A Narrative-based Virtual Environment as a Research Tool

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Introduction

The overall goal is to develop an instrument that measures aspects of navigational map use. We explore the possibility of using desktop virtual environments (VE) to simulate field studies in a more controlled setting (the lab).

Research Questions: Professor Amy Lobben has led a set of field studies to explore pedestrian navigational use of tactile-maps with the visually impaired population, in downtown Eugene, OR. In conducting these studies, we noted logistical *difficulties* in recruiting subjects and getting them to the field site, while experiencing *success* of controlled desktop spatial tests at the center. This leads to our research questions:

- ❏ Can we replace field studies with simulation by using a desktop VE?
- ❏ Can *narrative* virtual reality (VR), instead of low-level sensory VR, work for the purpose?

A subject is studying the tactile map in Professor Amy Lobben's field studies.

Building Virtual Reality: Two Alternatives

Alt 1 : Low-level Sensory Simulations
Attempt to simulate:
- ❏ Audio (Sanchez *et al*, 2009)
- ❏ Haptics (Lahav *et al*, 2008)
- ❏ Smell
- ❏ Environment

Lahav O., Schloerb D., Kumar S. & Srinivasan M. A. (2008), "BlindAid: A virtual exploration tool for people who are blind", 13th Annual CyberTherapy Conference 2008.
Sanchez, J., Tadres, A., Pascual-Leone, A., Merabet, L. (2009), "Blind children navigation through gaming and associated brain plasticity", Virtual Rehabilitation 2009.

Phantom: a haptic device for low-level sensory VR.

Alt 2: **Narrative Virtual-Reality**
Text-based virtual environments


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YOU ARE STANDING AT THE END OF A ROAD BEFORE A SMALL BRICK
BUILDING . AROUND YOU IS A FOREST. A SMALL
STREAM FLOWS OUT OF THE BUILDING AND DOWN A GULLY.

GO IN
YOU ARE INSIDE A BUILDING, A WELL HOUSE FOR A LARGE SPRING.

THERE ARE SOME KEYS ON THE GROUND HERE.

THERE IS A SHINY BRASS LAMP NEARBY.

THERE IS FOOD HERE.

THERE IS A BOTTLE OF WATER HERE.
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Adventure Game as an example of narrative VR.

## Can a Narrative VR Simulate Field Tests?

Currently building the first version of narrative VR:
- ❏ Subjects have a tactile map that is a duplicate of that used in Professor Lobben's field studies.
- ❏ Subjects have a set of actions they can perform.
- ❏ Researcher/computer provides the travel narrative.

Building A Narrative Virtual Environment

Two Big Questions:
- ❏ What can be included in the narrative?
  Two blind subjects asked to talk out-aloud when navigating in the field study area.
  What they reported sensing:
  - ❖ Audio (e.g., traffic, buildings, trees/bushes, poles)
  - ❖ Haptics (e.g., vibration, textures)
  - ❖ Smell (e.g., restaurants)
  - ❖ Environment (e.g., wind, sun, shadow)
- ❏ What actions can subjects carry out?
  Pilot testing is next on the agenda. The alternatives are:
  - ❖ Gross, e.g., "walk 3 blocks"
  - ❖ Micro, e.g., "walk 10 yards"
  - ❖ Macro, e.g., "walk 1 block" (current choice)
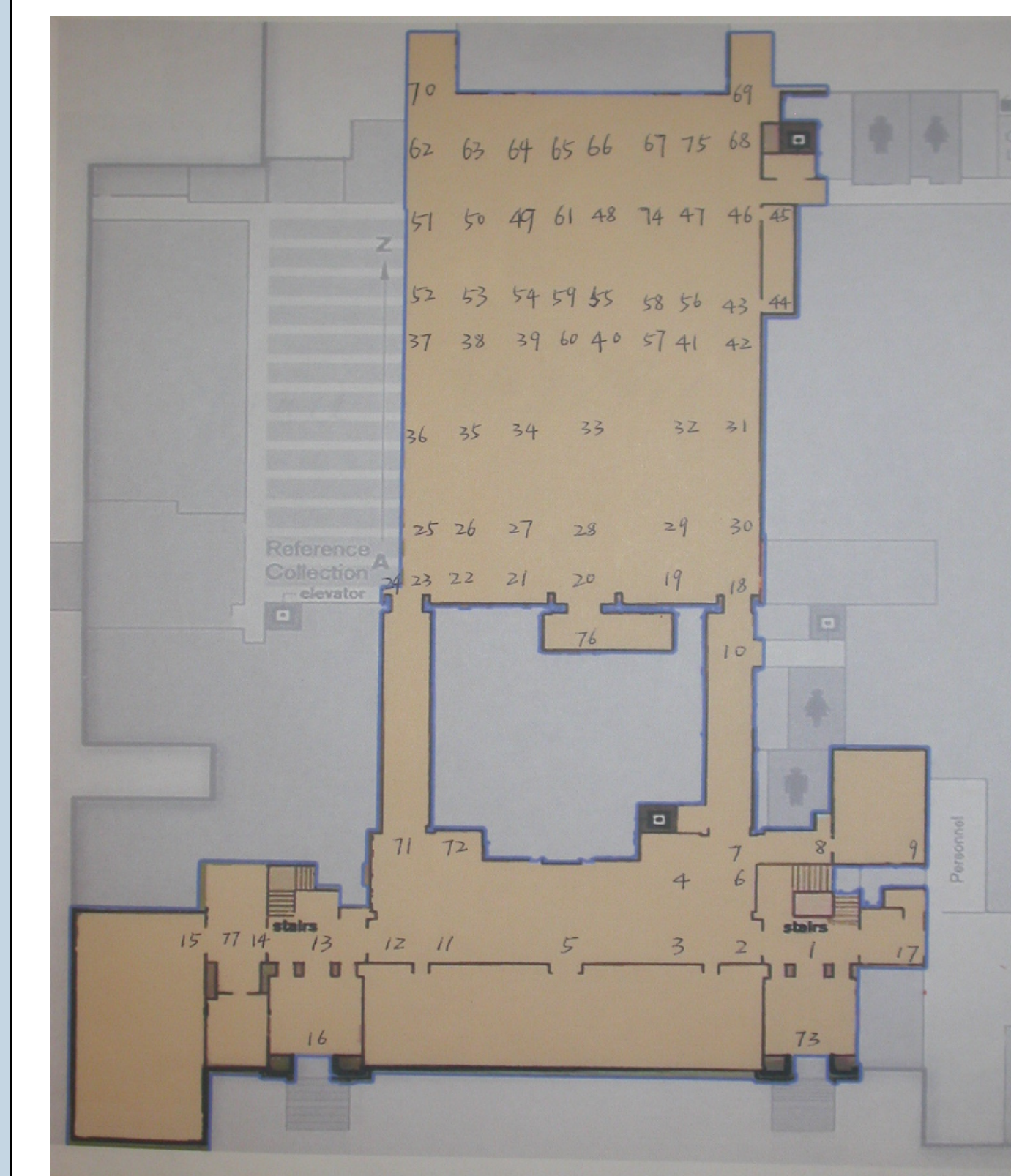
The area of the VE study for the sighted (the first floor at the Knight Library). Numbers are choice points.

Transfer of Knowledge from a Previous Study

Macro-actions worked effectively in a previous VE study with the sighted.

Results in summary (report in preparation):
- ❏ 2 groups of sighted subjects, 15 each.
- ❏ One group navigates in physical library and one group in VR depiction of the area, both for 10 minutes.
- ❏ Both groups given identical tests on cognitive mapping of the navigated area afterwards.
- ❏ VR group performed similarly with physical one.
- ❏ Good performers in both groups showed similar navigation strategies.

Interface of the VE study for the sighted. At each choice point, users see pictures in the current orientation, and move/turn using buttons.