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Effects of age and period on map use after the digitalisation: results from online surveys at four time periods

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Abstract:

Digitalisation has changed map usage. Although a variety of theoretical works have been conducted on the changes in people's use of maps after digitalisation (e.g. MacEachren, 1995), few studies have quantitatively evaluated these changes. An exception is Wakabayashi's (2022, 2023) work on intergenerational differences and temporal changes in map use by non-experts after digitalisation. Based on the Age-Period-Cohort (APC) model (Kupper et al., 1985), the inter-generational difference is related to "age effect" while temporal changes are affected by "period effect". The age effect refers to the physiological aspects of aging or the effects associated with transitions in the life stage, whereas the period effect refers to the changing trends in the population as a whole influenced by social conditions. However, previous work of Wakabayashi (2022, 2023) dealt with one of these effects on map use. Hence, this study examined how age and period influence map use using questionnaire data from online surveys.

The data used in this study were derived from online surveys conducted over four periods: 2014, 2018, 2022, and 2024. The questionnaire was designed to gather data on the respondents' current state of map use, usage of ICT devices, and map-use skills on a Likert scale. We outsourced the sampling and data collection to an Internet-based marketing company. The respondents were residents aged 15 years and older in the Tokyo Metropolitan area and featured equal distribution among age groups and sexes. We used data from 624, 624, 664, and 624 samples for each period, for a total of 2,536 samples, and examined the age and period effects by employing Analysis of Variance (ANOVA) and chi-square tests. The results of this analysis are summarised in Table 1.

Table 1. Results of a statistical test of the age and period effects for questionnaire items

Question item	PE	AE	Question item	PE	AE
Web map platform			**Use of conventional (paper) maps**		
Google Maps	#	#	Road atlas	#	#
Yahoo! Map	#	#	Tourist guide map	#	#
Apple Map	#	#	Guide map in magazines	#	#
Devices for using web maps			You are here map	#	NS
Laptop PC	#	#	Topographic map of GSI	NS	#
Smartphone	#	#	**Skills for map use**		
Thematic maps on the web			Be able to draw a route map of one's neighborhood	#	#
Hazard maps	#	#	Easy to find the shortest path on a map	NS	#
Crime maps	#	NS	Be able to estimate travel time based on a map	NS	#
Medical/welfare maps	#	#	Good at using paper maps rather than digital maps	NS	#
Maps for tourists	#	#	Prefer to ask others for directions rather than read maps	NS	#

PE: Period effect, AE: Age effect, #: significant at 0.01 level. NS: not significant at 0.01 level.

Concerning the web map platform, both age and period effects were observed, with Google Maps used predominantly by the younger generation (Fig. 1). However, the use of Google Maps is increasing for most age groups, while Yahoo Maps and Apple Maps have maintained a lower level of usage rates.

Concerning the effects of age on the devices used to view these maps, the proportion of smartphones and tablet computers has increased over the years (Fig. 2). This has been replaced by less PC-based browsing, indicating that map use on mobile devices that can be used anywhere is becoming the norm. This is also reflected in the use of web maps, which are often used for navigation when going out or travelling, and the number of people who print them is decreasing.

In terms of the use of thematic maps on the Web, age and period effects were evident on hazard maps, medical/welfare maps, and maps for tourists (Fig. 3). This demonstrates the growing awareness of disaster prevention and the increasing demand for medical information on COVID-19 and tourism. Concerning existing analogue maps, the proportion of use of road atlases, tourist maps, and guide maps in magazines and advertisements was higher among older people, although the overall use of these maps declined.

By contrast, an age effect was observed for topographical maps, with a higher rate of use among older people. This age effect is also reflected in map-use skills; young people are accustomed to web maps that automatically change direction and calculate distance and time but do not necessarily have the skills used for analogue maps.

As described above, both age and period effects influence on map use after digitalisation, but intergenerational differences gradually shrink.

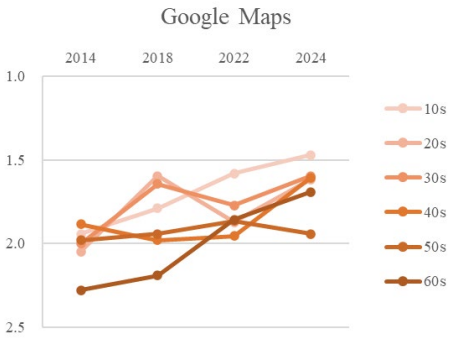

Figure 1. Use of Google maps by age and period. The vertical axis is the mean score of utilisation, with smaller values indicating higher utilisation.

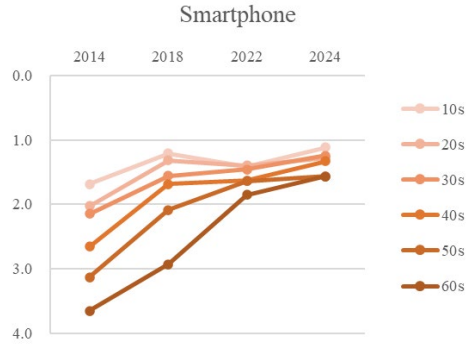

Figure 2. Use of smartphone in using maps by age and period. Vertical axis is same as Fig. 1.

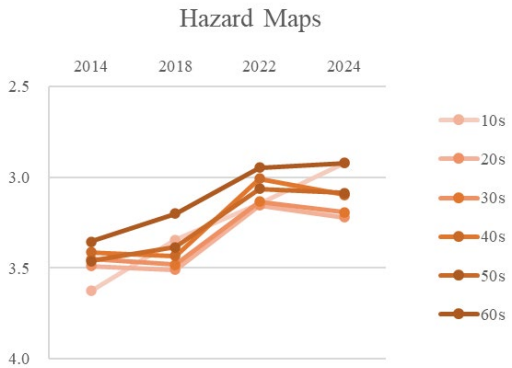

Figure 3. Use of hazard maps by age and period. Vertical axis same as Fig. 1.

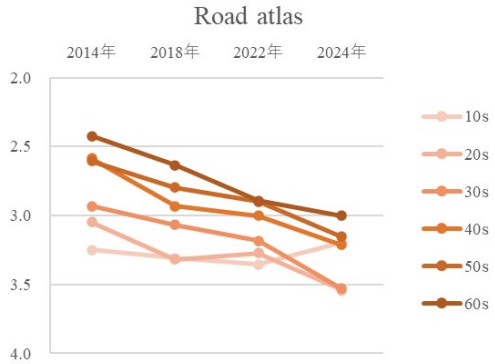

Figure 4. Use of road atlas by age and period. Vertical axis same as Fig. 1.

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