

S. ISHIHARA, K. ISHIHARA, M. NAGAMACHI. **Development of the music game for retaining cognitive and motor functions.** *Gerontechnology* 2012;11(2):409; doi:10.4017/gt.2012.11.02.664.00 **Purpose** Retaining cognitive and motor functions is indispensable for independent life into old age. 'Asobilation'¹ {asobi (playing game) + rehabilitation} and music therapy have potentials for pleasant, spontaneous daily rehabilitation activity. An assumption of stimulating brain fields using a music rhythm game was made, based on recent advances of brain science. We are continuously developing and improving our music game and have trials at rehab center, elder people gatherings and events. In this first report, we aimed attractiveness and playability of the game. Findings and results of ongoing development are shown. **Method** The task: Listen to the first half of a tune. Take a rhythm and anticipate the time should react to, then move hands and hit the button. This task takes at least these 4 process units: (i) understanding the structure of the tune, (ii) extracting the timing of rhythm, (iii) anticipating when to react, and (iv) moving arm and hand (motor control)². Process (i) relates to many regions of cortex. Among them, ventrolateral prefrontal cortex (VLPFC) has major role on retrieving long term memory. Process (ii) uses not only auditory cortex, but part of motor cortex³. Ventral premotor cortex's general sequential controlling is, has been recently argued, based on phoneme, syntactic sequence and music recognition describes by process (iii). VLPFC is also used for retrieve⁴. Process (iv) requires motor cortex. From above facts, we anticipate music games could stimulate wider areas than calculation or memory games (for example, prefrontal cortex only has continuously stimulated by 'Brain Training' Nintendo DS game⁵). **Results & Discussion** We developed a music game on Windows with the Panda 3D-game engine. We used the Python programming language. A well-known folk tune was used, and there are two instances for hand clapping. This game requires hitting a button with specific timing. A girl figure shows the cue for this rhythm. We have examined the game with 5 half-paralyzed persons at a rehabilitation center, 11 older adults (Average 75 yrs) at local gatherings, and 28 people from a wide age range. Even for groups of older adults, effect of practice was shown (Figure 1). Attractiveness and playability were good for all participants. We will examine transfer effect to other cognitive functions over a longer trial period, with common tests like Mini Mental State Examination and Pfeffer Functional Activities Questionnaire.

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Full paper:

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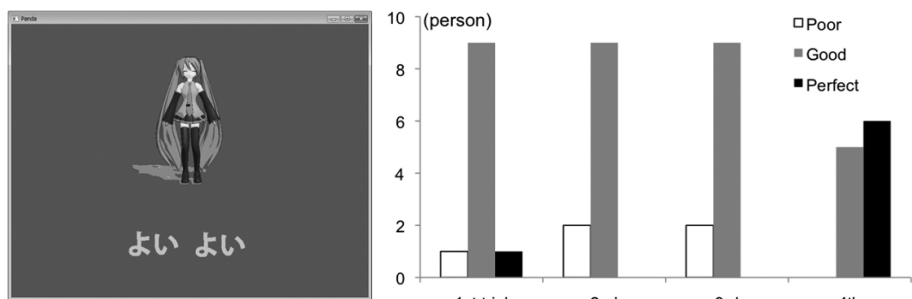


Figure 1. Left: Screen of the game, Right: 11 elders (average 75 yrs) achievement on reaction timing on 4 trials in a day; Perfect = ± 50 ms; Good = ± 200 ms on the timing; Poor = > 200 ms