Professor Roni Rosenfeld

1) An *I-have-to-run-to-the-bathroom* effect

2) A *drunk chipmunk* effect

3) Converting the voice to a *whisper*

4) Adding *background music*

5) The original, *unmodified* recording

This brief video depicts a typical user interaction with Polly

USER INTERFACE

Pilot Launch

- Pilot tested in Lahore in early March 2011
- Seeded with **two** office workers at LUMS
- Test lasted **two weeks**
- User base increased to **32**
- We then stopped Polly and **gathered feedback by interviewing the users**
- Software flaws detected and fixed

Main Launch

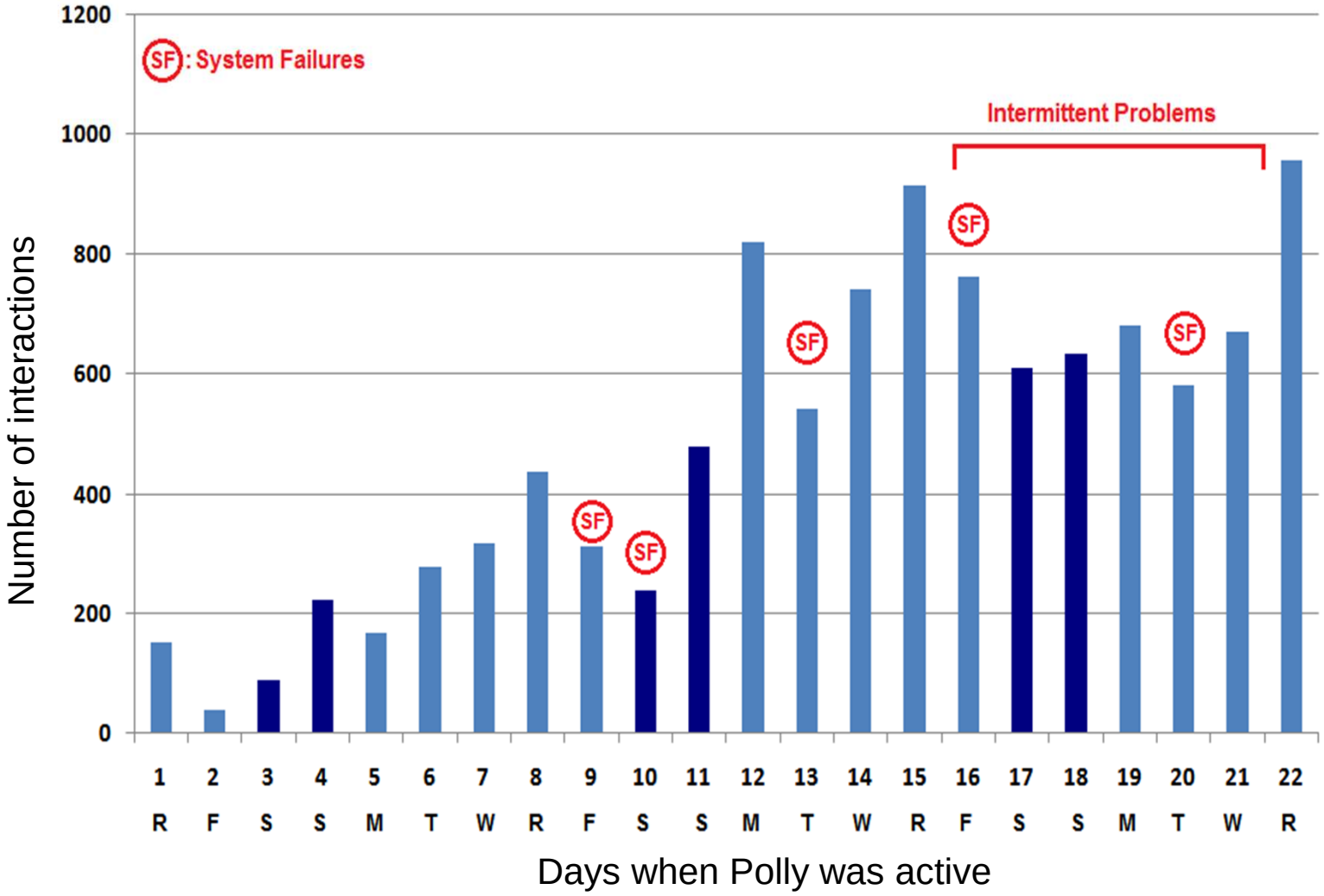
- Launched on March 31, 2011, at 1:00 PM Pakistan Time
- **Seeded with the 32 users** who had participated in the pilot launch
- We made no further attempts to solicit users
- We kept Polly up for **22 days during which it** amassed **2,032 users** who took part in **10,629 interactions**

System Failures

Polly experienced multiple down times due to power/ internet failures and administrative reasons

We shut Polly down after 22 days for reasons described later.

Main Launch


SF: System Failures
Intermittent Problems
Number of interactions
Days when Polly was active
1200
1000
800
600
400
200
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
R F S S M T W R F S S M T W R F S S M T W R

Breakdown of Interactions and Users

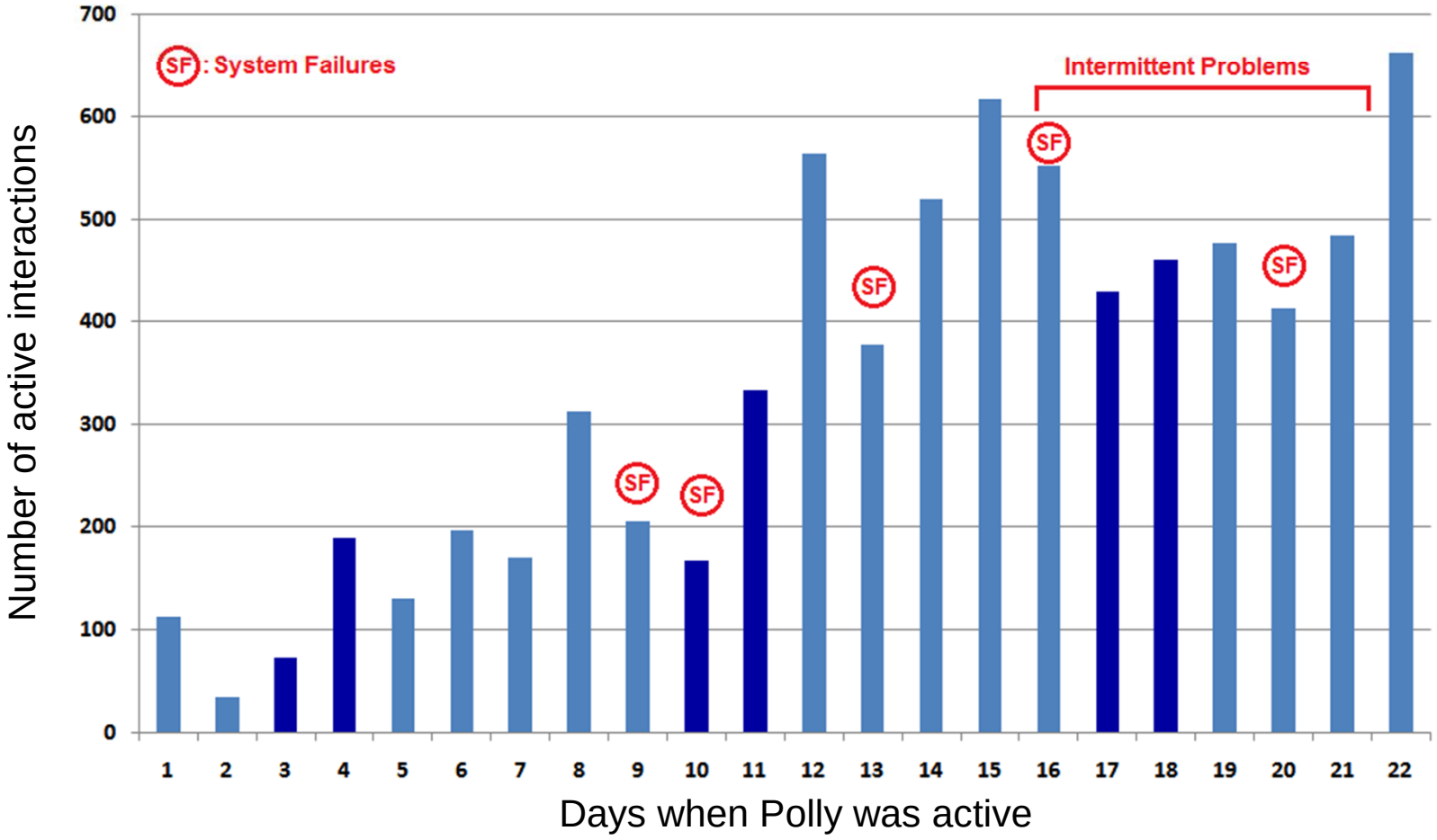
	User Initiated	System Initiated (delivery)
User made new delivery requests during interaction	**4,340**	**699**
User made no delivery request during interaction	**2,444**	3,146
Total	**6,784**	**3,845**

Active Interactions

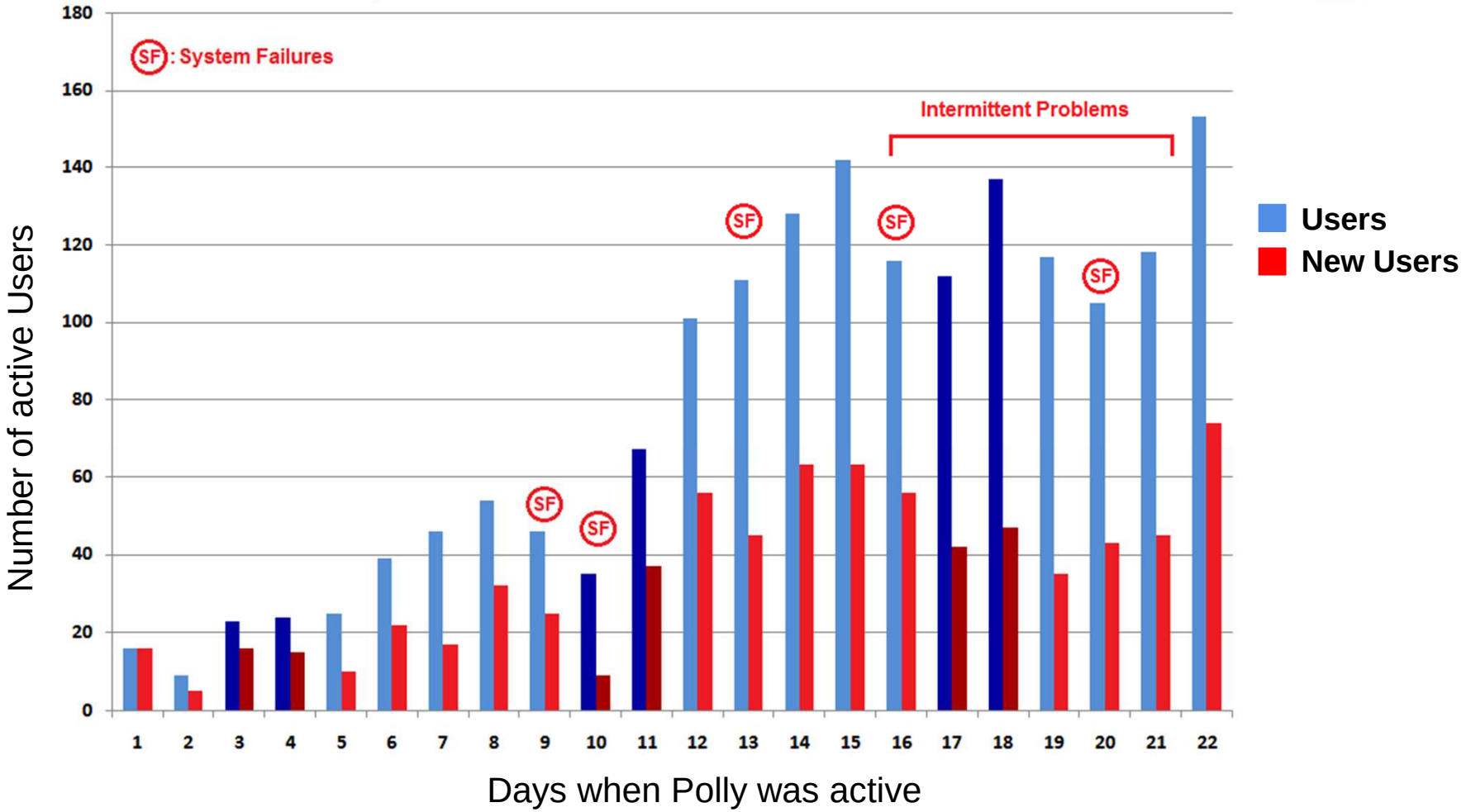
	Call Initiators	Call Receivers
New delivery requests made during call	**525**	**313**
No delivery request made during call	**476**	1,723
Total	**613**	**1,843**

Active Users

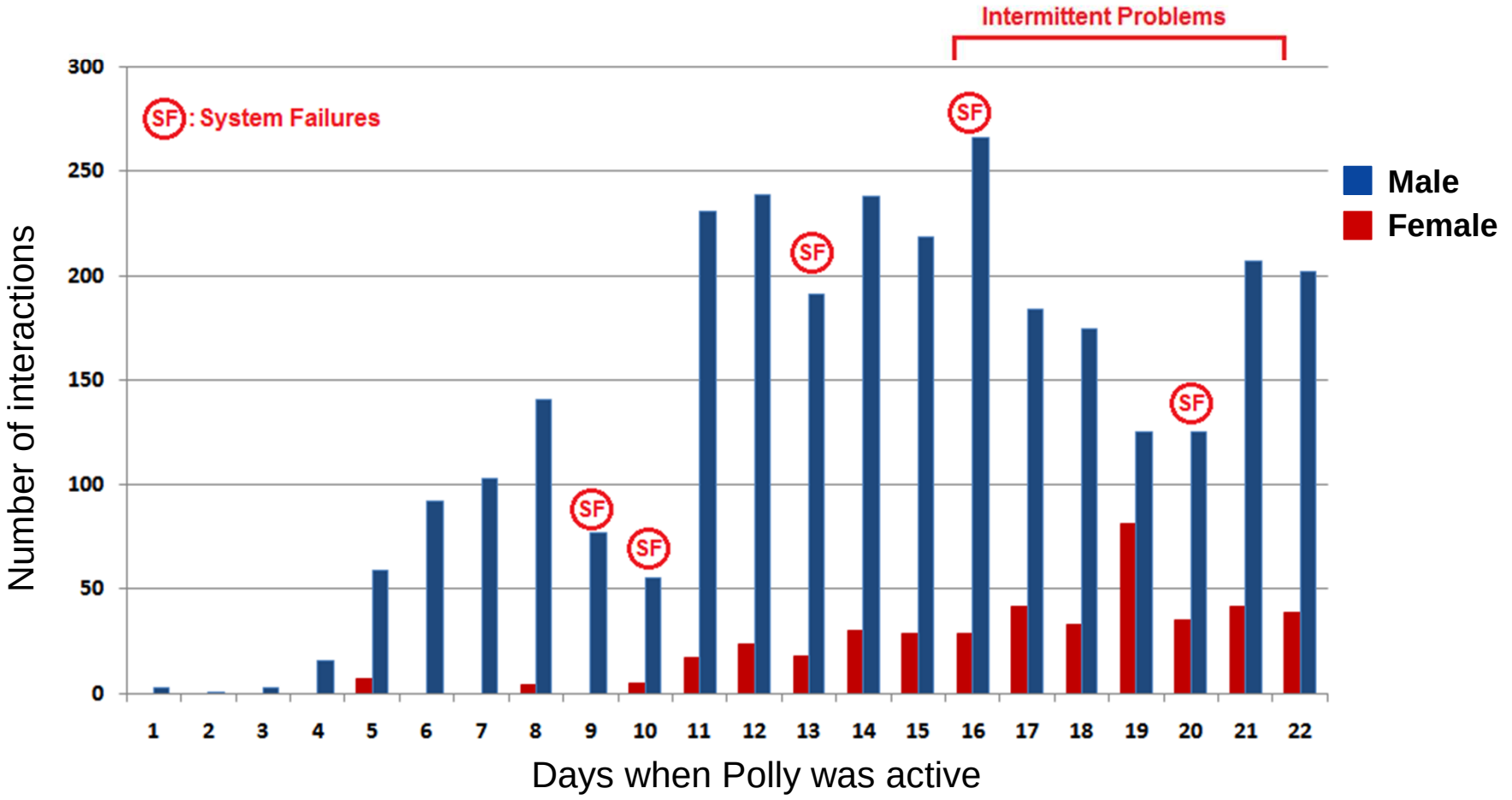
Usage growth pattern
(Active Interactions Only)



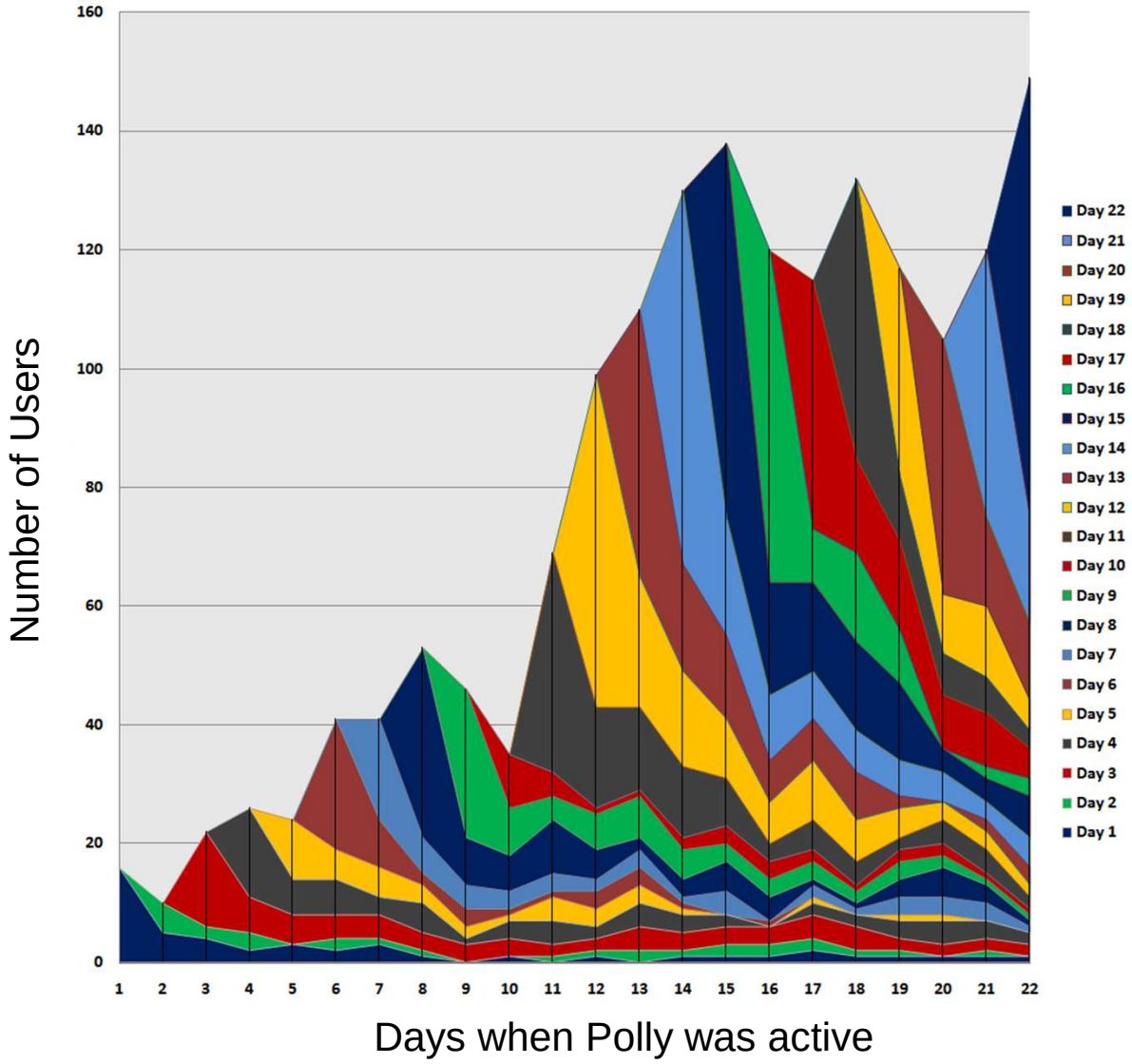
Usage growth pattern
(Active Users)



Usage growth pattern
(by gender)

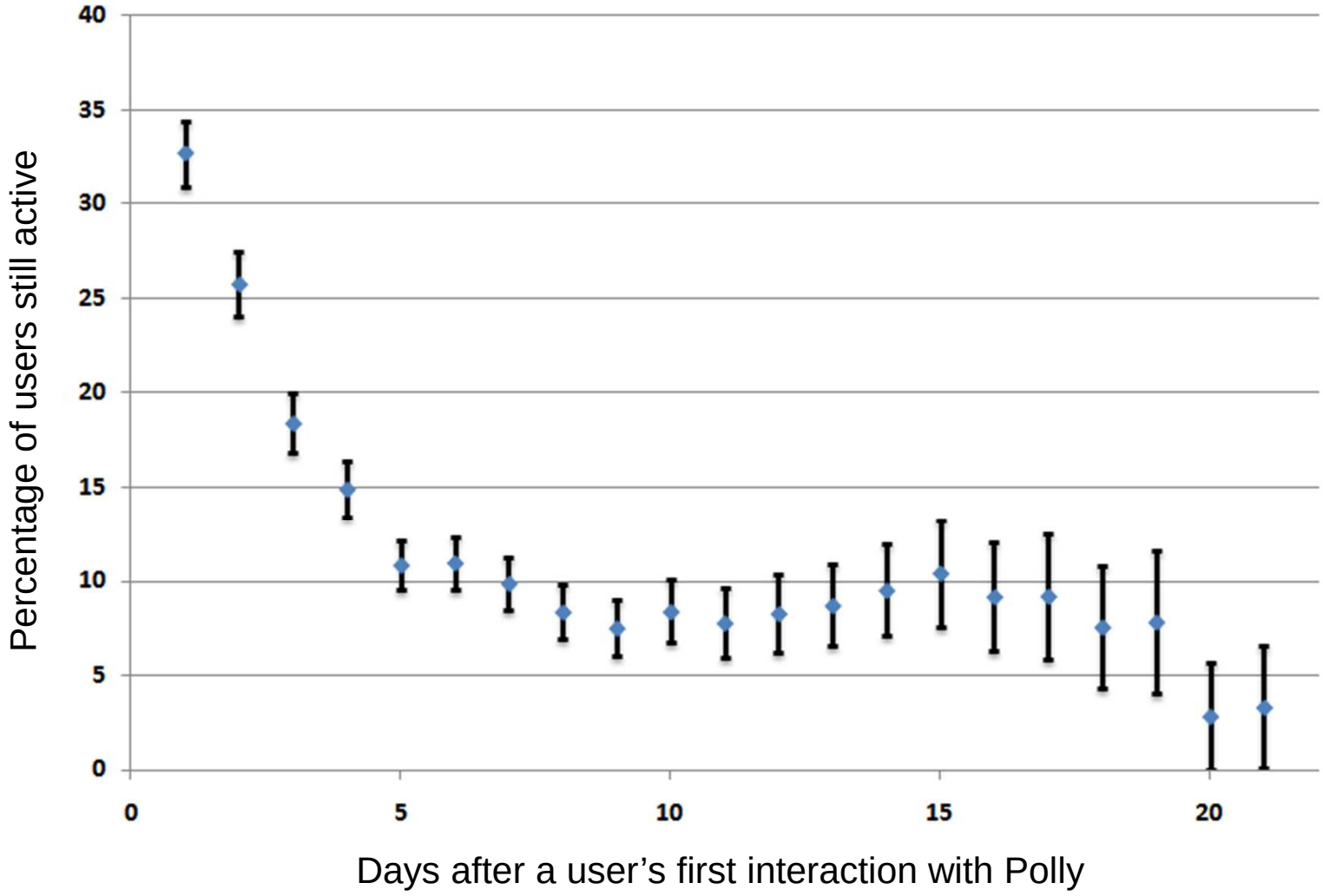


User Retention

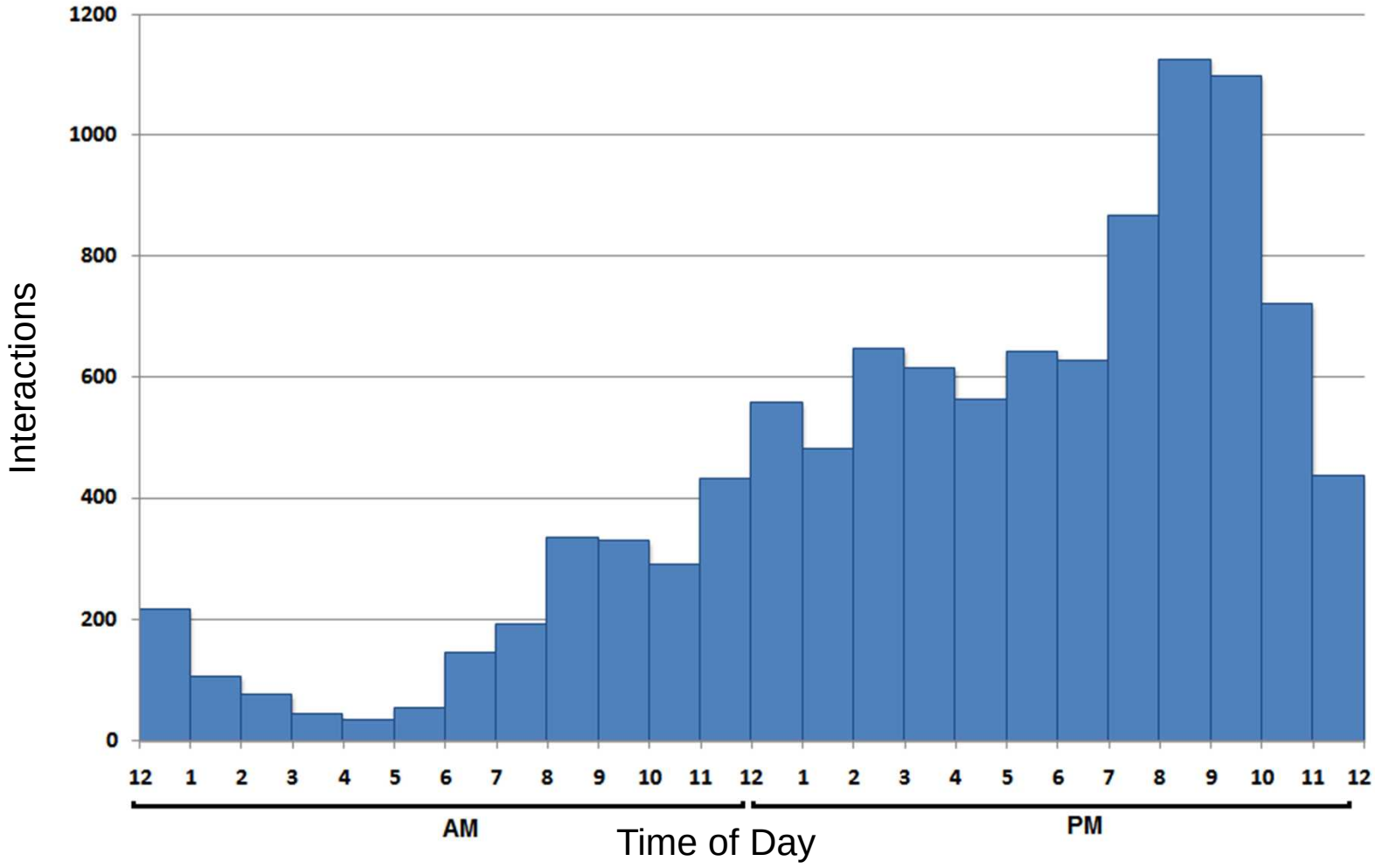


A small but non-negligible fraction of long-term users…

User Retention



Activity by Time of Day



Shutdown

We shut down Polly on April 22, 2011 at 3:00 AM, after 22 days, because:

1. We had a single telephone line; the system was saturating during peak hours, resulting in busy signals.
   - We did not want users, especially new ones, to be frustrated in their interactions with our system
2. The international call charges were becoming a significant financial burden for us.

So, we did a *graceful* shutdown.

Post Shutdown: People Miss Polly!

- Some users were still calling Polly **40 days** after its shut down when we finally stopped monitoring the calls on May 31, 2011.
- We received **1276 calls** during this period made by **310 individuals**.
- **117** out of these callers were **new users**
- A significant number of users kept calling repeatedly, as many as **46 times**.

Feedback Summary

Feedback Type	Fraction of Messages
Interface/functionality related feedback and complaints: too long turn-around time of message delivery; poor call/sound quality; busy network; too short message recording time; increase/rearrange sound effects etc.	49%
General appreciation including mentioned reasons such as: a way to connect to friends; a means of having fun; free service etc.	47%
Confused Users: pressing keys or saying “hello”	7%
Irrelevant feedback including: songs; messages for friends; irrelevant messages for Polly etc.	5%

Most of the people were eager that the service should continue and improve.

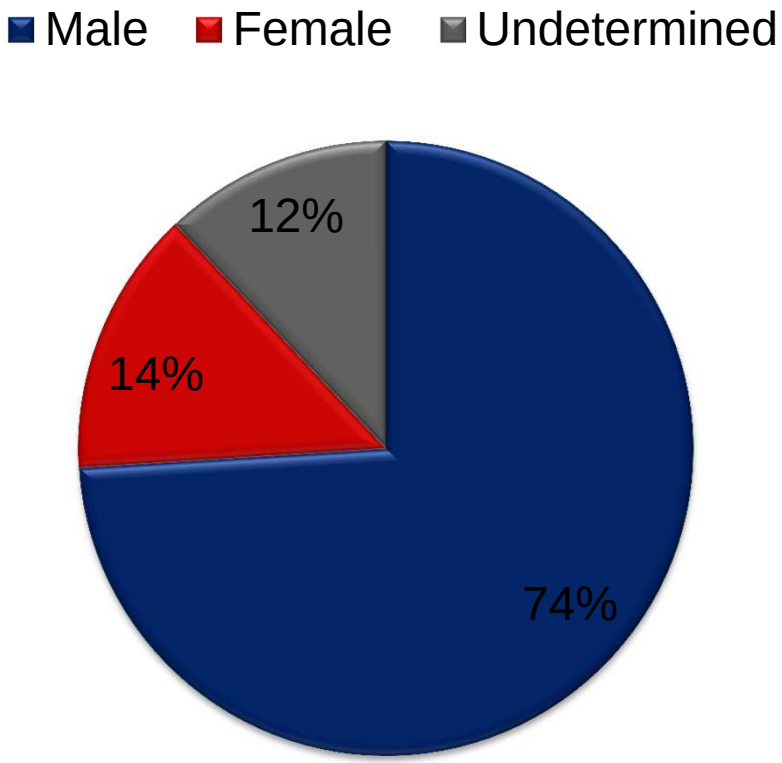
Feedback Summary (Additional)

- Ideas for new voice modification effects
  - female/child voice modification
  - laughter and giggling
  - Scary voice
  - Back ground effects like sad music, rain drops, sound of a train, wind blowing etc.
- A application similar to Polly **just for ladies**
- Several **suggestions to improve user interface** including:
  - Rerecord
  - Rapid access to effects of choice
  - Options to go to the previous menu and to end the call etc.
- Additional suggestions included:
  - An accessibility software for blind that could be used on less expensive mobile phones
  - A software that could identify and filter out foul language in a message

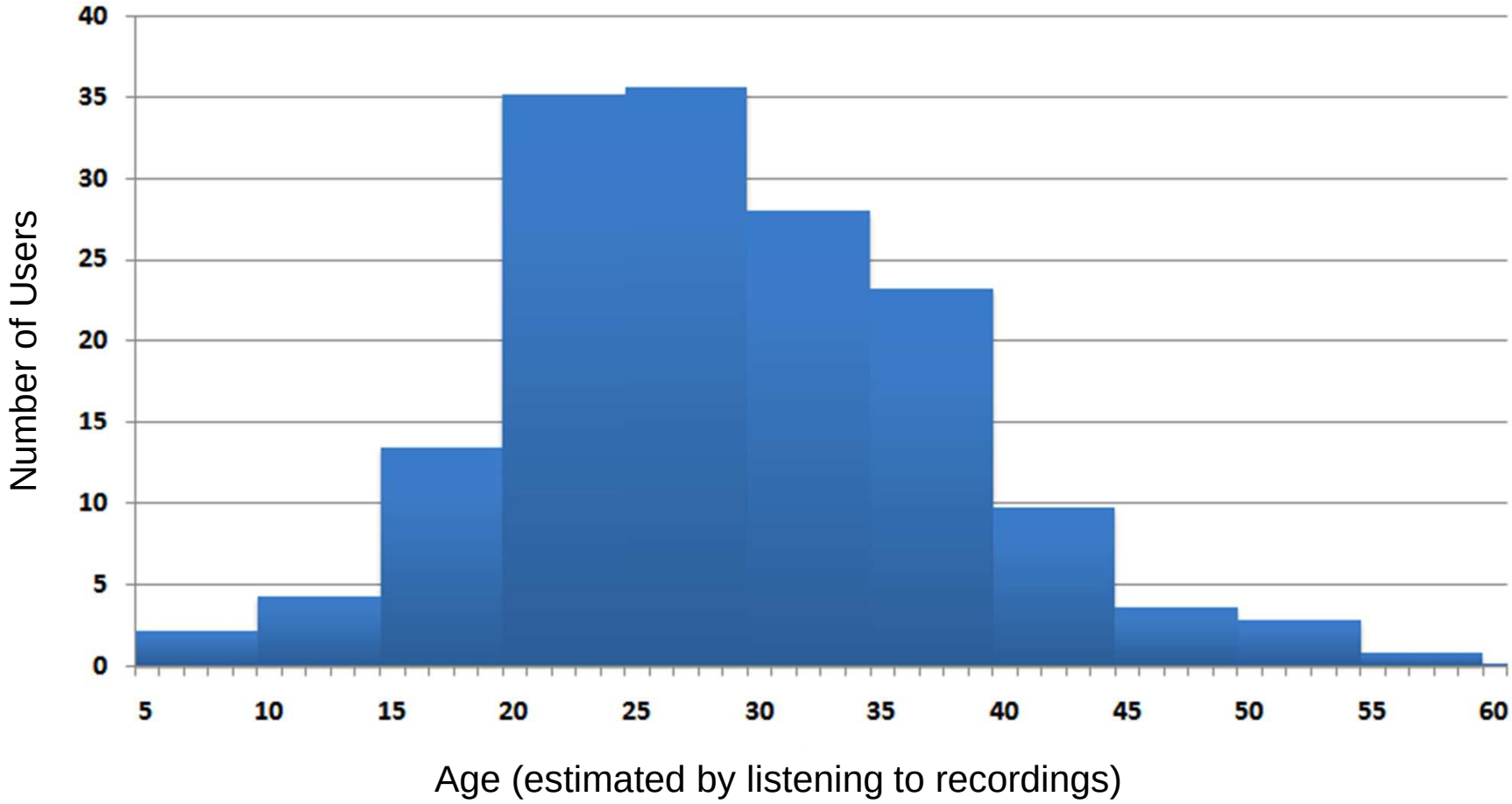
User Demographics

(Gender, as determined by listening to the audio)

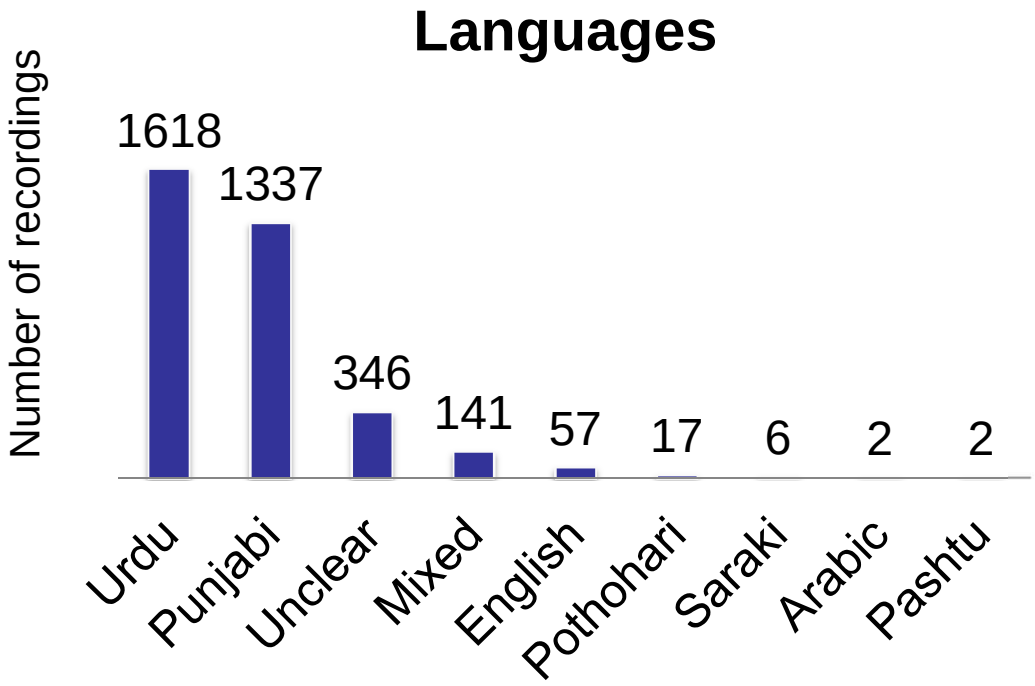
Among Polly's 773 Active Users:



User Demographics
(Age)



User Demographics
(Language of recording)

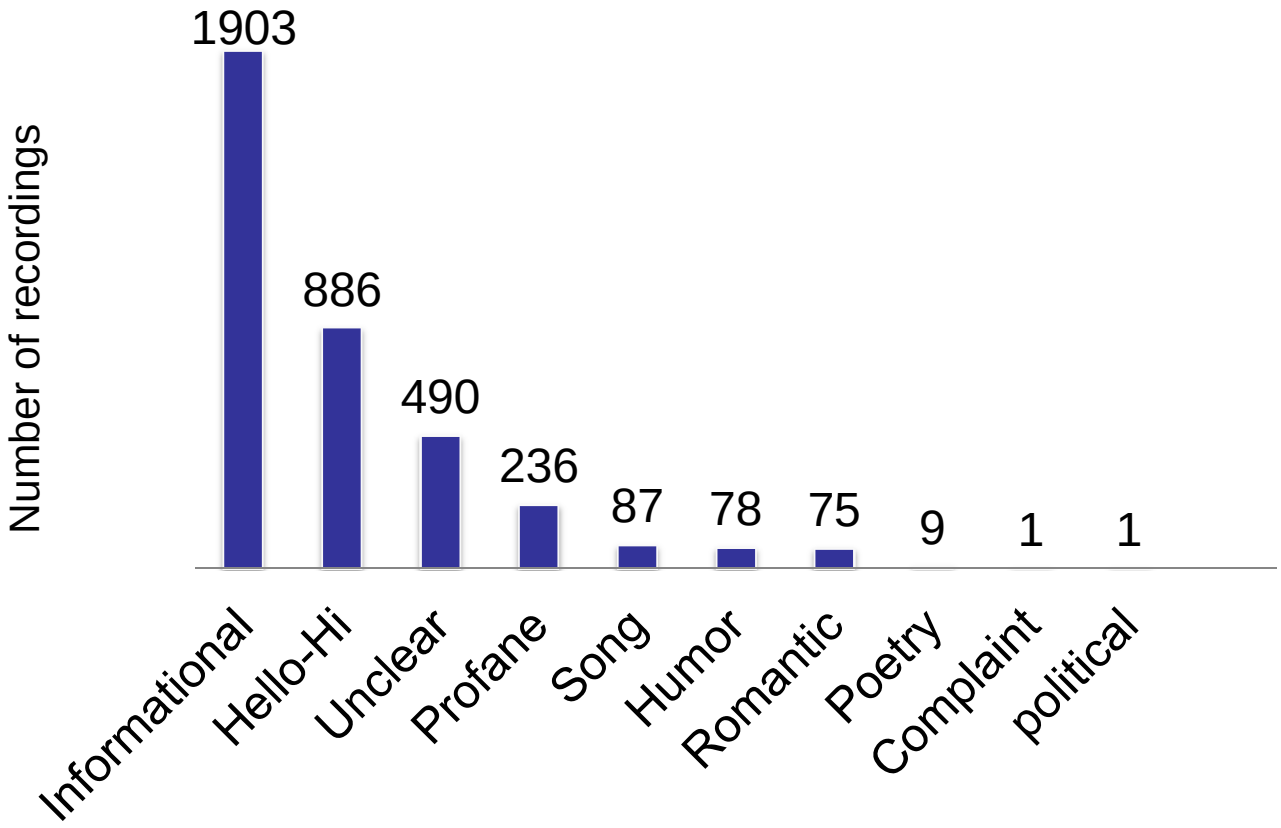


User Demographics
(Socio-economic levels)

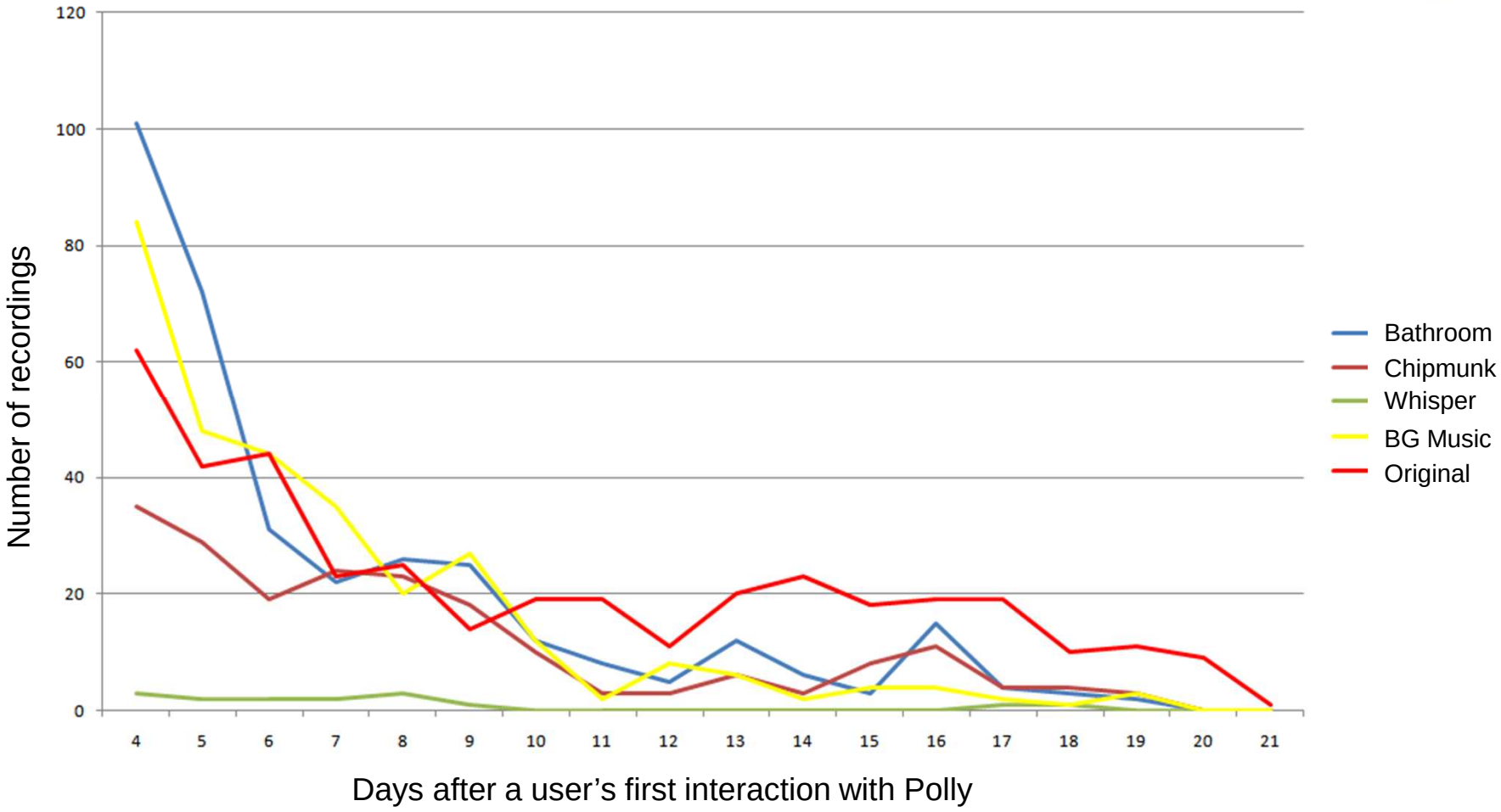
According to the transcribers' best estimates:

- vast majority of the callers come from a socio-economic class similar to that of the originally-seeded low-skilled office workers
- with an educational level that does not exceed theirs (approximately 5th grade and below)

What were the recordings used for?



Effects Chosen by Users over Time



Additional Findings

- Word-of-mouth spread

  Of Polly's **613** Call Initiators, **291 (47.5%)** placed their first call before receiving any calls from Polly.

- Users training others

- Polly's use as a platform for redress of grievances

Future Plans

- Polly come back!!!
  - Stability and Capacity
  - Sustainability
    - Local deployment
    - Subsidized (bare bone) vs. unsubsidized (premium)
  - Help menus
  - Speed Dial

- Payload
  - A development oriented service to be introduced using Polly

Payload Options

Health care

Agriculture

Job Search

Entertainment

Commerce

???

Education

Our Strategy: Entertainment → Employment → Education (job skills)

Payload Options

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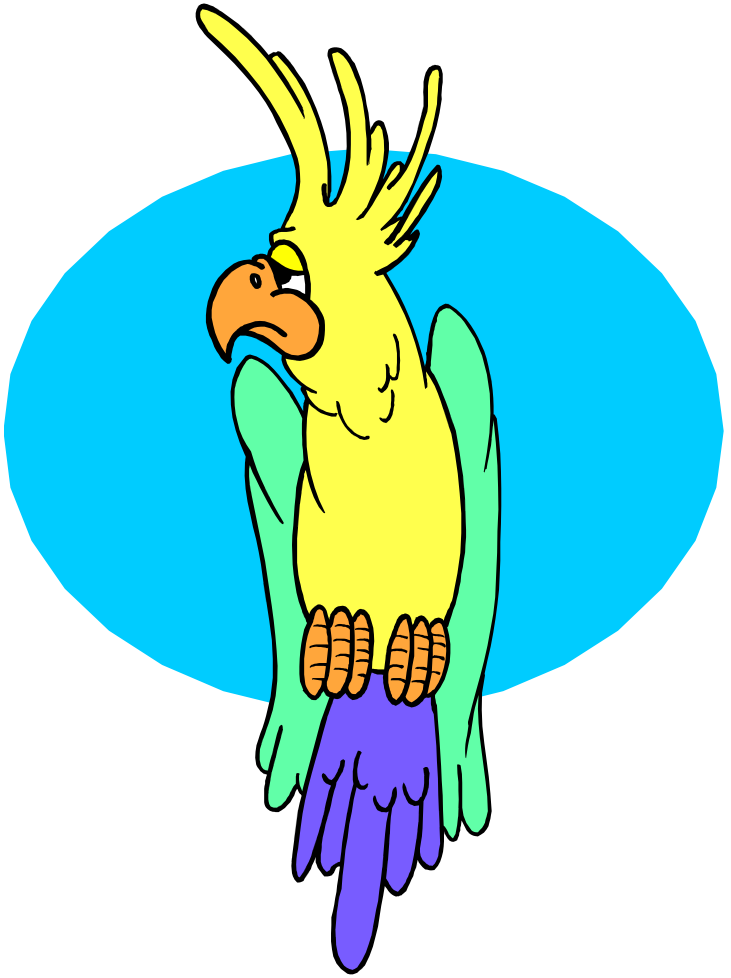
Questions