

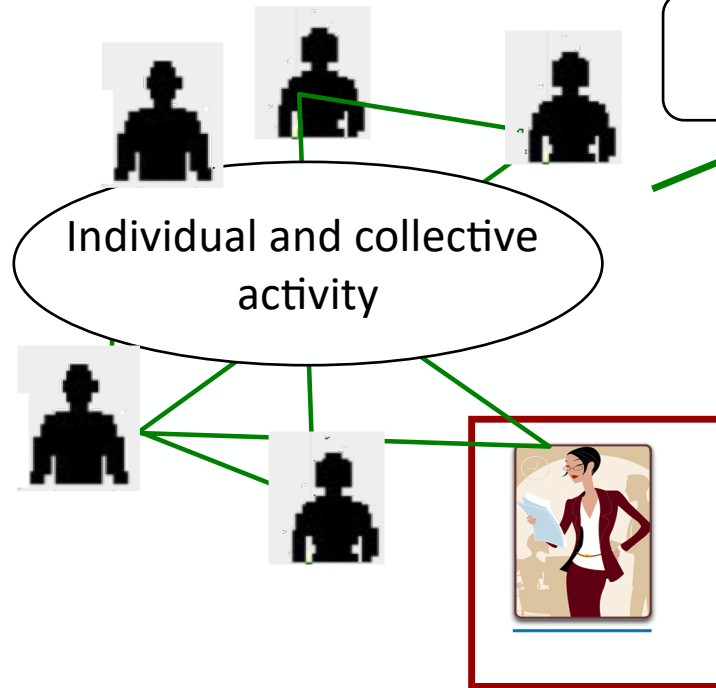
# Designing effective and enjoyable computer-supported systems for L2 learning

Mireille Bétrancourt  
Brigitte Steiner

TECFA  
University of Geneva

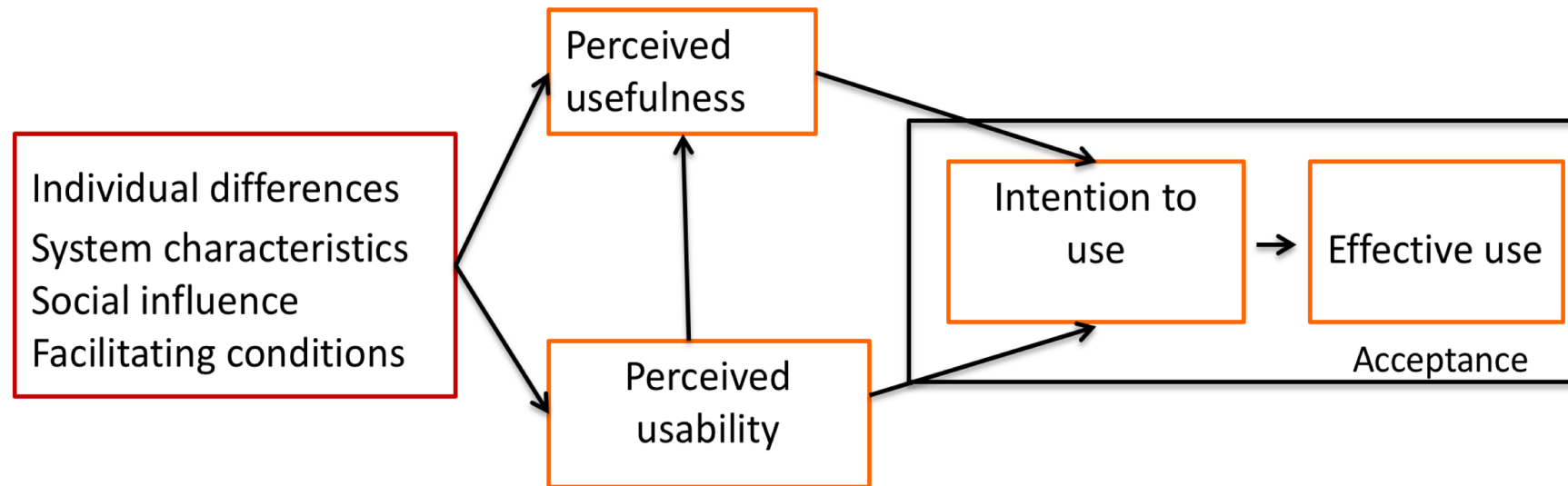
# Cognitive ergonomics for computer-supported learning

Acceptance



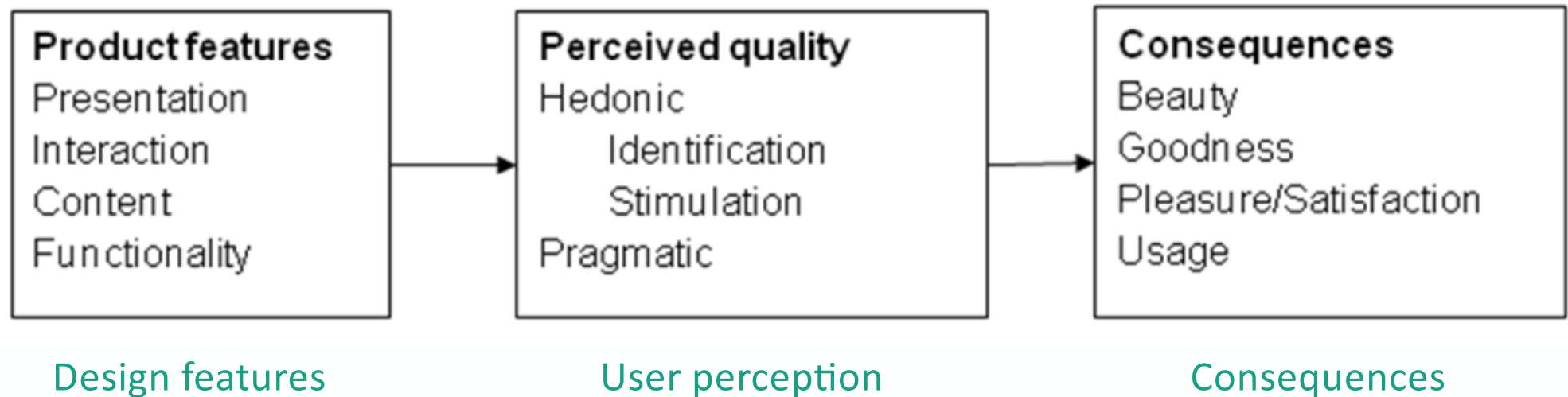
Usability





General framework of the Technology acceptance Model (TAM)- Davis (1989), Venkatesh (2012)

# Concept of user experience: pragmatic and hedonic quality



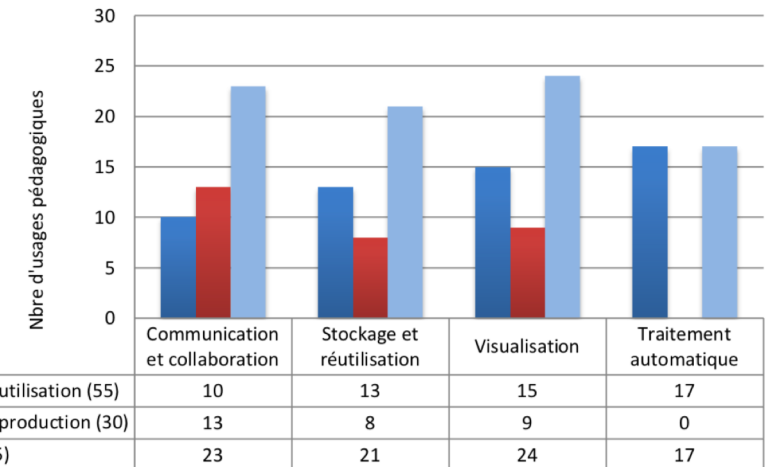
Hassenzahl & Monk, Hum. Comp. Int., 2010

# Three approaches to evaluate user experience and usefulness

## 1. Comprehensive approach: use in context



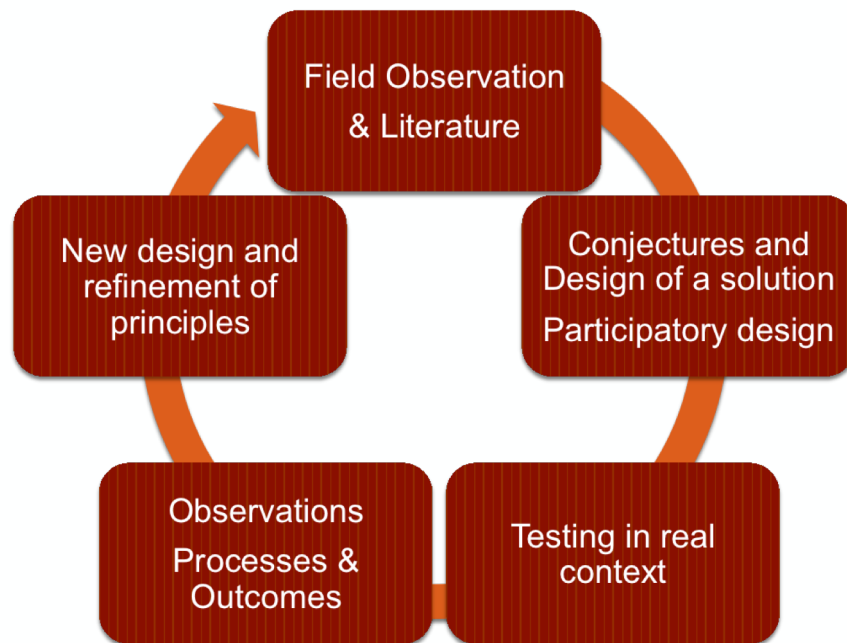
Boujol, 2013



- ✓ usability
- ✓ usefulness
- ✓ acceptance

# Three approaches to evaluate user experience and usefulness

## 2. Design-based research approach



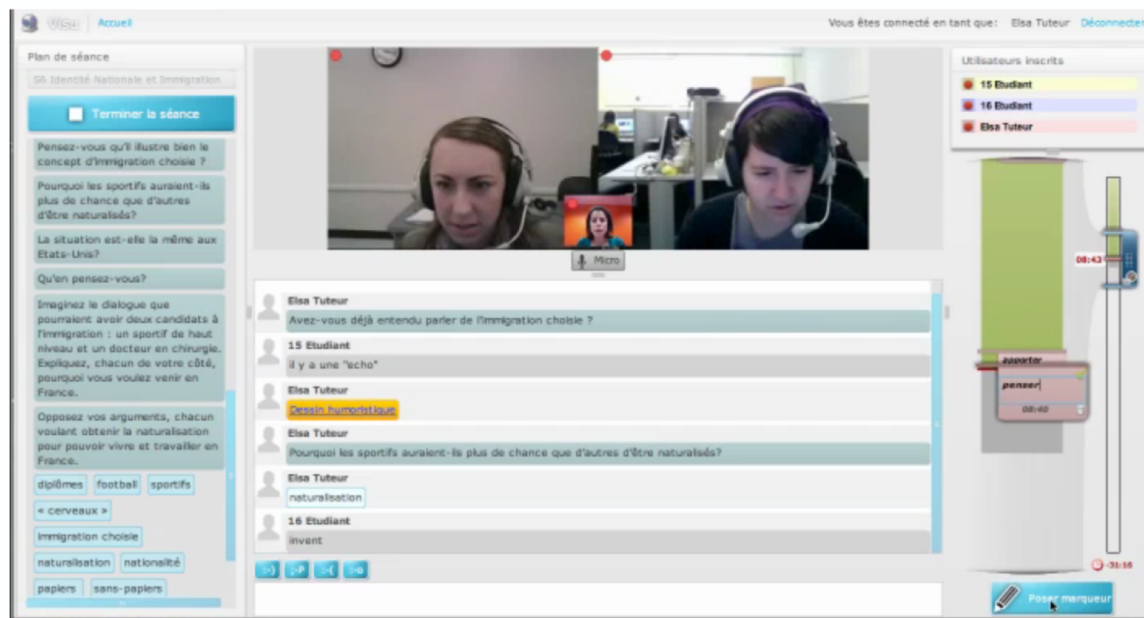
*Sandoval, 2004; Mc Kenney & Reeves, 2010*

Qualitative and quantitative data  
Process and outcomes  
Performance and user experience

- ✓ usability
- ✓ usefulness
- ✓ acceptance
- ✓ System use in context

# Three approaches to evaluate user experience and usefulness

## 2. Design-based research approach



## VISU

Annotated video systems for language learning  
Used for student learning and teacher training and

*Guichon, Bétrancourt, & Prié, Computer Assisted Language Learning (2012)*

# Three approaches to evaluate user experience and usefulness

## 3. Experimental design

Usually pre-test / post-test measures, for experimental and control group, or single case design.

Example for L2 learning of Brigitte Steiner's master thesis.

- ✓ usefulness
- ✓ user experience
- ✓ evidence-based and replicable
- ✓ lab context





# Context

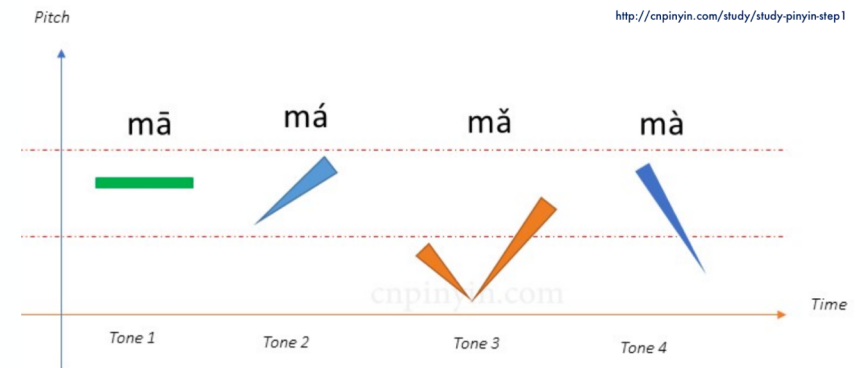
Perception and production of chinese lexical tones are particularly difficult for French speakers.

Computer-based training proved effective for perception and production of chinese tones (Wang et al., 1999; 2003).

Feedback is critical in computer-based training : self-regulation ; motivation

*Mason & Bruning, 2001*

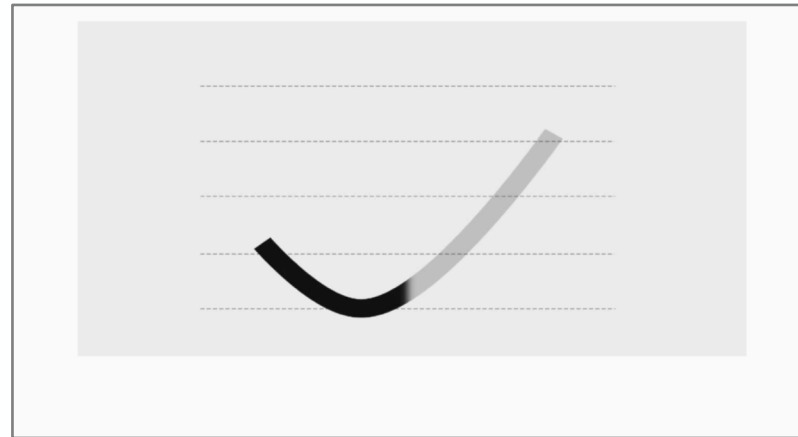
What would be the best form of feedback for learning to discriminate and identify chinese tones?



# Hypotheses

Providing an animated visualization of the tones will help learners to understand and memorize the tones since

- it provides a dual coding (visual and auditive) of the information (Paivio, 2001)
- It is synchronized with the audio (attention guiding) (Mayer, 2001)



# Method

## Participants

N = 30 adult french native speakers, 17 women, 13 men. No knowledge of chinese.

## Pre and post-test

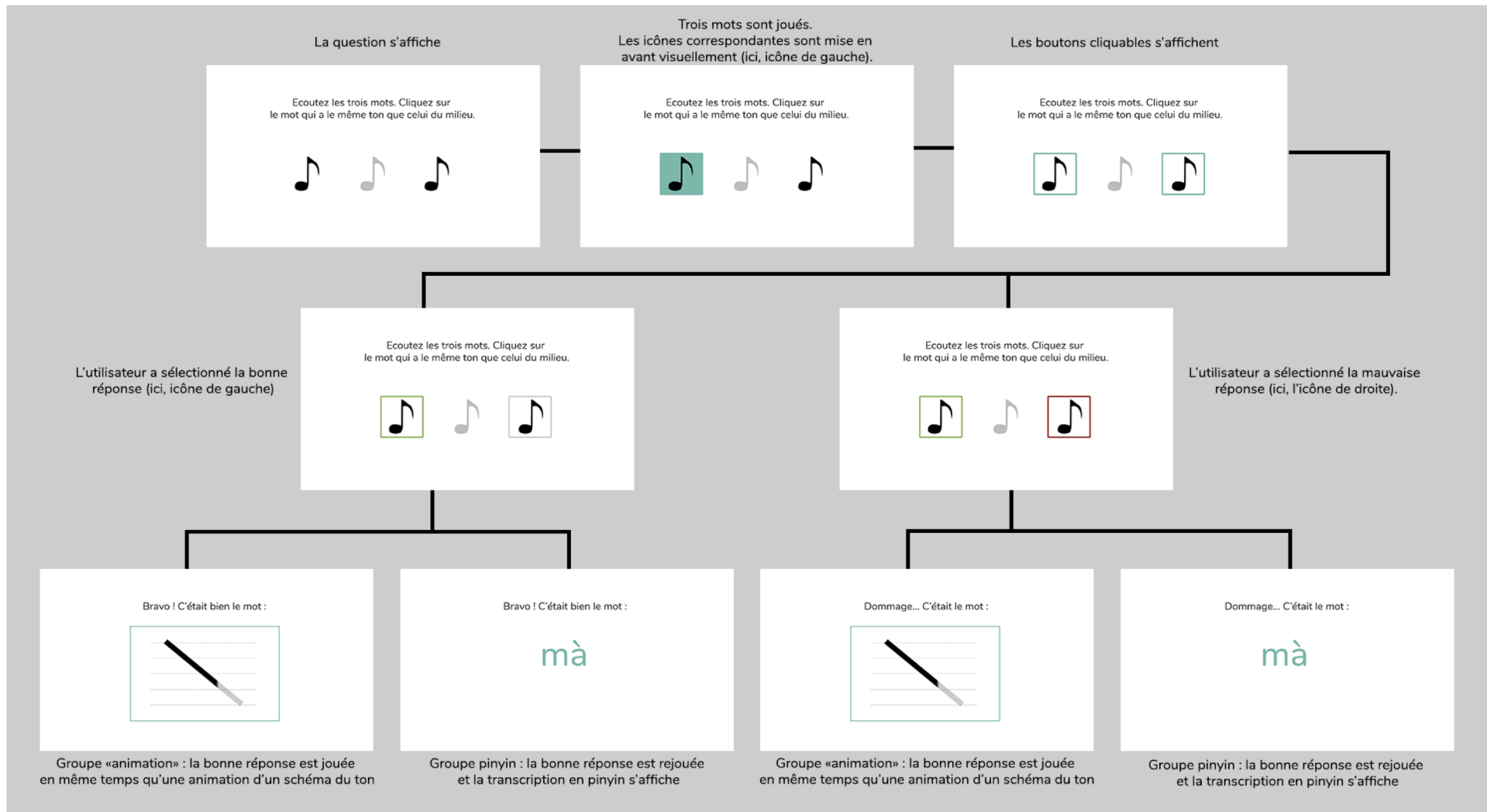
Forced-choice identification task

Items recorded from 4 chinese native speakers (high variability training)

4 syllables (ma, zuo, sheng, fu)

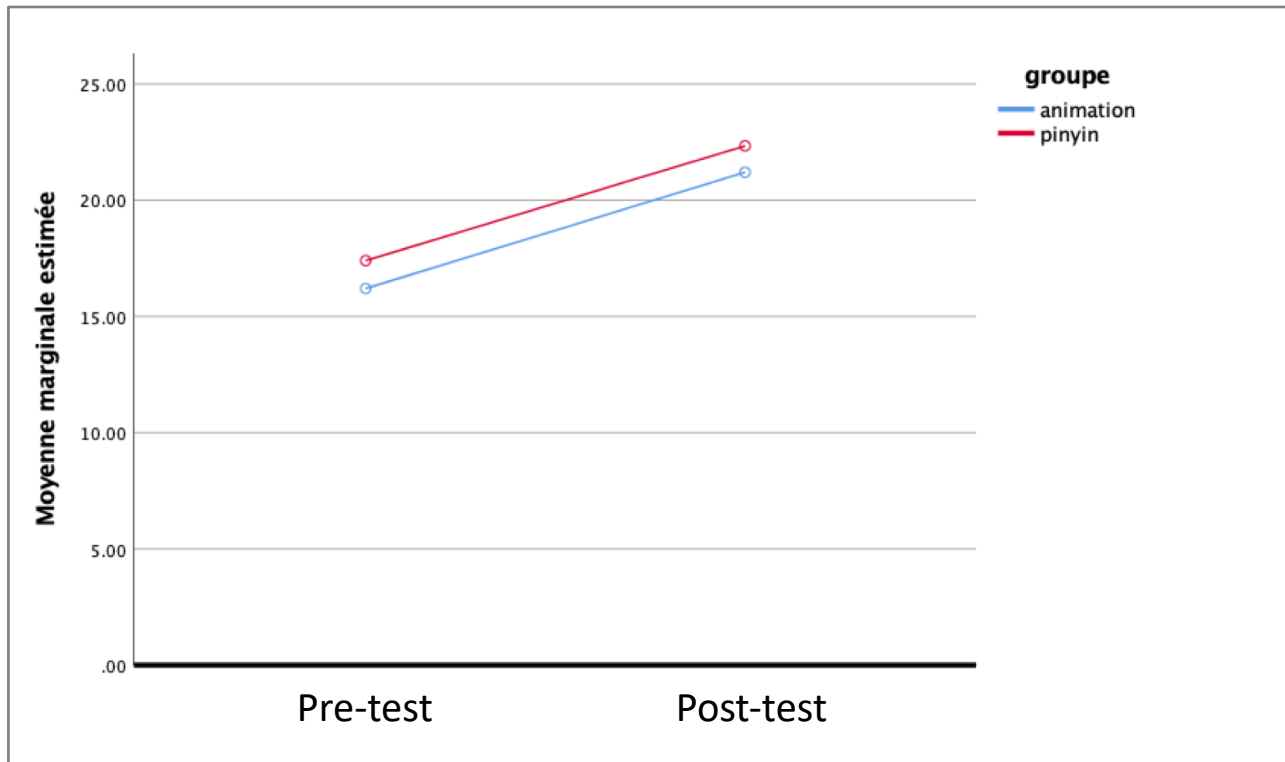
N = 32 items (4 items \* 4 syllables \* 2)





## Results (1) : Effect of type of feedback (animation vs pinyin)

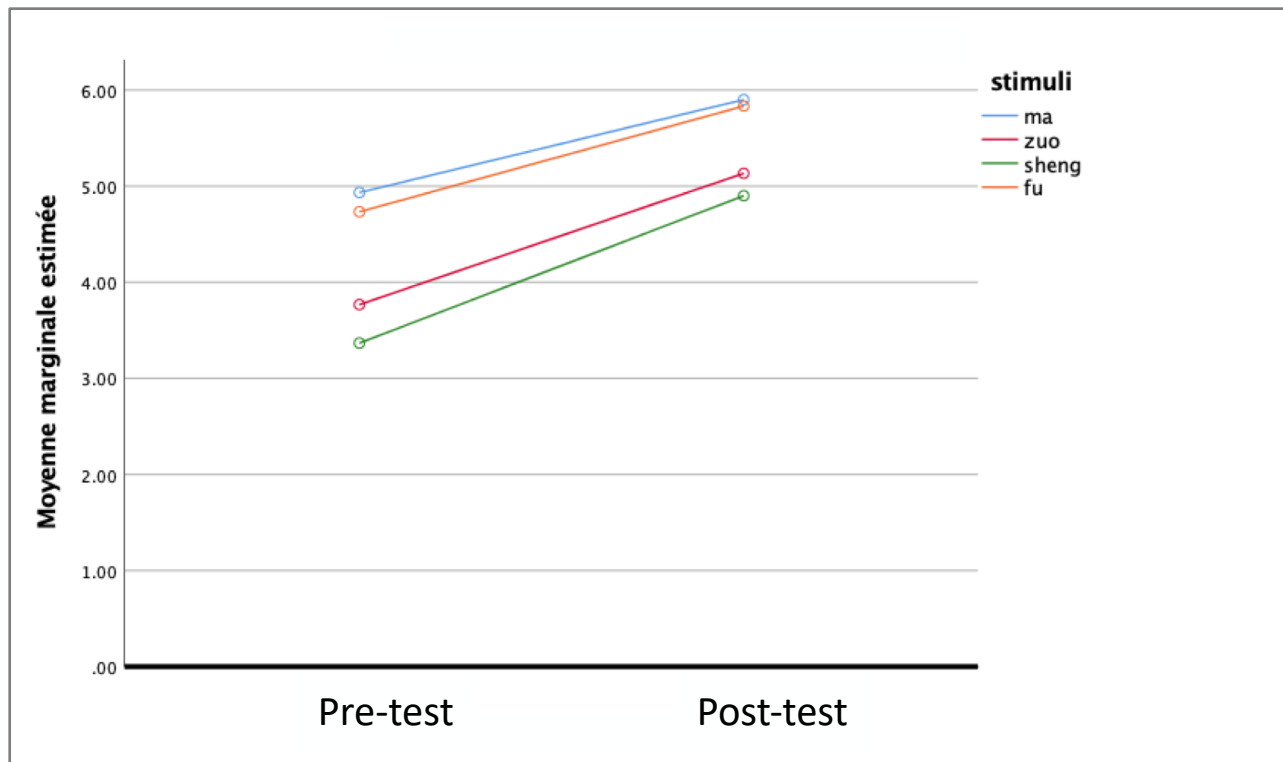
Mean score (max = 32) pre-post test \* group



Testing time:  $F(1,28) = 39.2, p < .0001$   
Group:  $F(1,28) = 0.28, p = .60, NS$   
Interaction:  $F(1,28) = 0.02, NS$

## Results (2) : Effect of type of syllables (ma, fu, zuo, sheng)

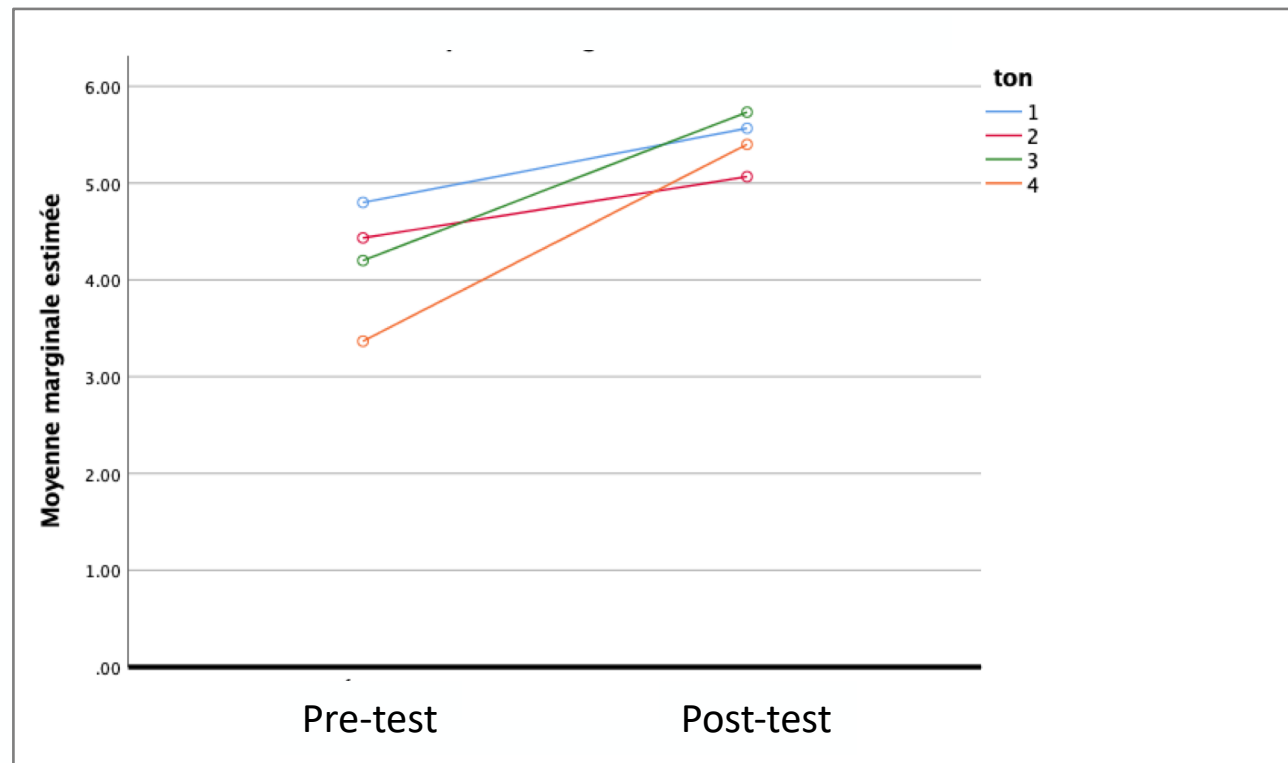
Mean score (max = 32) pre-post test \* syllables



'ma' sig. higher than 'zuo' and 'sheng'  
'fu' sig higher than 'sheng'  
No sig. diff between 'sheng' and 'zuo', nor  
between 'ma' and 'fu'.

## Results (3) : difference between the four tones

Mean score (max = 32) pre-post test \* tones



Tones:  $F(1,28) = 5.616, p < .05$   
Interaction testing time \* tone :  
 $F(1,28) = 10.79, p < .005$

## Results (4) : Learners' experience

Huang (2017) questionnaire, 10 items, 7-point likert scale

	Animation	Pinyin
Interest	5.75	5.86
Effort	6.55	6.57
Difficulty	4	4



# Discussion

## Synthesis

Training works!

- Large improvement at post-test: discriminative training supports better identification (only 48 trials for four tones), even for the fourth most difficult tone.
- Transfer to untrained syllables (fu as good as ma)
- Lower performance for complex syllables
- Learners enjoyed it

No effect of type of feedback

- Pinyin good enough, visualization of the movement does not help memorization and perception.

# Discussion

## Limits and perspectives

Performance at immediate testing, should be tested in delayed testing.

Only single syllables, few locutors.

Only perception and not production.

Lab experiment: would people train that way in real situation?

Good situation for testing repeated microlearning sessions using comprehensive ou design-based approach

Thank you for your attention!