



Using Eye Tracking to Examine Age-Related Differences in Web Site Performance



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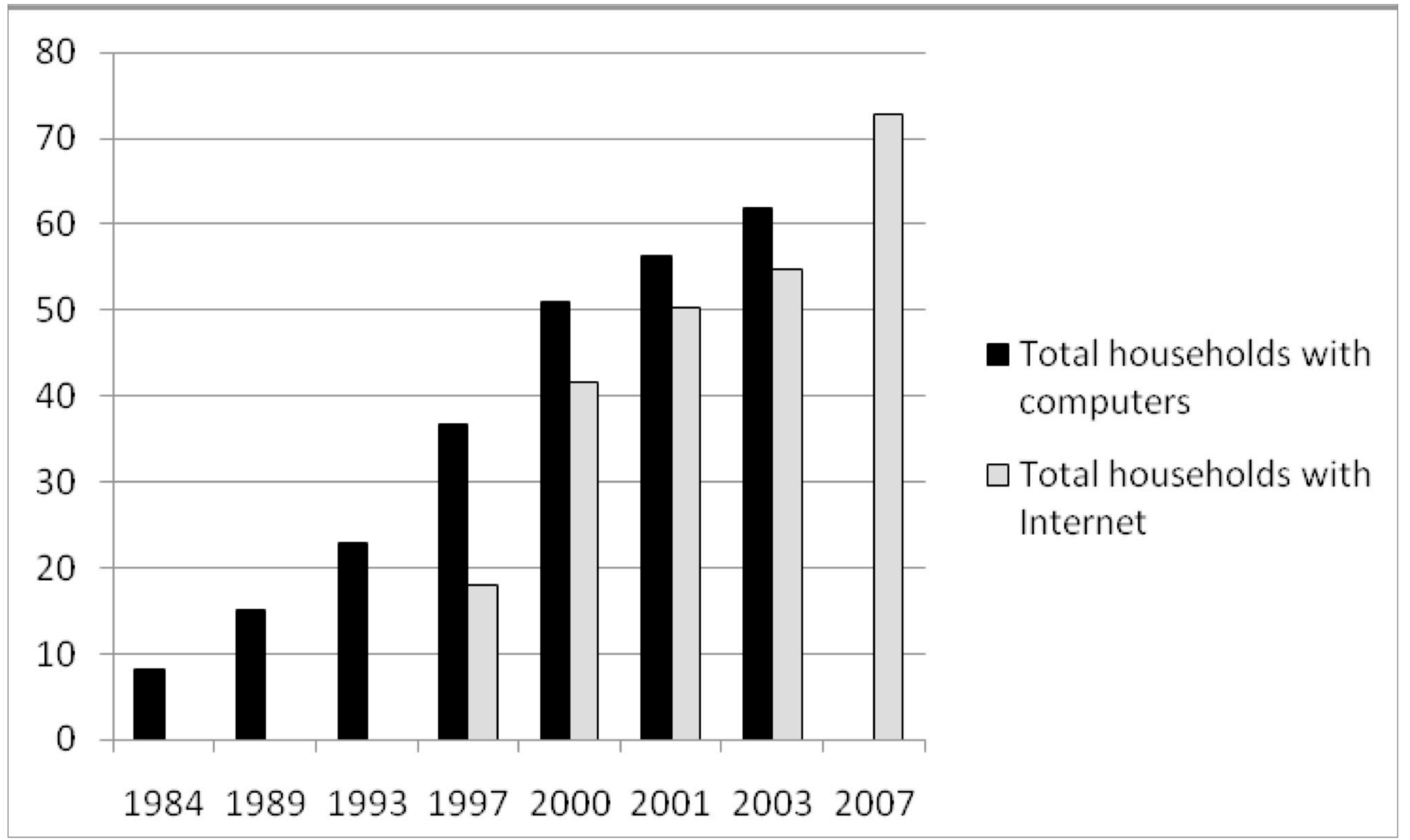
Abstract

The U.S. population is increasing, people are living longer, technology is moving forward, and the number of older adults using computers is greater than ever. The percentage of older adults who are connecting to the Internet has grown more than any other age group. However, Web sites are often not designed with older adults in mind, and the cognitive difficulties that are inherent with age are often not taken into consideration. Using Census Bureau data, this paper addresses changes in population and technology, and using eye-tracking data from a usability study conducted at the Census Bureau, this paper demonstrates age-related differences in Web site performance. Implications and future directions for research are discussed. See Proceedings paper.

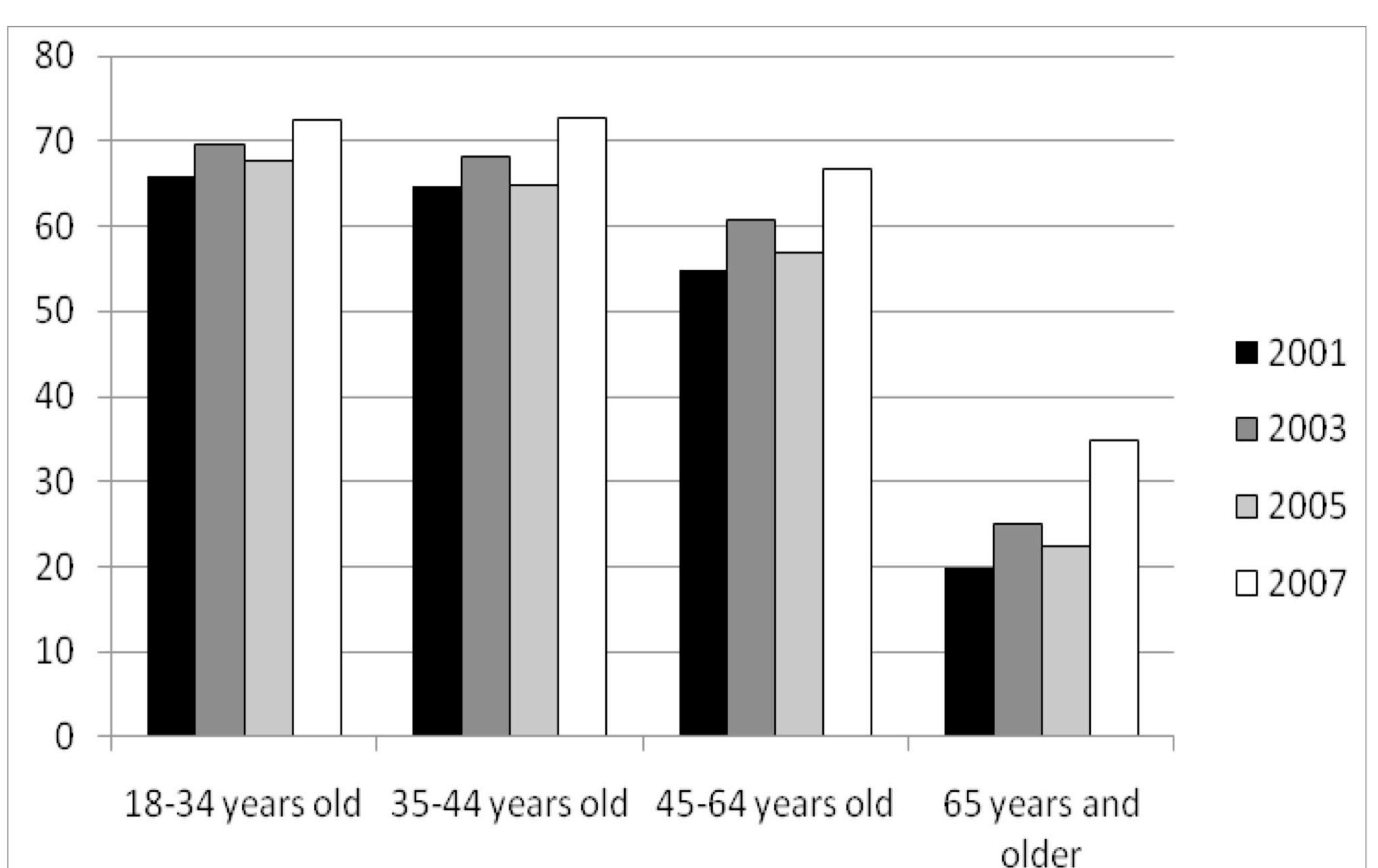
Introduction

Year	Age group			
	18-24 years old	25-44 years old	45-64 years old	65 years and older
2000	27.3	85.0	62.5	35.1
2003	28.6	83.6	68.6	35.9
2006	29.2	83.0	74.7	37.2
2009	30.4	83.0	79.5	39.5
2010	30.7	83.1	81.0	40.2
2020	30.8	89.7	84.4	54.8
2030	34.1	95.2	84.3	72.1
2040	37.0	101.4	92.0	81.2

Estimated (2000-2009) and projected (2010-2040) U.S. population by age group, in millions.



Percentage of U.S. Households with Computers and Internet: 1984-2007



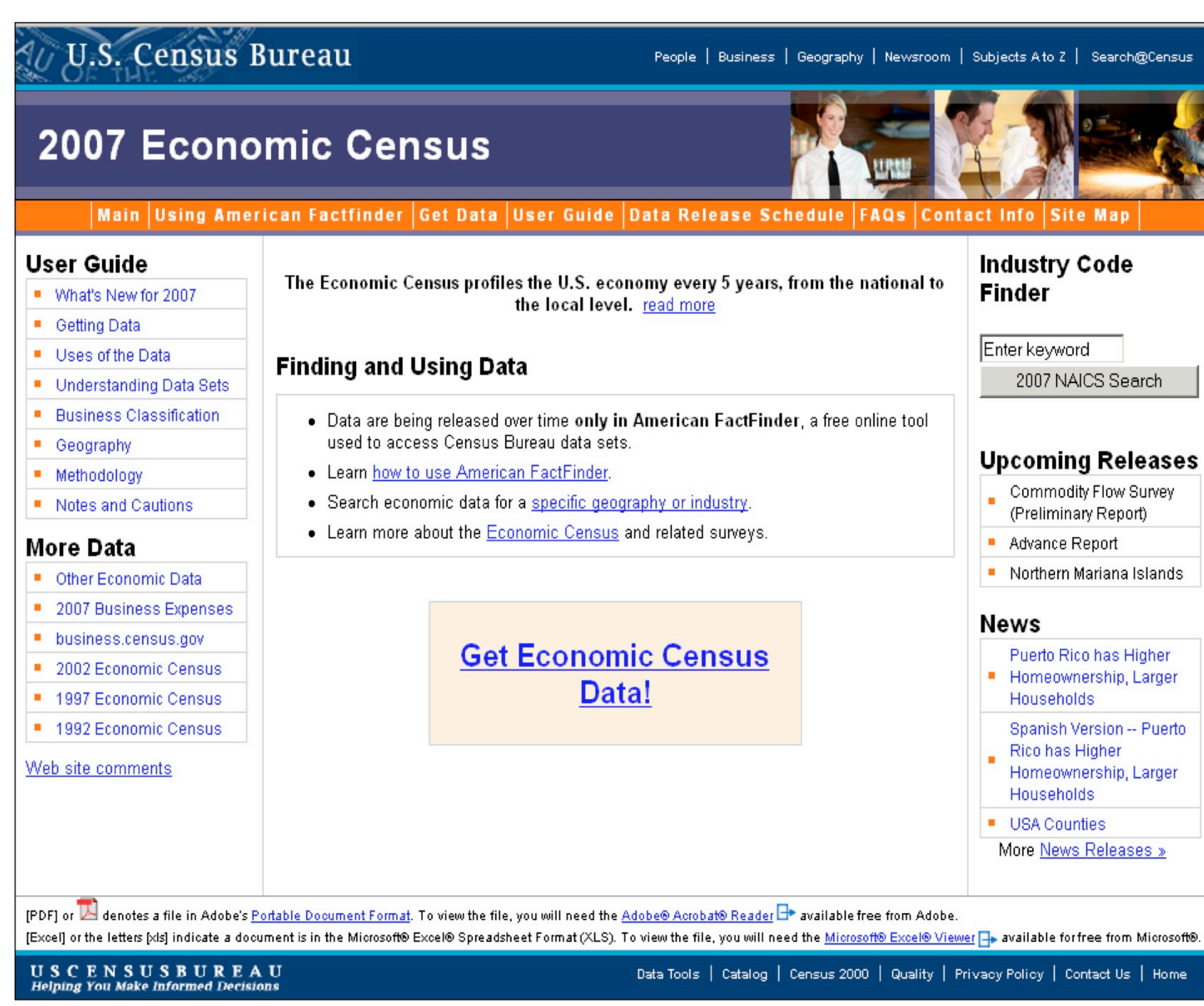
Percentage of Individuals Who Connect to the Internet by Age Group: 2001-2007

Method

Age-related differences in Web site performance were assessed by examining eye-tracking data from a usability study (Romano & Murphy, 2008). The original objective was to test the usability of the Web site. Participants performed tasks on the Web site while they provided a running commentary, and their eye movements were recorded.

The goals of this project were:

- (1) to examine age-related differences in Web site performance
- (2) to examine if age-related differences were related to performance and satisfaction
- (3) to recommend Web site design to developers so that older adult users can access information on the Internet successfully.



- 10 information-search tasks (i.e., “You have a question about Finance and Real Estate information, and you want to send an e-mail. Find the e-mail address where you should send your question.”)
- 10-item Satisfaction Questionnaire
- Time on task recorded
- Task success recorded
- Eye tracking recorded
 - Peripheral targets: top and left-navigation bar
 - Central target: “Get Economic Census Data” button

Participants

	Group	
	Older adults	Younger adults
N	3	4
Gender	1M / 2F	2M / 2F
Age (years)	54 (51-59)	27 (23-31)
Education (years)	17.33 (14-20)	18.00 (16-21)
Comfort learning a new Web site*	4.00 (2-5)	4.25 (4-5)
Comfort navigating the Internet*	4.33 (3-5)	4.50 (4-5)
Overall experience with computers**	6.33 (3-8)	6.75 (6-8)
Overall experience with the Internet**	6.67 (6-8)	7.00 (6-8)

* Scale 1-5. ** Scale 1-9.

Results

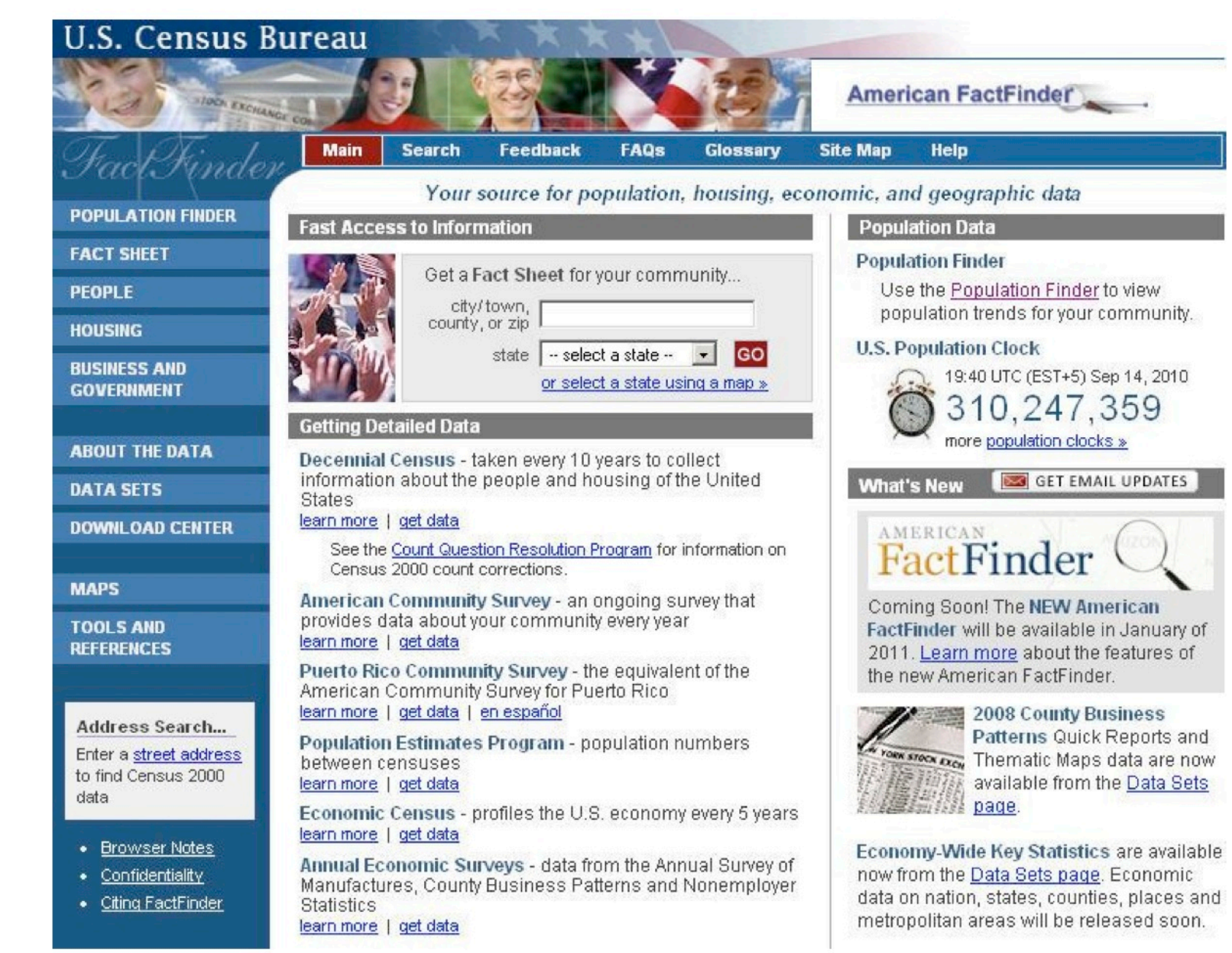
	Group	
	Older adults	Younger adults
Number of fixations		
Peripheral: top	5.33**	69.20
Peripheral: left	6.33**	181.00
Central	16.00	21.50
Time, in ms, elapsed to first look at target		
Peripheral: top	659.33^	191.50
Peripheral: left	767.33*	14.00
Central	524.00^^	116.00
Satisfaction^^^	4.78	6.31
Accuracy	57%	58%
Efficiency	3m11s*	2m10s

* Significant age group difference at $p \leq 0.01$.
 ** Significant age group difference at $p = 0.02$.
 ^ Trend for age group difference at $p = 0.14$.
 ^^ Trend for age group difference at $p = 0.15$.
 ^^ Range 1-9. Higher values indicate greater satisfaction.

Conclusions

- Age-related differences in the way people manage information on the Web site were discovered.
- Results suggest that older adults take longer to look at peripheral items and look at peripheral items less often than central items, compared to younger adults.
- These data are consistent with useful field of view research that has shown that older adults have greater difficulty processing items that are located in the periphery (Ball et al., 1988; Scalf et al., 2007; Sekuler et al., 2000).
- This study extends previous work and assesses older adults’ performance on Web sites.
- One implication is that any important content located on Web sites in the periphery also needs to be located in the center part of the screen so that Web-site design takes users of all ages, including older adult users, into consideration.
- Future experimental-design research on the American FactFinder Web site with a larger sample is underway, which is investigating whether:

- (a) older and younger users perform differently on peripheral versus central tasks on Web sites
- (b) there are systematic age-related differences in useful field of view on Web sites.



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