

# Cultural adaptation of the Virtual Reality Functional Capacity Assessment Tool (VRFCAT) for use in the UK and Canada

Alexandra S. Atkins<sup>1</sup>, Brian K. Saxby<sup>1,2</sup>, Sarah Ellen Kelly<sup>1</sup>, Maren Hamby<sup>1</sup>, Pierre Roux<sup>1</sup>, Michael Gonzalez<sup>1</sup>, Jonathan Madden<sup>1</sup>, Mirko Stankovic<sup>1</sup>, Richard S.E. Keefe<sup>1,3</sup>

<sup>1</sup>NeuroCog Trials, Durham, NC; <sup>2</sup>Institute of Health & Society, Newcastle University, UK; <sup>3</sup>Duke University Medical Center, Durham, NC

Email: brian.saxby@neurocogtrials.com www.neurocogtrials.com



## INTRODUCTION

**Methodological Question:** Cross-cultural adaptation of performance-based outcome assessments

- Cultural adaptation of performance-based outcomes can improve the quality of these assessments by ensuring tasks, stimuli and instructions are understood and appropriate for use in populations of interest.
- Use of culturally appropriate materials is especially important for tests of functional capacity, which assess an individual's potential to function in culturally specific real world environments.
- We describe cultural adaptation of the Virtual Reality Functional Capacity Assessment Tool (VRFCAT), a computer-based assessment of functional capacity originally developed for the U.S.

### Virtual Reality Functional Capacity Assessment (VRFCAT)

- Using a realistic virtual reality environment, the VRFCAT assesses a subject's ability to complete instrumental activities associated with a shopping trip, including searching the pantry at home, making a list, taking the correct bus, shopping in a store, paying for the purchases, and returning home.
- In previous studies, the VRFCAT has demonstrated high test-retest reliability and has shown sensitivity to functional impairment (Keefe et al., 2016).



- Searching the pantry
- Shopping in a store
- Making a list
- Taking the correct bus
- Paying for the purchases
- Getting home

Scene	VRFCAT Objective	Cognitive Domain
Apartment	1. Pick up the recipe on the counter	Visuospatial ability
	2. Search for ingredients in your cabinets and refrigerator	Visuospatial ability Executive Functioning
	3. Access recipe and cross off the ingredients	Verbal and Visual Memory, Working Memory
	4. Pick up the billfold on the counter	Visuospatial ability
	5. Exit the apartment and head to the bus stop (Game Element)	
Bus to Store	6. Wait for the correct bus to the grocery store and then board it when it arrives.	Attention, Verbal Memory, Executive Functioning
	7. Add up the exact amount of bus fare in your hand and pay for the bus	Working Memory
Store	8. Select a food aisle to begin shopping	Executive Functioning
	9. Continue shopping for the necessary food ingredients, and when finished check out	Attention, Visuospatial ability, Visual Memory, Verbal Memory, Executive Functioning
	10. Add up the exact amount for your purchase and pay for groceries	Working Memory
Bus to Apartment	11. Wait for the correct bus to your apartment and then board it when it arrives	Attention, Verbal Memory, Executive Functioning
	12. Add up the exact amount of bus fare in your hand and pay for the bus	Working Memory

## METHOD

Methods for cultural adaptation of the VRFCAT was based on recommendations of the International Society for Pharmacoeconomics and Outcomes Research (ISPOR; Wild et al., 2005, 2009), and included the following:

Stage	Critical Components
Preparation	<ul style="list-style-type: none"> <li>Development of detailed concept sheets for all text seen and heard during the assessment, as well as visual stimuli and task icons, including food ingredients, currency and items present in the task background.</li> <li>Due to significant cultural differences in living quarters, bus stops and grocery stores, screen shots of each VRFCAT scene were prepared for distribution with concept sheets.</li> </ul>
Translation/Adaptation	<ul style="list-style-type: none"> <li>Cultural adaptation was completed independently by two cultural experts using concept sheets, screen shots and additional task materials.</li> <li>Discrepancies between cultural experts were reconciled through discussion and ultimate consensus amongst reviewers.</li> <li>Culturally specific graphic and audio content was created, including graphic design of virtual environments, objects and icons, and professional recording of audio content (UK only)</li> </ul>
Finalization	<ul style="list-style-type: none"> <li>Final review and approval of adapted test versions by cultural reviewers and in-house content experts.</li> <li>Certificate generation for each culturally adapted version.</li> <li>Formal computer system validation of each culturally adapted version</li> </ul>

Table 1. Procedures for cultural adaptation

## RESULTS

- Culturally adapted test versions were created based on thorough review of feedback received from in-country cultural reviewers.
- Adaptation for UK required changes to spoken narrative to account for differences in US and UK English: e.g., apartment > flat, schedule > time table, counter > worktop
- Adaptation of content and graphic design was required for both regions - currency, pricing, bus design.
- Adaptation for the UK version required significantly more customization, including customized voice over.
- Changes in food items and recipes were required to account for differences in item frequency and familiarity across English-speaking cultures.

Figure 1. Localization of Currency

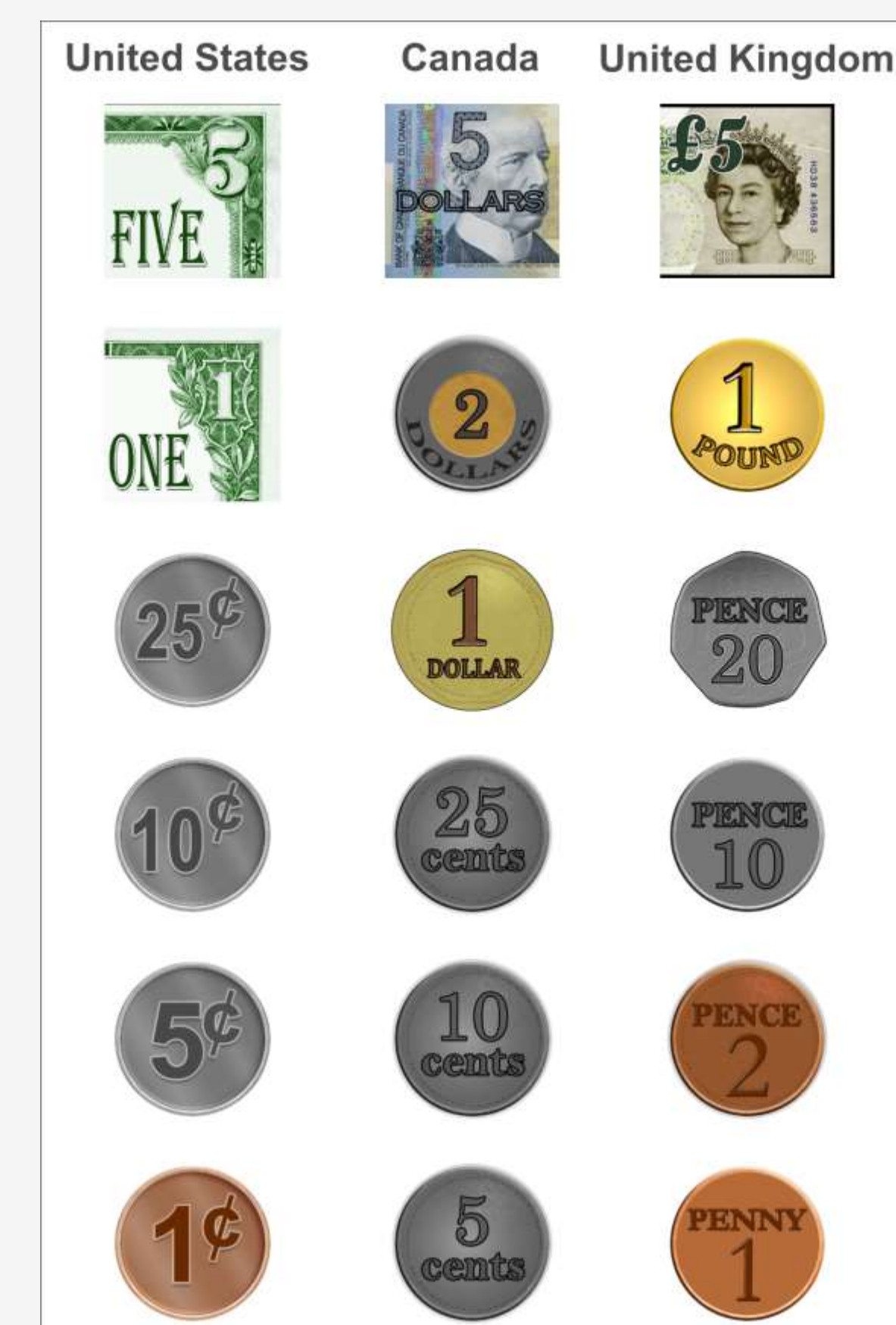


Table 2. Localization of Recipes\*

U.S. & Canada	U.K.
Lasagna	Lasagne
Beef Tacos	Beef Tacos
Supreme Pizza	Meat Feast Pizza
Chicken Salad	Chicken Tikka
Hamburger w/ Fries	Burger and Chips
Chicken Pot Pie	Cottage Pie
House Salad	Chicken Salad

\* For each UK recipe, adaptation was required for specific ingredients and measurements.

## RESULTS (cont.)

### VRFCAT Screenshots

#### United States



Kitchen: Refrigerator size reduced (UK)



Bus stop: Bus stop moved to other side of street; Localization of bus design, street signs, background cars, street names

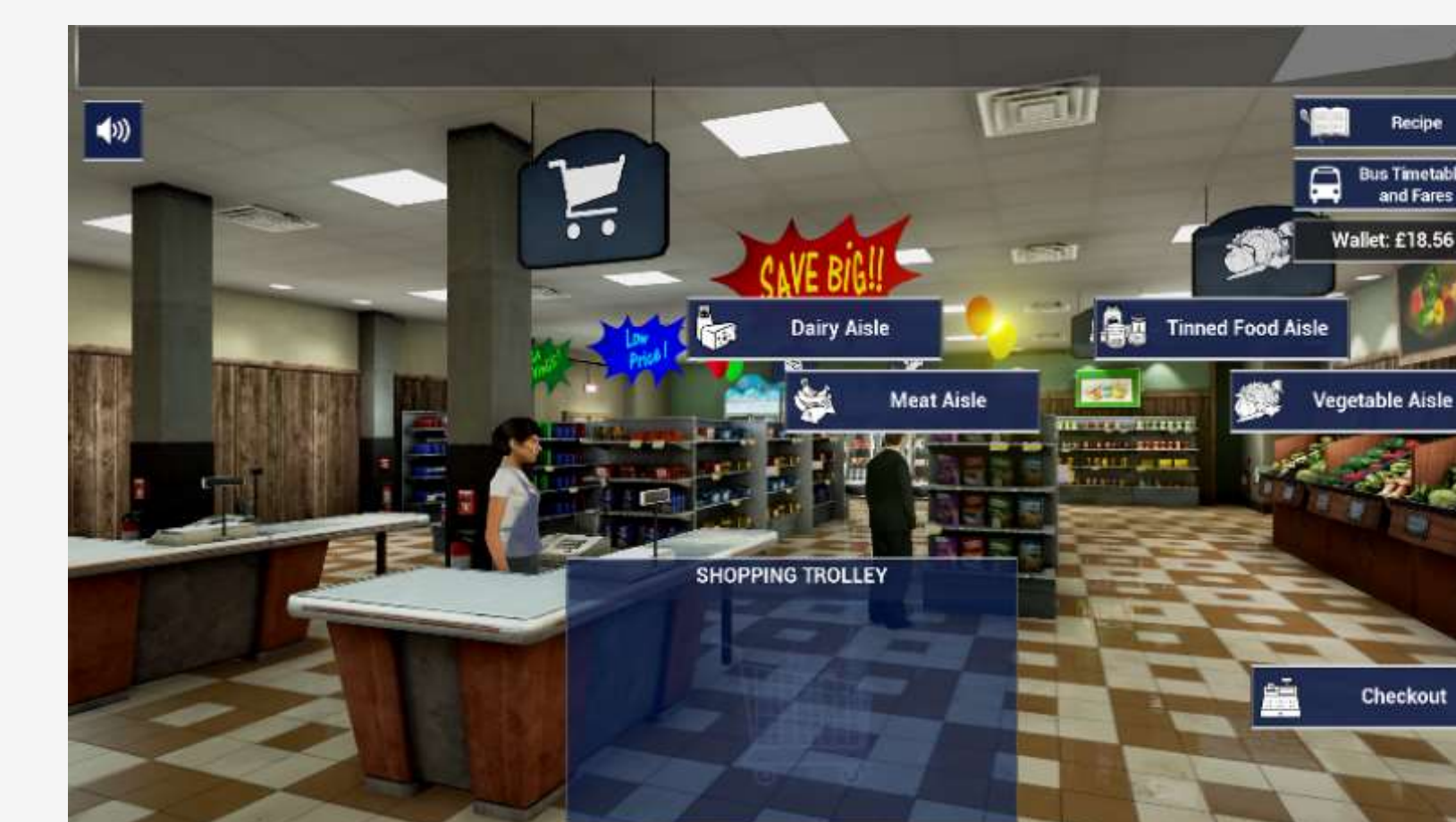


Grocery Store: Localization of aisle names, pricing and specific products as needed.



Recipes: Each recipe was localized for the UK

#### United Kingdom



## CONCLUSIONS

- Cross-cultural adaptation of a realistic computer-based assessment of functional capacity revealed significant cultural variations across English-speaking cultures,
- This process highlighted the importance of appropriate adaptation of functional assessments used in multinational trials.

### REFERENCES

Keefe et al. (2016). *Schizophrenia Research* 175, 90–96; Wild D et al. (2005). *Value in Health*, 8(2):94–104; Wild D et al. *Value in Health*, 12(4):430–440.

### DISCLOSURES

A.S. Atkins, B.K. Saxby, S.E. Kelly, M. Hamby, P. Roux, M. Gonzalez, J. Madden & M. Stankovic are employees of NeuroCog Trials. R.S.E. Keefe currently or in the past 3 years has received investigator-initiated research funding support from the Department of Veterans Affairs, Feinstein Institute for Medical Research, National Institute of Mental Health, Psychogenics, Research Foundation for Mental Hygiene, Inc., and the Singapore National Medical Research Council. He currently or in the past 3 years has received honoraria, served as a consultant, or advisory board member for AbbVie, ACADIA, Akebia, Astellas, Asubio, Avanir, Avinuro/ChemRx, Biogen Idec, BiolineRx, Biomarin, Boehringer Ingelheim, Envivo/FORUM, GW Pharmaceuticals, Janssen, Johnson & Johnson, Lundbeck, Merck, Minerva Neurosciences, Inc., Mitsubishi, Neuralstem, Neuronic, Novartis, NY State Office of Mental Health, Otsuka, Pfizer, Reviva, Roche, Sanofi/Aventis, Shire, Sunovion, Takeda, Targacept, and the University of Texas South West Medical Center. Dr. Keefe receives royalties from the BACS testing battery and the MATRICS Battery (BACS Symbol Coding). He is also a shareholder in NeuroCog Trials and Sengenix.