

Current Directions in HCI

CS 160: User Interfaces
John Canny

Themes

Beyond the screen: interacting with other objects

Context-awareness: less talk and more action

Perceptual Interfaces: Speech and Vision

Social media

Direct Manipulation of Video

Video Browsing by Direct Manipulation. Dragicevic et al. 2008.

Digital Paper

Paper Windows: Interaction Techniques for Digital Paper. Holman et al.
2005 <http://www.youtube.com/watch?v=gVEslp0BicE>

Foldable Displays

Foldable Interactive Displays. Lee and Hudson. In Submission.

http://www.youtube.com/watch?v=nhSR_6-Y5Kg

Multimedia capture & linking

ButterflyNet. Yeh et al. 2006.

See-through interfaces

LucidTouch: A See-Through Mobile Device. Wigdor et al. 2007.

<http://www.youtube.com/watch?v=aASuL7RHJHM>

Brain-computer Interfaces

Brain-computer interfaces:

http://www.youtube.com/watch?v=wNr3yGcl_V8

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Context Awareness

Context-Awareness

Widely regarded as the holy grail for next generation mobile applications:

- Location (e.g., video store) heavily shapes the user's likely actions.
- The system can present streamlined choices – “here are your top-10 video suggestions with clickable previews”
- For users this is very convenient
- Also for vendors...



Context aware example

Knowledge of user background and context provide great opportunities for pro-active services:

- “It’s 7pm and you’re in San Francisco, would you like me to find a nearby restaurant?”



Context aware example

Knowledge of user background and context provide great opportunities for pro-active services:

- “It’s 7pm and you’re in San Francisco, there is a table available two blocks away at Aqua restaurant, would you like me to book it?”



Context aware example

Knowledge of user background and context provide great opportunities for pro-active services:

- “It’s 7pm and you’re in San Francisco, there is a table available two blocks away at Aqua restaurant, and they have a special on Salmon in parchment, would you like me to book it?”



Context aware example

How much do you think the restaurant might be willing to pay me to receive that message?



Speech recognition example

Consider now a speech recognizing version of this application:

- “It’s 7pm and you’re in San Francisco, there is a table available two blocks away at Aqua, and they have a special on Salmon in parchment for \$28. Would you like me to book a table, and order the special?”

User: Yes or No



So what is context?

Much of the work on context-awareness considers only “immediate context”:

- Information that can be sensed or is available where the user is, e.g.
 - Time
 - Location
 - Who is the user, who else is there
 - What is the user doing
- Google Voice Search appears to be using some of this context (Patent 7027987).

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Perceptual Interfaces

- Perceptual interfaces make high-level interpretations of sensor data:
 - Computer Vision
 - Speech recognition
 - Bluetooth, location sensing

Face recognition



Face Recognition

- Face recognition is very useful on phones because:
 - It allows you to index the people in your photographs for later retrieval.
 - It allows you to immediately share photos with friends over the network.

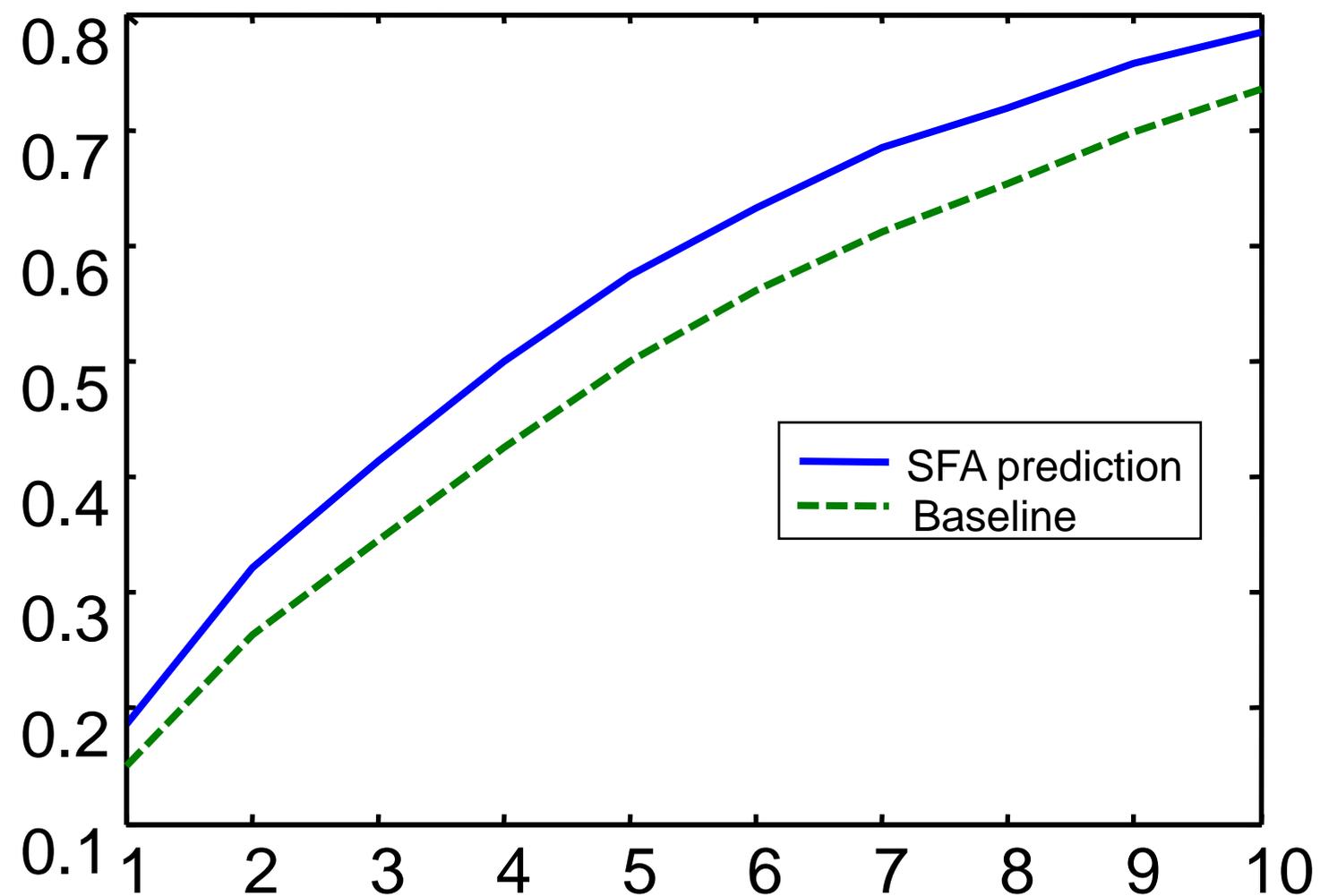
Context-aware Face Recognition

- Context data (time, place, contact list) improves face recognition significantly, in fact:

Recognition method	Accuracy:
• Image analysis alone	30%
• Context analysis alone	55%
• Context+Content analysis	67%

Context-aware Face Recognition

You can also use context data to predict who users will want to share their photos with, apart from those in the photo.



Perceptual Interfaces - Speech

Speech recognition technology has improved steadily in the last ten years, particularly in noisy environments.

Speech was never a good match for office environments.



But the **mobile playing field is completely different.**

Mobile users often **need their eyes and hands free**, and the phone always has a voice channel for telephony.

Speech on cell phones

On the server side:

- Microsoft's Tellme service
- Google Voice Search

Quality good but uses airtime and needs a connection

On the client side:

- Voicesignal software, available on many handsets now. Able to do voicedialing.
- About two years ago, handsets started shipping with large vocabulary recognizers suitable for dictation and message composition.

Hard to do real-time large-vocabulary recognition at low error rates. But no airtime and better user adaptation possible.



Speech in developing regions

Speech is an even more important tool in developing regions.

Literacy is low, and iconic (GUI) interfaces can be hard to use.

Unfortunately, IT cannot help most of these people because they lack even more basic skills – fluency in a widely-spoken language like English or Mandarin.

Speech-based phones are ideal for this.

Since recognition is expensive and error-prone, hybrid (speech+keyboard) systems are often used:

Hit “1” for yes, “2” for no.



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Social Networking

A new way for people to socialize and a new medium that computers embody.

“Heavy” users spend $>$ 1 hour a day, sometimes much more.

Researchers try to understand patterns of use, design issues, and new phenomena (e.g. Facebook app propagation).



Why do people network online?

Remember the original motivation for Friendster...?

One survey (Cliff Lampe et al.) found that the primary motivation is “**social searching**” - finding out about people you have met or know from your past.

“**Social browsing**” (Friendsters original goal) was less common.

About 90% of messages go directly to friends, and 40% to friends who are distant.

Why do people network online?

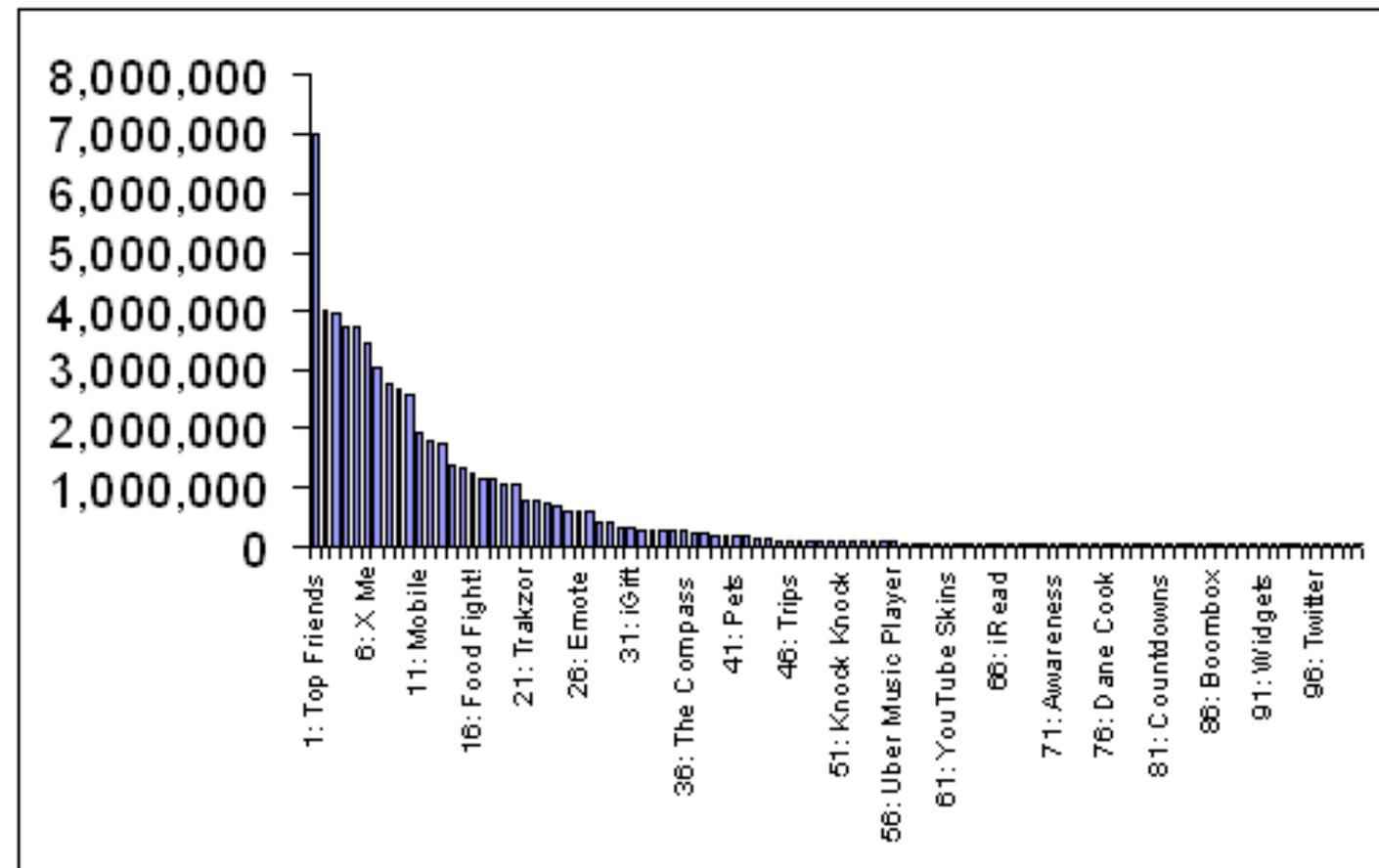
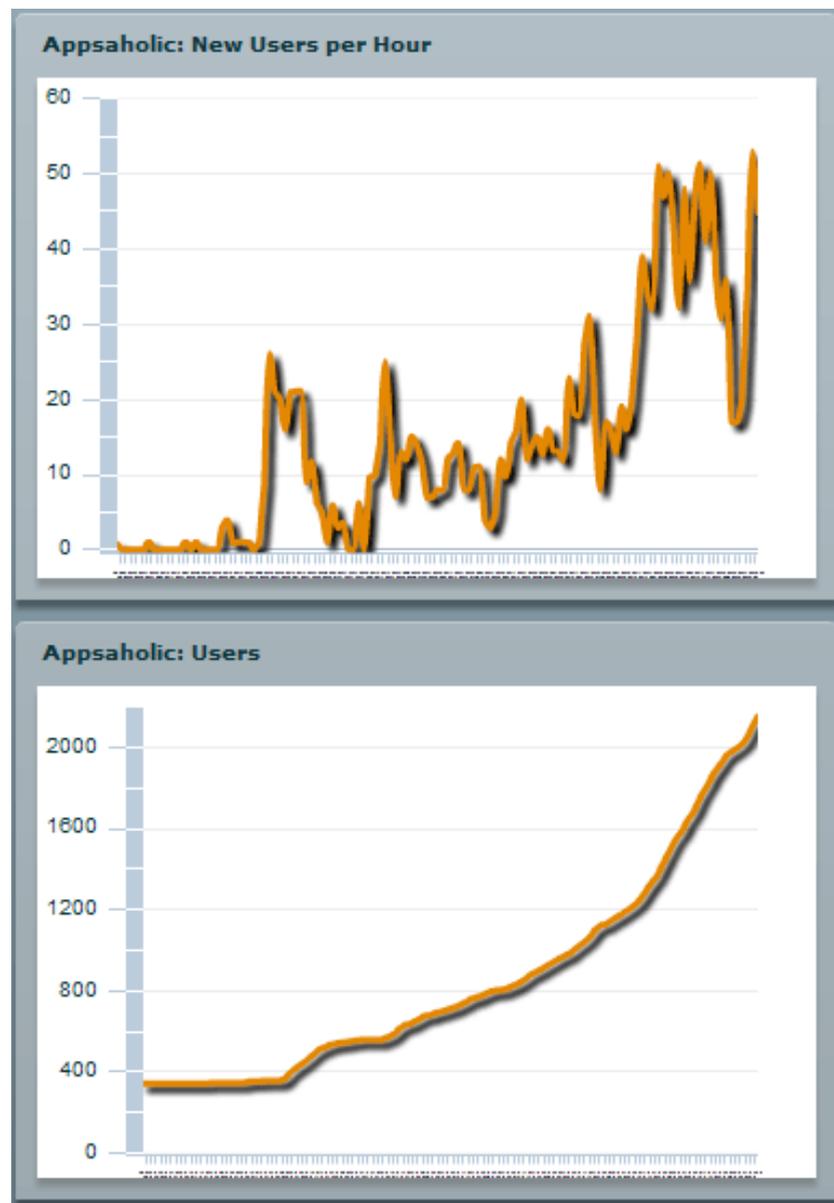
Results from a free text survey:

- Keeping in touch (52 responses)
- Virtual people-watching (19 responses)
- Reconnecting with old friends (15 responses)
- Communicating (15 responses)
- Photograph-related (11 responses)
- Making new contacts (5 responses)
- ...

Viral app diffusion

Facebook apps can show remarkable growth rates (10% / day).
Many researchers want to understand, use and replicate this.

Social proof is a big part of it, but probably not the whole story.



Groups in World of Warcraft

- WoW encourages group play in two ways:
 - Characters have complementary abilities
 - Groups are required to perform harder quests

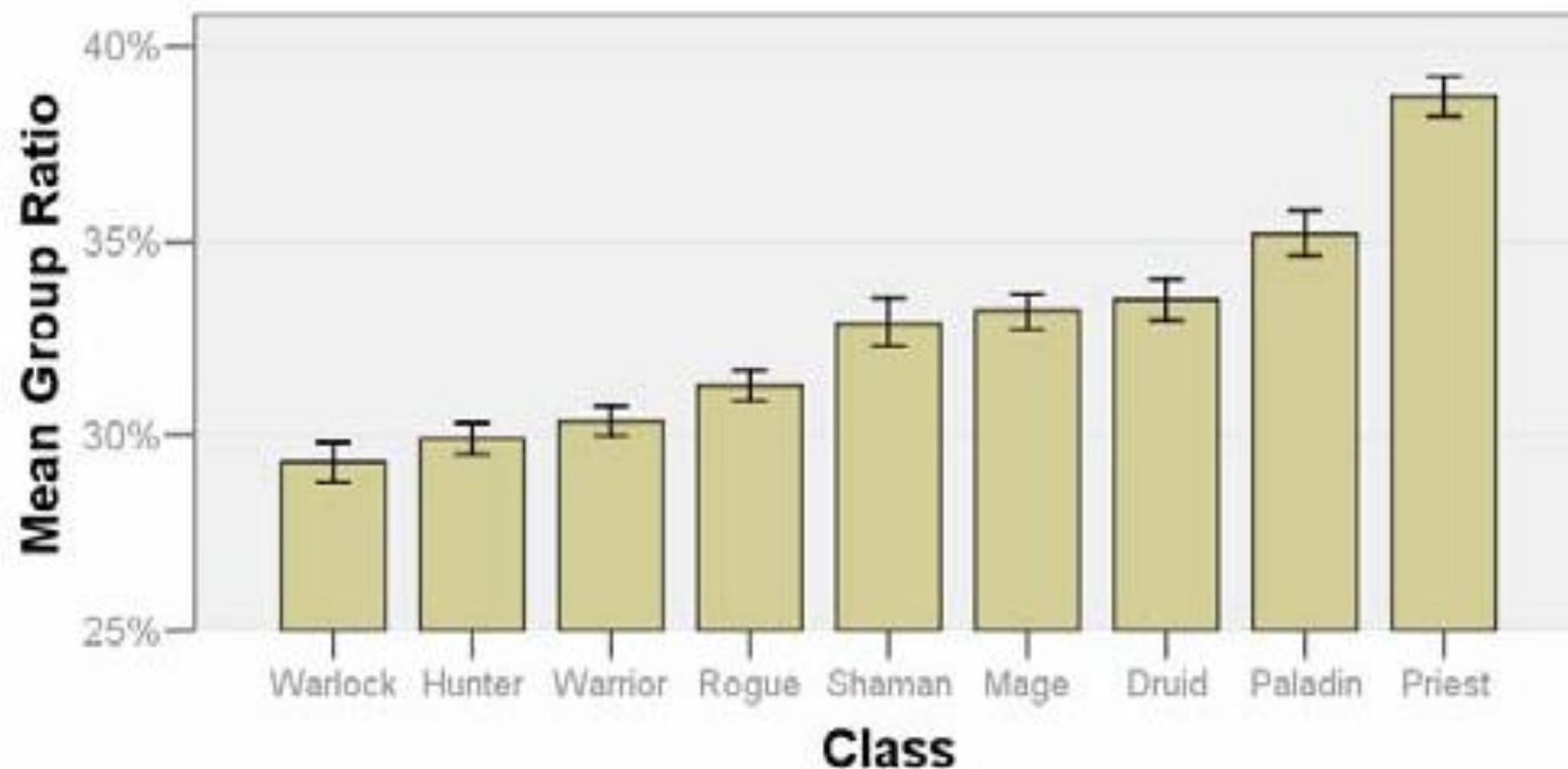


Figure 4 - Average time spent in a group, by class

Groups in WoW

- Group play as a function of level:

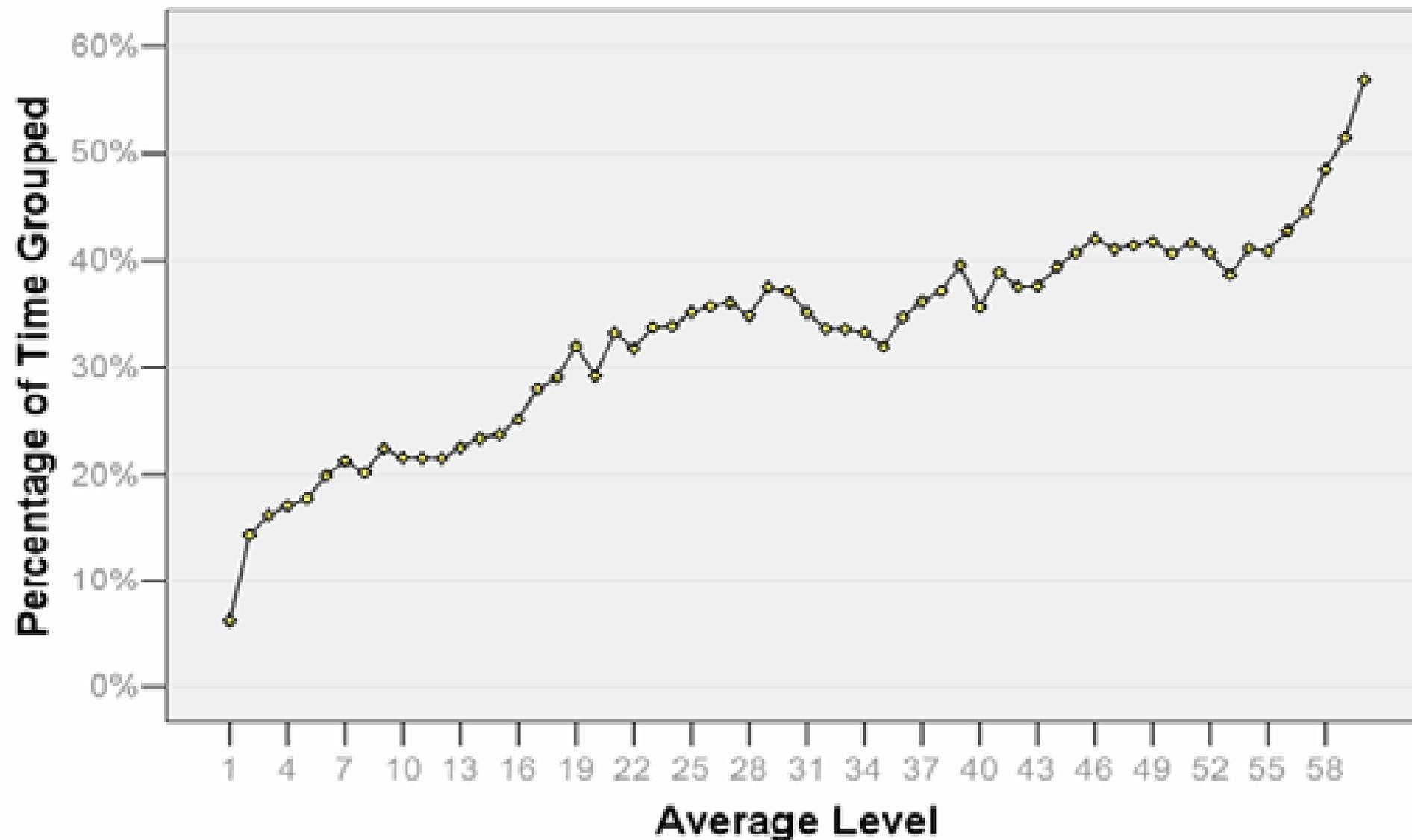


Figure 5 - Fraction of time spent in groups, by level

Groups in WoW

- Leveling time as a function of time spent in groups

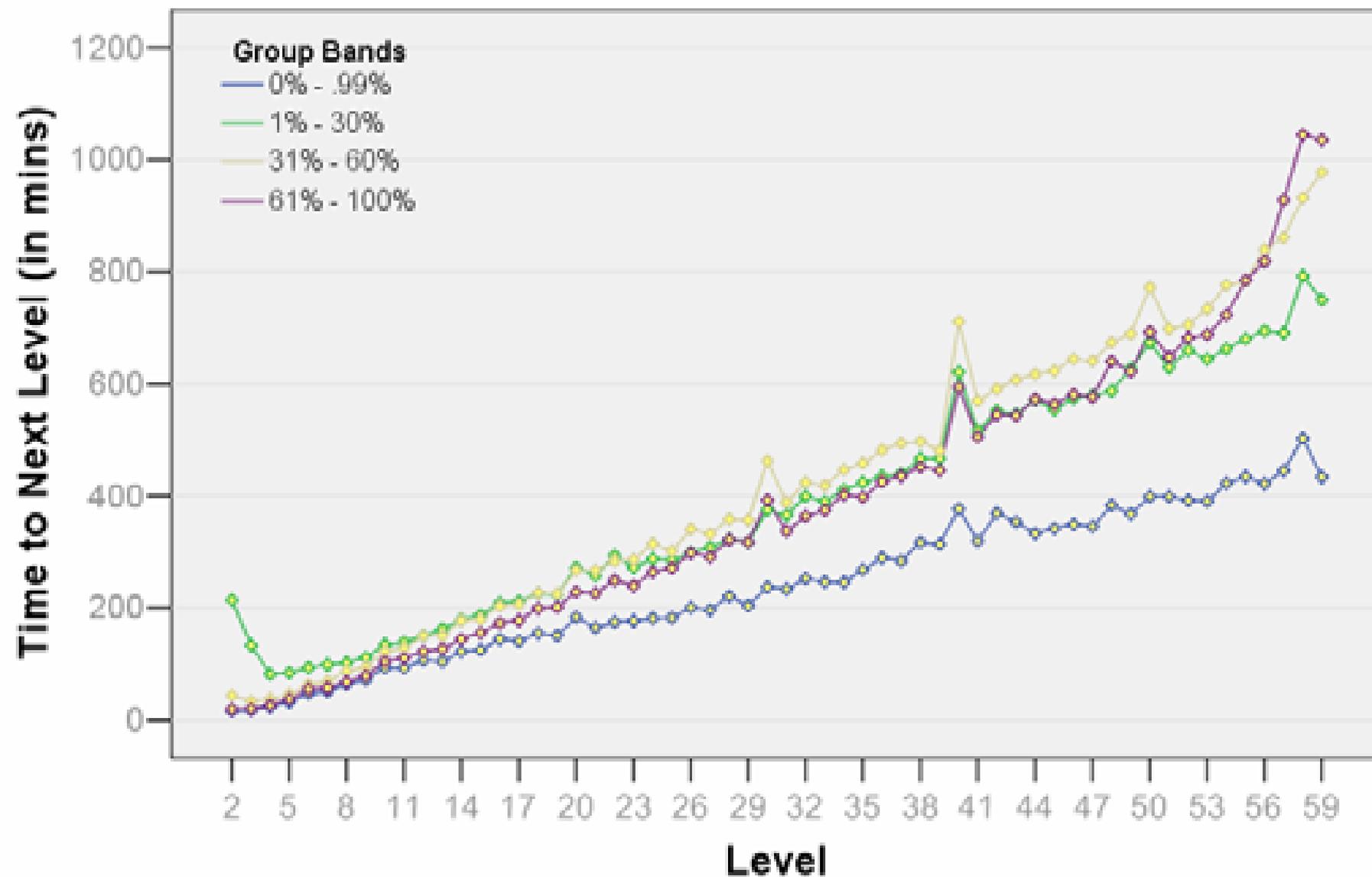


Figure 6 - Impact of grouping on leveling time

Guild Networks

- The social networks in guilds usually have a committed core, and several peripheral players:

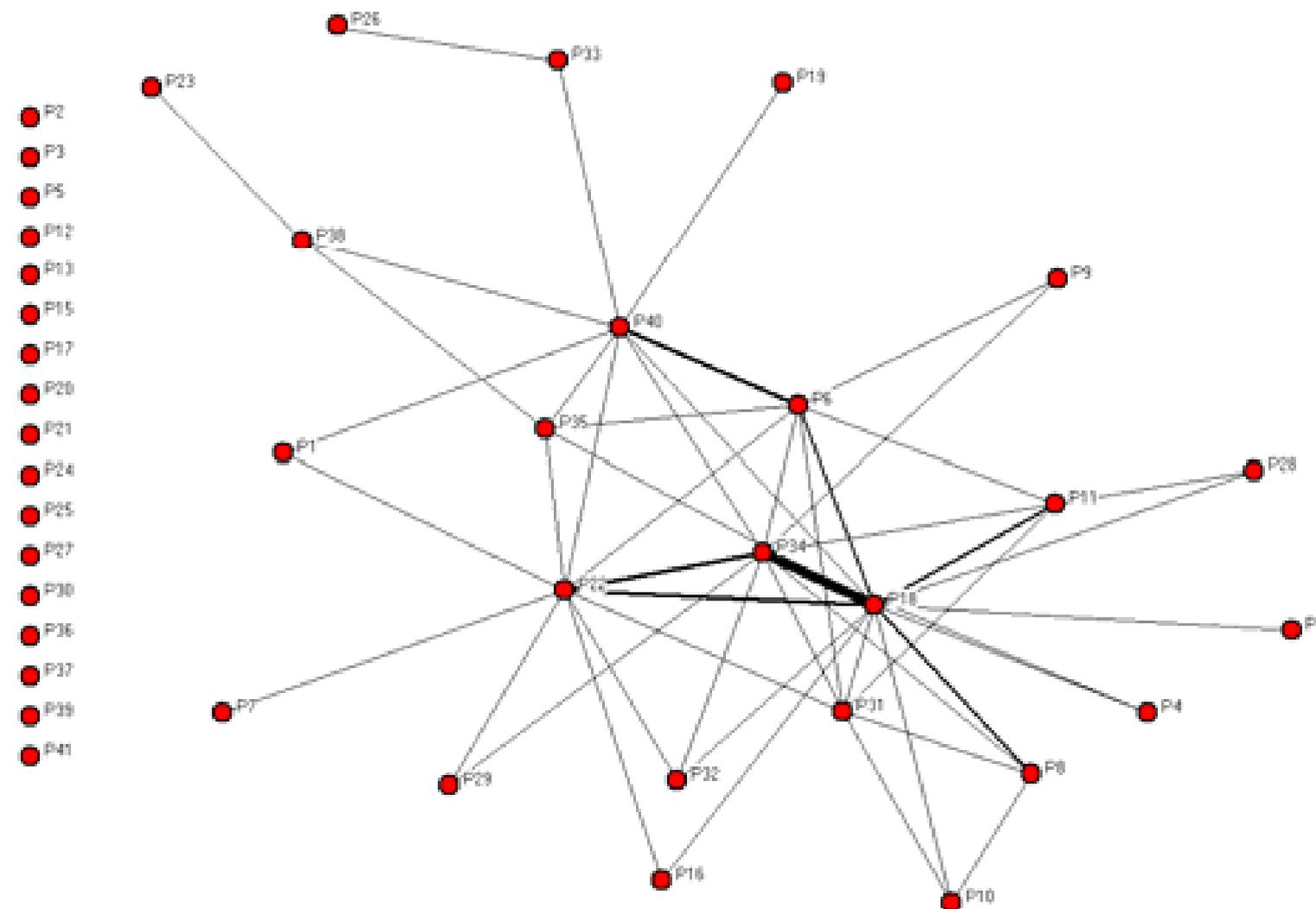


Figure 8 – Co-location network in a medium-sized guild

Summary

Beyond the screen: interacting with other objects

- Emphasis on flexible, tangible interfaces

Context-awareness: less talk and more action

- Appearing in mobile services more and more

Perceptual Interfaces: Speech and Vision

- Driven by mobile, vehicle, medical, home uses

Social media

- Lots of work, not well understood yet

Games – covered before, and all the above is relevant