S. HAGLER, B. SMITH, M. PAVEL. Gait characteristics reveal aspects of cognition. Gerontechnology 2010;9(2):286; doi:10.4017/gt.2010.09.02.213.00 **Purpose** Mobility is one of the most important determinants of quality of life and independence. There is also evidence that aspects of gait are indicative of elders' cognitive and sensory-motor functionality. More specifically, younger and middle aged adults seem to choose step size, cadence and velocity in accordance with biomechanics and minimizing energy expenditure[1], whereas elders may have a different objective function. The choice of gait parameters by elders is also affected by their disinclination to lose balance and minimize cadence while attempting to match the desired velocity. In accordance with these principles, we proposed a model in which an objective function to be minimized by the elder is computed by an additive combination of these three components, namely cadence, step size and the deviation from the desired velocity. Each of the three components in this model is multiplied by a constant that represents the contribution (weight) of that component to the objective value. These weights then represent the relative utility of each component. The goal of this study was to determine how aging, and change in health state influences the choice of gait parameters, identify the "weights" and determine whether the values of these parameters can be used to infer aspects of functionality. **Methods** Gait parameters were measured in an experiment using an 854cm long GAITRite® Walkway System gait mat placed in a common room in a continuous care facility. The participants, 14 males and 10 females, recruited from the pool of residents in this retirement facility, ranged in age from 76 to 96 years (average 86 years). After giving consent, they were first asked to walk back and forth on the mat at their normal, comfortable velocity. Subsequently, they were asked to walk slow and fast, relative to their normal velocity. These trials were repeated until the participants completed 15 to 30 walks each. The raw data from the gait mat were processed to estimate, for each walk, average velocity, step size and cadence. Before proceeding further with the analysis, the data were normalized by the height of the walker. Gait summary data were then analyzed in terms of the additive model described above by estimating the "weights" associated with each of these components. **Results & Discussion** The results of this experiment suggest that individual subjects select their gait parameters in a way that is consistent with the optimization of the objective function described above. For each subject we estimated weights for the three components and the results were evaluated with respect to their consistency with the model characterizing the individual tradeoffs in response to the instructions of slow, normal and fast gait velocities. The resulting weights will also be compared to the results of standard neuropsychological tests.

References

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Address: OHSU, USA; E: pavelm@ohsu.edu