Phasic and long-term shifts in mobility and cognition: Implications for gerontechnology design
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Purpose It is a widely held belief among designers that cognitive capacities of older adults are relatively stable, except perhaps in brain disorders such as dementias, which assume relatively linear declines of functional abilities over months. These notions are being challenged as improved longitudinal monitoring technologies bear on the study of cognitive changes associated with aging. Longitudinal monitoring of gait parameters in assisted living facility residents has demonstrated that "path tortuosity" – a measure of variability in walking paths – correlates .47 with cognitive performance measures such as the Mini-Mental State Exam (Kearns et al., 2017). Path tortuosity has been observed to change significantly from one day to the next (Kearns, unpublished observations), which suggests that notions of cognitive processes as stable may be in error, especially for older adults. **Results & Discussion** Our data suggest that cognition may fluctuate significantly within 48 hours, covarying with disordered movement paths. This reinforces anecdotal observations of caregivers that an elder "had a good (or bad) day today." Such shifts in cognition can be large, changing persons who are lucid one day into their complete opposite the next – eliminating the ability to recognize well-known family members. Engineers and designers have treated older adult cognition as a "steady state" or assumed that the cognitive declines are relatively slow and constant, thereby creating gerontechnologies that cannot rapidly adjust to phasic cognitive changes. The implication is that random shifts in cognition constitute more than "measurement noise" and should not be overlooked when designing new gerontechnologies. Gerontechnology designs that can modify their difficulty level contingent on user cognitive status may provide the user with increased usability during periods when cognitive abilities are ebbing, for instance during temporary conditions such as a urinary tract infection. The enhanced functionality may have implications for aging in place.

References
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