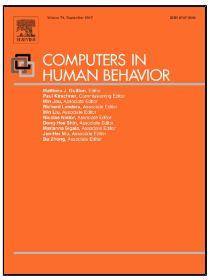
Accepted Manuscript



Differences between blind people's cognitive maps after proximity and distant exploration of virtual environments

Antonio Cobo, Nancy E. Guerrón, Carlos Martín, Francisco del Pozo, José Javier Serrano

PII:	S0747-5632(17)30533-2
DOI:	10.1016/j.chb.2017.09.007
Reference:	CHB 5152
To appear in:	*Computers in Human Behavior*
Received Date:	29 March 2017
Revised Date:	28 July 2017
Accepted Date:	07 September 2017

Please cite this article as: Antonio Cobo, Nancy E. Guerrón, Carlos Martín, Francisco del Pozo, José Javier Serrano, Differences between blind people's cognitive maps after proximity and distant exploration of virtual environments, *Computers in Human Behavior* (2017), doi: 10.1016/j.chb.2017.09.007

Differences between blind people's cognitive maps after proximity and distant exploration of virtual environments

Antonio Cobo[b,a], Nancy E. Guerrón[a,c], Carlos Martín[a], Francisco del Pozo[a,b], José Javier Serrano[a,b]

[a]Centre for Biomedical Technology (CTB), Technical University of Madrid (UPM), Autopista M-40, km 38, 28223 Pozuelo de Alarcón, Madrid, Spain

[b]Centro de Investigación Biomédica en Red en Bioingeniería, Biomateriales y Nanomedicina, (CIBER-BBN), Av. Monforte de Lemos, 3-5. Pabellón 11. Planta 0 28029 Madrid, Spain

[c]Universidad de las Fuerzas Armadas ESPE, 170501, Av. Gral. Rumiñahui, Sangolquí, Ecuador

{antonio.cobo, josejavier.serrano, nancy.guerron, francisco.delpozo}@ctb.upm.es
carlos.martin.lucendo@gmail.com

Abstract

Visits to simulations of real spaces in virtual reality have been proposed as a means for blind people to gain spatial knowledge regarding the disposition of obstacles within a place before actually visiting it. Within the present study, different configurations of distant and proximity exploration were compared to each other, in order to test whether differences in effectiveness and efficiency lead to changes in exploration behaviour, without a detrimental impact on cognitive-map quality and usefulness. Evidence supports effectiveness improvements due to distant exploration (p-value=0.0006). The flat-spotlight distant-configuration entails a 53% reduction in discovery time (p-value= 0.0027). A trend is observed entailing a 38% reduction in the duration of the overall exploration stage for a flat spotlight configuration (p-value=0.067). Wall-detection effectiveness alters exploration duration (p-value = 0.012). Improvements in effectiveness and discovery time are associated with shorter overall exploration time. Duration of exploration after discovery time depends on wall-detection effectiveness. Benefits from a distant exploration configuration are not enough to build better cognitive maps.

Keywords: cognitive mapping, blind people, virtual reality, smartphone
Corresponding author: Antonio Cobo. e-mail: antonio.cobo@ctb.upm.es