Combining language and animation in multimedia instructions can help older people

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P. Wright, S. Belt, Combining language and animation in multimedia instructions can help older people, Gerontechnology, 2001; 1(1): 60 - 62. This is a preliminary report of an empirical study comparing the benefits of animation and language, both alone and in combination, for people following procedural instructions. The results show that older people benefit from the combination whereas younger people need only the animation. Possible reasons for this difference are discussed and will be investigated in on-going research.

Key words: animation, comprehension, electronic document design

Technologies offering portable multimedia presentations, such as compact disc, can be used in a variety of contexts for giving procedural instructions, explaining what to do and how to do it[1]. Have these technologies any advantages for older people? Animation might be expected to help older people because sensory problems accompanying aging can make it harder for them to read instructions, influencing word identification and the integration of ideas[2]. When written text is supplemented with speech output by computer this might reduce the effects of sensory impairments, but if comprehension difficulties reflect cognitive rather than sensory problems[3, 4] combining reading and listening may not be adequate. Adding graphics showing the actions to be performed might compensate for language impairments[5], especially if the graphics are animated and synchronised with verbal instructions. That is why this study examined the benefits of combining animation and language for 32 older adults (aged 50-83, mean 65 years) and 32 younger adults (aged 20-46, mean 30 years).

Everyone did two tasks with the order fully counterbalanced across participants. One task had instructions combining animation with written and spoken language; the other task had instructions given **either** by animation alone **or** just by written and spoken language. There were approximately 8 minutes between these tasks, which both involved rearranging seven shapes on a computer screen to create a target figure (Figure 1). Different targets were used for each task. The screen was divided vertically into two windows, with instructions given on the left and carried out on the right. Written instructions appeared separately for each shape at the foot of the left window. Spoken instructions were recorded Wav files of a female voice reading the written instructions at a medium pace. When animated, the movement of the pieces on the screen was synchronised with the voice. When animation

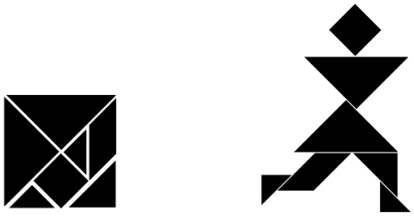

Figure 1. Example of a start (left) and end shape (right).

was removed the shapes remained unchanged in the left window. Language was removed by turning speech off and leaving the text box empty. The instruction sequence paused mid-way and the left window went blank while participants worked in the right window; then they clicked Continue for the remaining instructions. If participants forgot the instructions or became confused there was a Help button at the bottom of the right window where they were working which displayed a small graphic showing the target positions of the moves explained so far.

Accuracy was high: older 85% correct, younger 83% correct. The effects of the multimedia instructions on various aspects of performance were analysed by sign tests to avoid making strong assumptions about the shape of the underlying distributions - e.g. some people used Help a lot and some people never used it. Older people were faster ($P<0.05$) and used Help less often ($P<0.05$) when instructions combined animation and language compared with having only one or the other (Table 1). Younger adults were faster ($P<0.01$) and used less Help ($P<0.01$) whenever the instructions included animation. For younger adults the combination of language and animation had no advantage over animation alone (Table 1). Because the inclusion of language neither aided nor impaired younger adults but assisted older adults, these data support the practical recommendation that multimedia instructions should include animation together with written and spoken language.

Further studies are planned to investigate why older people benefit from combining language and animation. The possibilities include: memory[6], visuo-spatial processing[7], comprehension[8, 9]. Combining language and animation may have made retrieval of the information easier for people having difficulty remembering all the steps. If people could select how many steps to watch before carrying out the procedure then age might influence the number of steps selected but the effects of animation could be similar across age groups. Conversely for a longer sequence of steps younger participants might benefit from combining animation with language. Re-arranging shapes makes heavy demands on visuo-spatial abilities which may be impaired with age, and could account for the benefit of adding language to animation. Procedural tasks making fewer demands on visuo-spatial ability might not show the advantage of combining animation and language. But if the benefits of the combination come from support for comprehension processes, then these patterns among multimedia instructions will generalise to many other procedural tasks done by older people. Although the causal factors cannot yet be specified, it remains useful to know that combining animated graphics with written and spoken language is beneficial to older people, even in tasks where younger adults need only the animation.

Table 1. Time Taken and Use of Help in the Three Instruction Conditions for Each Age Group.

	Combined language + animation	Language alone	Animation alone
Older participants			
Time (minutes)	7.1	9.1	9.5
Clicks on Help	8.8	12.5	12.4
Younger participants			
Time (minutes)	2.5	4.1	2.9
Clicks on Help	2.1	6.2	2.3

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References

1. Wright P. Supportive documentation for older people. In: Jansen C, Punselie R, Westendorp P, editors. Interface design and document design. Amsterdam: Editions Rodopi BV; 2000. p. 81-100.
2. Aberson DH, Bouwhuis DG. Silent reading as determined by age and visual acuity. Journal of Research in Reading 1997; 20: 184-204.
3. Hamm VP, Hasher L. Age and the availability of inferences. Psychology and Aging 1992; 7: 56-64.
4. Tunn PA, Wingfield A. Language and communication: fundamentals of speech communication and language processing in old age. In: Fisk AD, Rogers WA, editors. Handbook of human factors and the older adult. San Diego: Academic Press; 1997. p. 125-149.
5. Morrell RW, Echt KV. Designing written instructions for older adults learning to use computers. In Fisk AD, Rogers WA, editors. Handbook of human factors and the older adult. San Diego: Academic Press; 1997. p. 355-361.
6. Howard DV. The aging of implicit and explicit memory. In: Blanchard-Fields F, Hess TM, editors. Perspectives on cognitive change in adulthood and aging. New York: McGraw Hill; 1996. p. 221-254.
7. Perfect TJ, Maylor EA, editors. Models of cognitive aging. Oxford: Oxford University Press; 2000.
8. Lipman PD, Caplan LJ. Adult age differences in memory for routes: effects of instruction and spatial diagram. Psychology and Aging 1992; 7: 435-442.
9. Stine EAL, Soedenberg LM, Morrow DG. Language and discourse processing through adulthood. In: Blanchard-Fields F, Hess TM, editors. Perspectives on cognitive change in adulthood and aging. New York: McGraw Hill; 1996. p. 255-290.

Productive aging

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J. Moraal, Productive aging, Gerontechnology, 2001; 1(1): 62 - 64. In our societies the growth in the number of older people is considerable. Consequently, the costs for old age insurance are rising accordingly. However, many healthy and motivated older people are willing and able to participate in the workforce. A concerted effort by government institutions, labour unions, employers, research institutions, and, not to forget, the elderly themselves, should offer all possible means to employ or re-employ older workers. The article discusses some relevant issues in this field.

Key words: aging, demographics, older workers, work, workforce

Current demographic trends show an increase in world population and an even more pronounced increase in people 65 and over. According to U.N. sources, in the more developed countries the percentage of people 65 and over will rise from 11.5 % in 1985 to 18.9 % in 2025; for the less developed countries these percentages respectively are