九龍醫院
KOWLOON HOSPITAL

職業治療部
OCCUPATIONAL THERAPY

Application of Instrumental Virtual Reality Training (eIVR) in Cognitive Rehabilitation for People with Brain Injury

Prepare by Marko Chan (OT, Kowloon Hospital)


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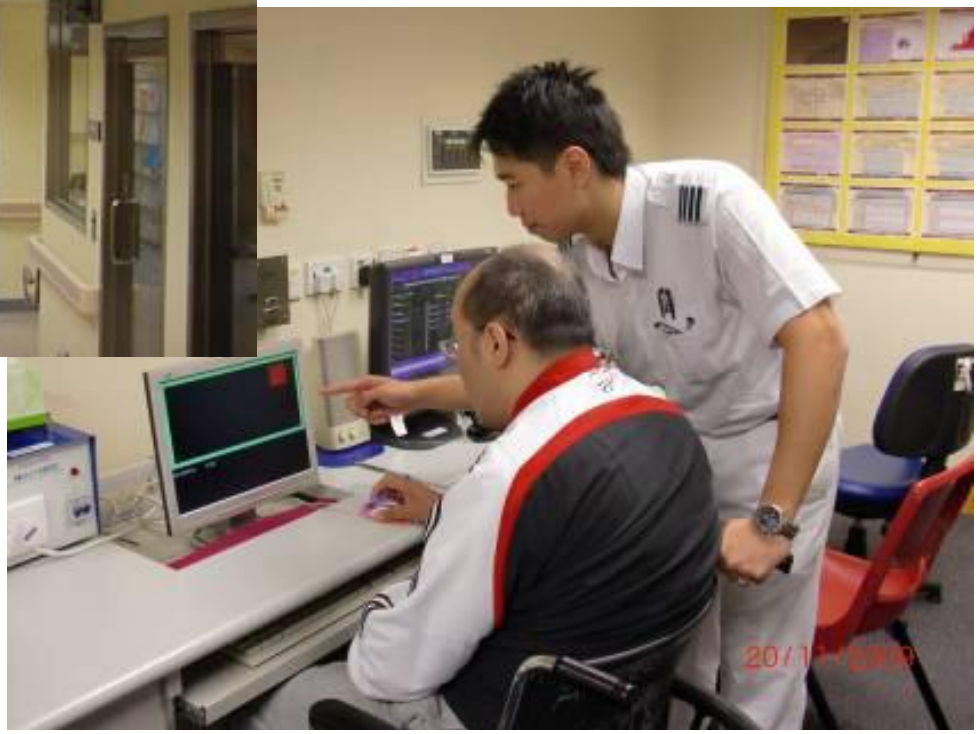
Rehabilitation Day Hospital



Application of VR for MCI and dementia

- The Virtual Action Planning Supermarket (VAP-S) is a viable tool for assessing EF deficits among elderly persons with MCI, in a context to their real-life shopping ability. **(Werner et al., 2009)**

Application of VR for learning disabilities

A screen-based virtual kitchen was used to train 24 catering students with learning disabilities on fish, meat, fruit, and vegetable preparation tasks, hazard recognition, and fire drills.

Virtual training was found to be as beneficial as real training and more beneficial than workbook training in food preparation.

Training on hazard detection in the virtual kitchen was not more benefited than workbook training.

Learning procedural steps more benefited. (Brooks et al., 2002)

Development of VR in HK

Brain Injury, December 2009; 23(13–14): 1017–1026

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Virtual reality (VR)-based community living skills training for people with acquired brain injury: A pilot study

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(Received 4 January 2009; revised 3 September 2009; accepted 29 September 2009)

Abstract
Primary objective: The purpose of the present study was to test the usability and effectiveness of a newly-de
reality (VR)-based community living skills training program for people with acquired brain injury (ABI).

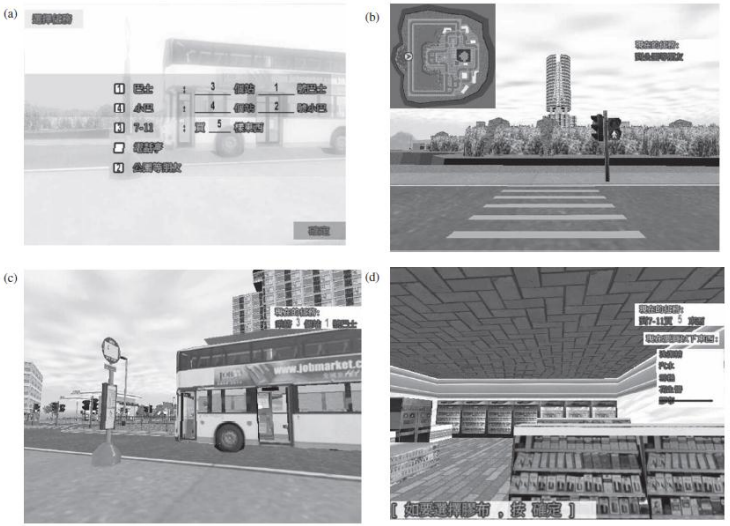

Figure 1. Screenshots of training program content. (a) Training menu (e.g. setting the number of stops before alighting from the bus, number of items to be bought in a convenience shop, place to meet a friend, etc.). (b) Using road crossing facilities (with vehicles moving in both directions and the proper of use of the zebra crossing according to traffic light signals). (c) Travelling by bus (getting to the right bus

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Virtual reality-based prospective memory training program for people with acquired brain injury

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Abstract. Acquired brain injuries (ABI) may display cognitive impairments and lead to long-term disabilities including prospective

Development of computer training in HK

Clinical Interventions in Aging

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ORIGINAL RESEARCH

Evaluation of a computer-assisted errorless learning-based memory training program for patients with early Alzheimer's disease in Hong Kong: a pilot study

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Background: Improving the situation in older adults with cognitive decline and evidence of cognitive rehabilitation is considered crucial in long-term care of the elderly. The objective of this study was to implement a computerized errorless learning-based memory training program (CELP) for persons with early Alzheimer's disease, and to compare the training outcomes of a CELP group with those of a therapist-led errorless learning program (TELP) group and a waiting-list control group.

Methods: A randomized controlled trial with a single-blind research design was used in the study. Chinese patients with early Alzheimer's disease screened by the Clinical Dementia Rating (score of 1) were recruited. The subjects were randomly assigned to CELP (n = 6), TELP (n = 6), and waiting-list control (n = 7) groups. Evaluation of subjects before and after testing.

Figure 1 Examples of training scenarios. (**A**) Prospective memory and dual task training: prospective memory task, such as "switch off the stove after five minutes" while buying vegetables. (**B**) Face-name recognition training, combined with mnemonic memory strategies of association and spaced retrieval technique: selection photograph of same patient

Introduction of VR IADL software

- **Advantage of VR IADL (Flanagan et al, 2008):**
- Bridge the gap between measurement tools and ability to function in natural environments.
- Provide a consistent environment of the same assessment or training task and provide various feedback (Schultheis et al, 2002).
- Safe setting to assess skills that might be too risky in the real world
- Fear of the reaction of others to faulty attempts in a natural environment are minimized.
- Can make mistakes without aversive consequences (Standen and Brown, 2005).

Generalization

Very similar

Somewhat similar

Different

Difference between virtual reality training and games

- Report accuracy and reaction time
- Simulated steps of real tasks
- Systematic cues and errorless learning
- Adjustable difficulty and speed

VS

Introduction of VR IADL software (eIVR)

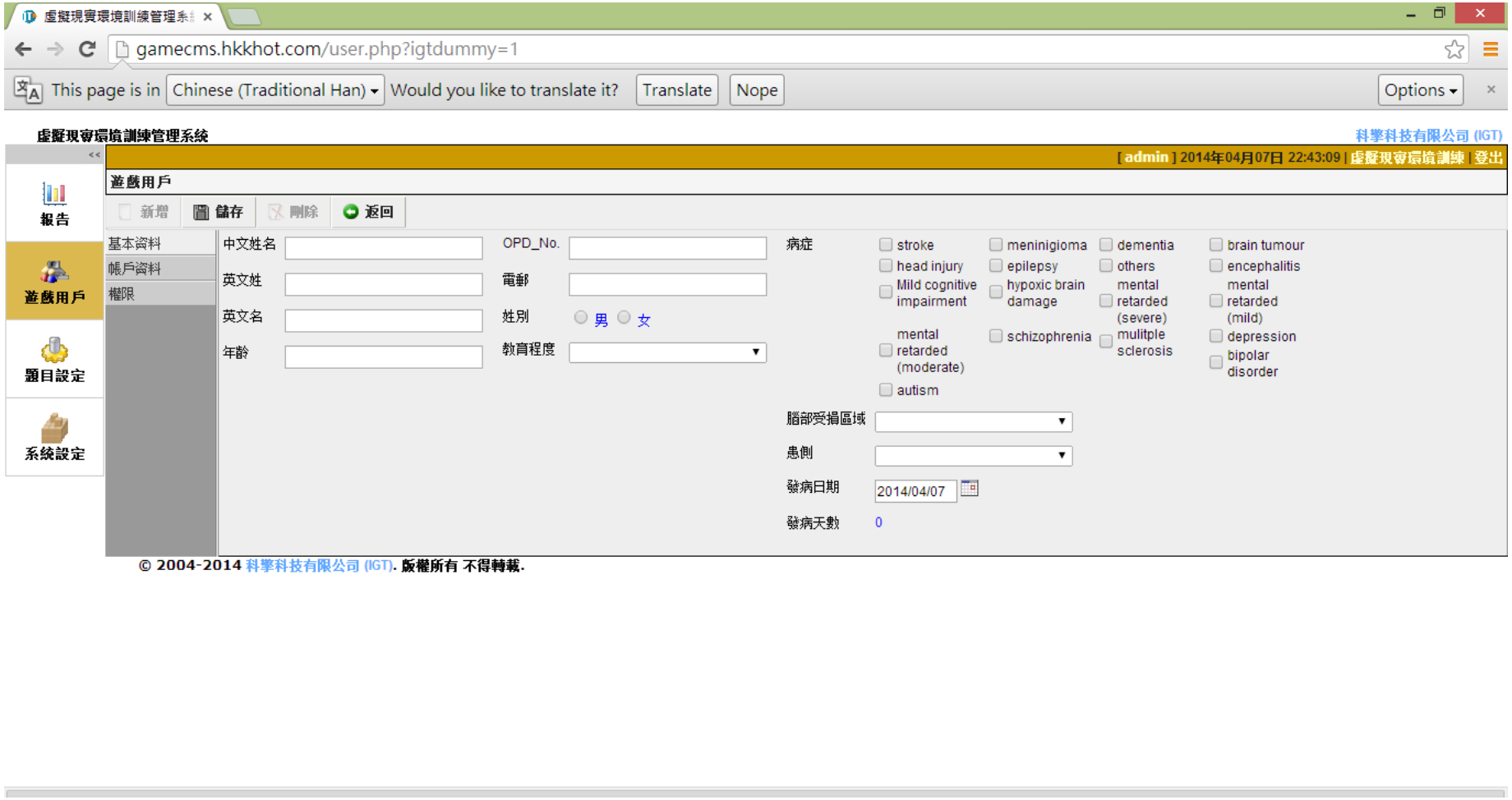
- Develop by local Occupational Therapists since 2005, consist of training and assessment modules.
- 2D, non-immersive design
- Reasons: learning steps, no cyber-sickness
- 5 modules:
  - ATM
  - MTR
  - Shopping
  - Cooking
  - Road safety
- 3 difficulty levels

Introduction of VR IADL software (eIVR)

- Errorless training approach
- 6 score level (score 1-6) (Zhang et al., 2003)
  - No cue
  - Text cue
  - Highlighting/ Flash cue
  - Verbal cue
  - Arrow cue
  - Skip
- Assessment / Training

Video demonstration

Database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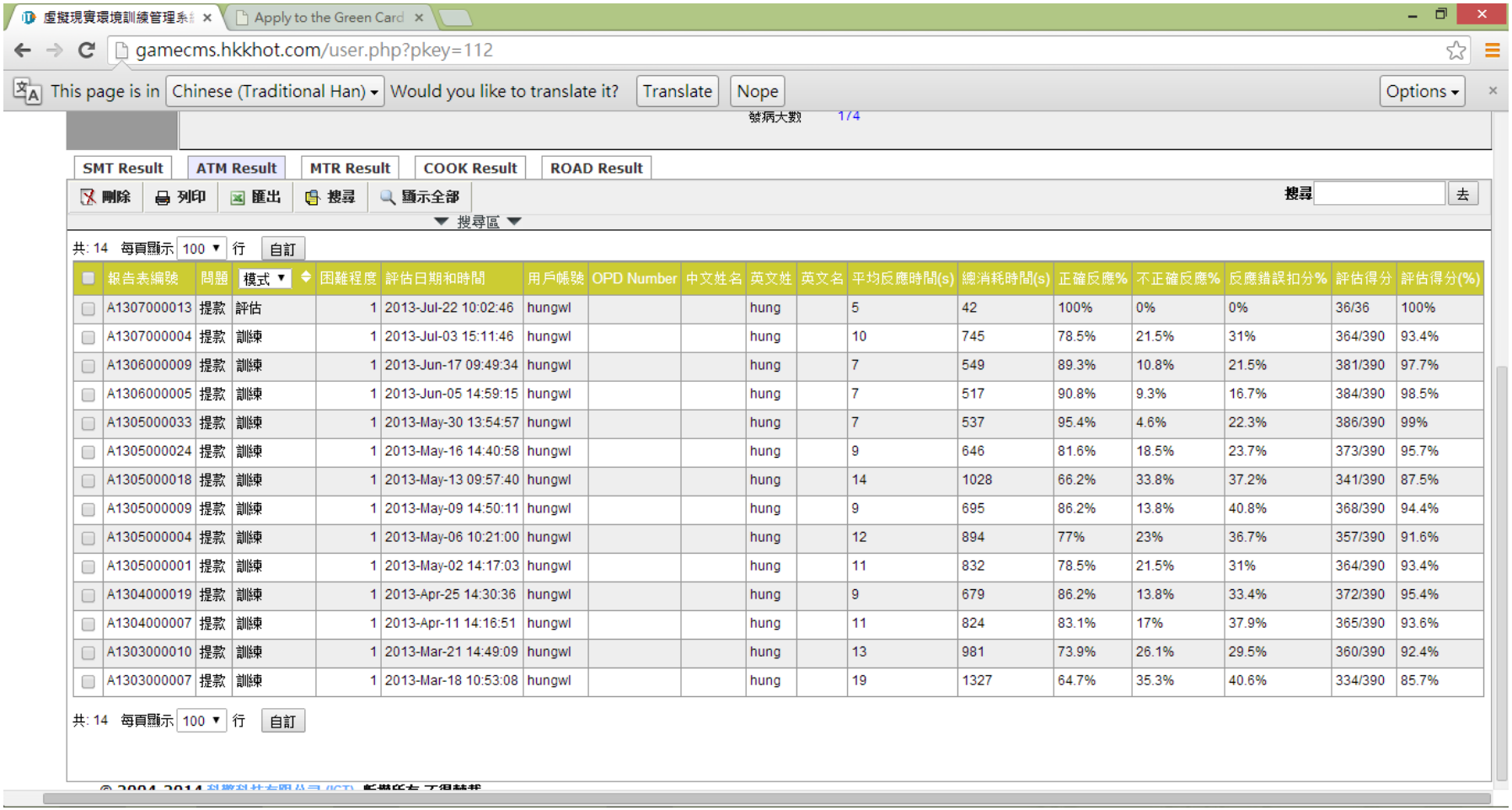

報告表編號	問題	模式	困難程度	評估日期和時間	用戶帳號	OPD Number	中文姓名	英文姓	英文名	平均反應時間(s)	總消耗時間(s)	正確反應%	不正確反應%	反應錯誤扣分%	評估得分	評估得分(%)
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Fong et al. Journal of NeuroEngineering and Rehabilitation 2010, 7:19
http://www.jneuroengrehab.com/content/7/1/19

JNER JOURNAL OF NEUROENGINEERING AND REHABILITATION

RESEARCH Open Access

Usability of a virtual reality environment simulating an automated teller machine for assessing and training persons with acquired brain injury

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Abstract

Objective: This study aimed to examine the usability of a newly designed virtual reality (VR) environment simulating the operation of an automated teller machine (ATM) for assessment and training.

Design: Part I involved evaluation of the sensitivity and specificity of a non-immersive VR program simulating an ATM (VR-ATM). Part II consisted of a clinical trial providing baseline and post-intervention outcome assessments.

Setting: A rehabilitation hospital and university-based teaching facilities were used as the setting.

Participants: A total of 24 persons in the community with acquired brain injury (ABI) - 14 in Part I and 10 in Part II - made up the participants in the study.

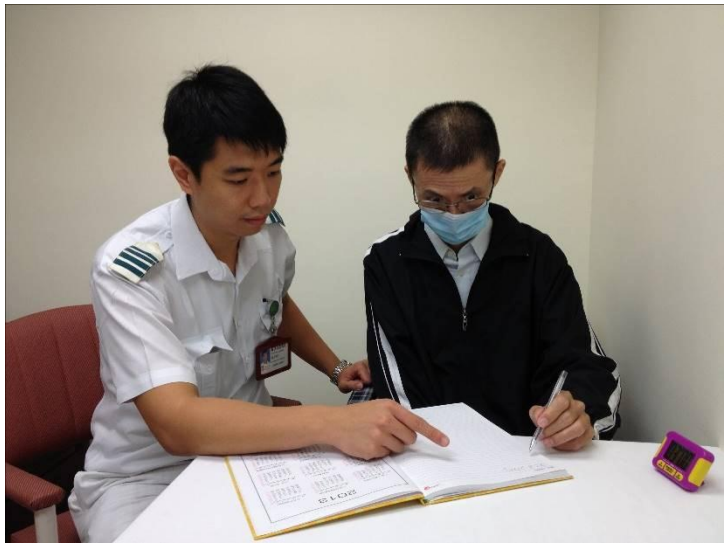
Interventions: In Part I, participants were randomized to receive instruction in either an "early" or a "late" VR-ATM program and were assessed using both the VR program and a real ATM. In Part II, participants were assigned in matched pairs to either VR training or computer-assisted instruction (CAI) teaching programs for six 1-hour sessions over a three-week period.

Study: Part I

- To investigate the validity of VR(ATM) as assessment tools
- The assessment will simply have a dichotomous result: failure or success in ATM using.
- ability of VR(ATM) to assess accurately whether the individuals will be fail or succeed while using real ATM

Part II

- to compare the effectiveness of VR(ATM) and conventional cognitive training in training up clients with ABI
- Both program consisted of six 1-hour sessions
- Content: basic ATM skills in cash withdrawal and funds transfer



Result

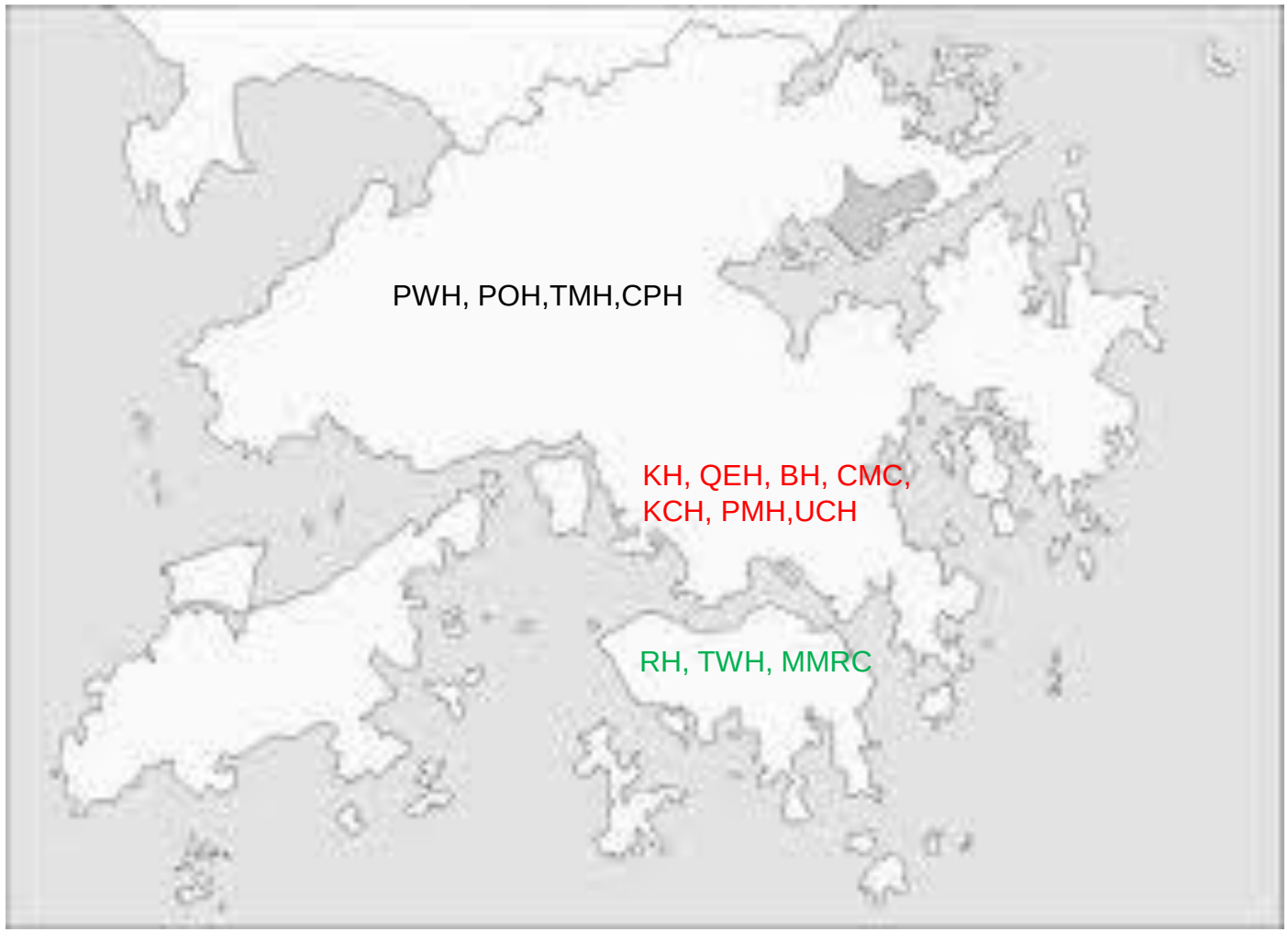
- Correlation between VR ATM and real ATM. ⟹ Significant for both cash withdraw and transfer (p=.001)
- VR(ATM) was found to be more effective than CAI training in funds transfer than case withdrawal.
- equally easy for the subjects to learn simple task.

Cost effectiveness= save 4-5 therapist interaction hours

Pilot result profile of different disease group in cooking task (making coffee)

Diagnosis	Avg Reaction time	Avg. Errors
MCI	41 seconds	2
Head Injury	25 seconds	0
Stroke	30 seconds	0
Meningioma	25 seconds	0

Active User list (n=16)



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Future development plan

- Construct result profile of different disease groups (Dementia, MCI)
- Develop new VR programme which may not be easy to carry out in real situation (escalator, crossing the road)

Bring home messages

- Design of VR should base on treatment aims (learning steps or highly interactive)
- VR could be ecologically valid assessment as well as treatment
- Generalization process is important to carry out treatment effect to daily life

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- Dr. Kenneth Fong (HK PolyU)
- All OTs using the system

Q & A