



I. Research Overview and Outcome

Overview

Thanks to technology, our world is becoming a close community where researchers can draw from and contribute to a collective knowledge base. At the root of this global community is communication. The better we can learn how to communicate, the better we can collaborate. Therefore, the tools and resources developed to expedite this process will undoubtedly lay the foundation for stronger international collaborations.

TipTapTones: Aural Training for Language Learners

What A one-minute “micro-game” that runs on learners’ mobile phones and provides an efficient, effective, and enjoyable way to train the brain to identify and differentiate between new phonetic categories.

Why Word perception is very important for learners and perceiving the nuances of tonal languages is very difficult for non-native speakers. The importance of understanding this tonal sound system is highlighted in the example of “ma”, which when spoken in the first thorough fourth tones “mā”, “má”, “mǎ”, and “mà” (as indicated by the diacritic marks), can refer to the words of mother, hemp, horse, and scold. Tones are not the only difficulty, however. Each syllable is segmented into an *initial* consonant sound followed by a *final* sound which can sound very similar to the non trained listener (i.e., chan vs. zhan).

How Microgame - one minute, 3 speeds, 3 levels, match Mandarin sounds with correct tones and syllables

- Level 1 (fig 1b): match Mandarin sound to tone (4 sound tasks, 4 options per task, 3 correct on each to continue).
- Level 2 (fig 1ci): match tone and correct syllable (4 sound tasks, 8 options per task, 3 correct on each to continue).
- Level 3 (fig 1d): match tone and correct syllable (4 sound tasks, 16 options per task, 6 correct to finish game).



Figure 1 TipTapTones : (a) Set speed; (b) zhen screen (followed by zhan, chen, and chan screens); (ci), chan vs. zhan screen with “correct” green flash; (cii) zhen vs. chen screen with “incorrect” red flash; (d) chen vs. chan vs. zhan vs. zhen screen.

Research Questions

1. Can we create a *test* of tone and syllable differentiation on which native speakers easily achieve perfect scores?
2. Does the *game* encourage repeat play and facilitate steady improvement for a range of learner abilities?
3. Does *gameplay* improve *test scores* on the identification of tonal syllables that (a) were trained in the game, and (b) were not trained, indicating phonetic generalization?

Results / Discussion

In a 3-week, 12-user study of this system, we found that an average of 71 minutes gameplay significantly improved tone differentiation, by means of 25% and 24% for sounds trained in the game and not trained in the game respectively. Combined with a significant 12% improvement in the differentiation of trained syllables, and almost perfect native speaker tone and syllable differentiation, we demonstrate support for aural language training .

SpatialEase: Language Learning through Body Motion

What A Kinect game for the embodied learning of language that is grounded in space and motion. In this game, learners respond to audio commands in the second language by moving their bodies in space, while a game mechanic based on distributed cued-recall supports learning over time.

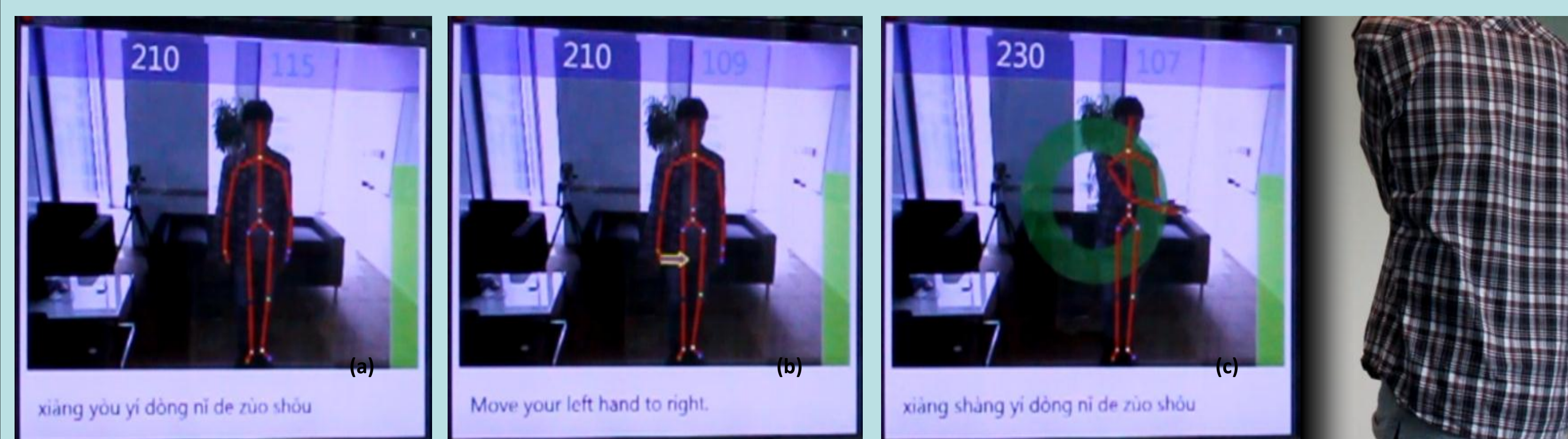


Figure 2. Interactive Flow: (a) SpatialEase issues a command in Chinese; (b) if the user doesn't move or moves incorrectly, arrows are drawn on the video indicating the corresponding action; (c) the user performs the correct action and hear the next command.

Why Learning words in a second language is hard, but mastering grammatical constructions that require a change in native-language thought patterns is even harder. For example, in the case of native English speakers learning Chinese, the command “move your left hand to the right” translates to a word order of “to the right, move you left hand”.

How inspired by the traditional “Simon says” school game and Rosetta Stone’s “puzzle-like” minimally different scenarios (i.e., “This {boy | girl} is {eating | drinking}”). . Our *focus on form* adaptation encourages a beneficial shift from semantic to syntactic processing.

- Level 1, Chinese commands follow the pattern “move your {left | right | pair} {hand | foot | head | body}”, giving 9 words and 7 meaningful constructions.
- Level 2, Chinese commands follow the pattern “towards {up | down | left | right | front | back} move your {left | right} {hand | foot | body}”, giving 7 new words and 24 meaningful constructions.

Research Questions

- 1.How do *inference-based* approaches (both Rosetta Stone and SpatialEase) compare with *instruction-based* approaches (e.g., textbooks, podcasts, flashcards)?
- 2.How does the *picture-based* learning of Rosetta Stone compare with the *body-based* learning of SpatialEase?
- 3.How does the *lesson-based* learning of Rosetta Stone compare with the *game-based* learning of SpatialEase?
- 4.How can the embodied learning of SpatialEase generalize beyond the language of body movement?

Results / Discussion Overall, we had 8 individuals participate in a 2 hour study and found measurable single-session learning gains from our novel SpatialEase game that were comparable to the gains from using Rosetta Stone, with average vocabulary improvements of 6.4 items for SpatialEase and 5.6 for Rosetta Stone, and average grammar improvements of 7.6 and 8.5 respectively. Additionally, it was reported that the inference based learning model was not “boring”.

II. International Experience



Working in the Cloud



Hold Tight



Hold Tighter



Yangshou, China

III. Collaborative Growth

Currently, I am interested in the dynamics of interaction amongst collaborative communities and my research this summer examined and developed various means to better facilitate said interaction. It would have been almost impossible to further this research agenda had I not worked with researchers in China. I expect to continue this relationship for many years as they helped me grow personally and professionally.

IIII. Acknowledgement

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