

Road Signs and City Driving: Do They Go Hand in Hand?

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ABSTRACT

This study investigated the interaction of roadside advertising signs (RASs) with driving decision at road intersections in Ile-Ife, Southwestern Nigeria with the aim of determining whether the influence of RASs on drivers in the study area was similar to findings in other cities of the world. 150 questionnaire were administered to respondents based on their familiarization with the selected roads. Using descriptive statistics and chi-square analysis, the results revealed a high concentration of RASs around location with highest road intersections. 78.0% of the respondents were induced to read RASs with 56.4% of the respondents distracted trying to read the content of the RASs. Result also revealed a relationship between education level and inducement to read the RASs. It was concluded that RASs constituted hindrance to drivers as found in other parts of the world. The rate of hindrance could be reduced where erections of signs are strictly regulated.

Keywords: Roadside advertising signs; road intersections; inducement; hindrance; regulations

Roadside advertising signs (hence, RASs) are a major source of information flow across the globe (Birdsall, 2008)^[1]. They are an aspect of the road environment which present all road users with a quantum amount of appealing visual pictorial and written information. Information provided by RASs provide visual impacts that command complete attention of readers or viewers and offer total cut-through thus becoming common visual external distractions for drivers (Brumec et al., 2010; Eyecorp, 2004)^{[2],[3]}.

Studies have shown that a proportion of drivers' time and attention is directed to sceneries and other irrelevant items other than active driving activities (Olapoju, 2016; Green, 2002; Land and Lee, 1994; Hughes and Cole, 1986)^{[4],[5],[6],[7]}. These sceneries are considered as contesting with the spare attentional capacity of drivers. Though, attention paid to RASs at the expense of executing various cognitive, sensory and psychomotor

driving skills has been regarded as distraction rather than attraction of attention (NHTSA, 2009; Stutts *et al.* 2001)^{[8],[9]} yet, it is the visual attraction provided by RASs that brings about distraction. In other words, it can be argued that attraction precedes distraction. For instance, studies have provided evidence that drivers' visual attention may be attracted or captured and held for a relatively long periods (Lee *et al.* 2007; Crundall *et al.* 2006)^{[10],[11]}. Again, NHTSA (2009)^[9] put forward that distractions are influenced by situations which captured driver's attention. However, studies have shown that drivers look at and process information (either pictorial or written) on the roadside advertising signs (Hughes and Cole, 1986)^[7] and that fixation of visual sensory can be made at short headways or in some unsafe circumstances (Smiley *et al.* 2004)^[12]. In addition, eye fixation on these signs may create an appealing scenario to drivers' emotion thus, further worsen driving performance. For instance, a study by

Ady (1967)^[4] directly linked advertisement to accident rates. This submission was made after a comparative study of pre-and-post-billboard erection on portions of roads. Ady (1967)^[4] provided a caveat that though, the content of RASs plays a significant role in distracting drivers, yet, not all RASs necessarily caused accident. However, further studies have identified RASs as one of the external distractors leading to traffic accidents and have established a correlation between crash rates and RASs (Stutts, *et al.* 2001; Farbry *et al.* 2001; Wallace, 2003)^{[9],[13],[14]}.

Various studies carried out on RASs have been mostly significantly centred on cities of the developed economies where there is existence of working guidelines on erection and display of roadside adverts. Again, significant number of these studies have adopted more of simulation rather than naturalistic observation and questionnaire administration to harvest drivers' opinion of the effect of RASs on driving decision on urban roads (Pecher *et al.* 2009; Di Stasis *et al.* 2009; Megias *et al.* 2011)^{[15],[16],[17]}. This study however, considered the influence of roadside advert signs on drivers' decision making in a city in Southwest Nigeria where there is little or no control on the erection of roadside advert sign. This was with the aim of determining whether the influence of roadside advert signs on drivers in this part of the world would be similar to the already existing findings in the developed economies.

As a way of clarification, this study adopted an aspect of the description of RASs given by Bendak and Al-Saleh (2010)^[18]: this included banners (which are portable signs usually made of fabric), shop fronts, billboards (that consist of a number of standard-sized poster panels) and changing message signs (which are animated signs consisting of messages changing in sequence) and did not include any road traffic enhancing signs especially those that give drivers information on direction and status of roads.

The study area

Ile-Ife is an ancient city in the South-western part of Nigeria. It is believed to be the headquarters of all the Yoruba race. The city is comprised of two main local government councils (Ife Central and Ife East Local

Government Areas). Ile-Ife is a host community to two major institutions in Nigeria (Obafemi Awolowo University Ile-Ife and Obafemi Awolowo University Teaching Hospital Complex). These two institutions are the drivers of the economy of the city as majority of the population are gainfully employed by the institutions. Other institutions, both secondary and post-secondary, also cropped up to serve as feeder institutions to the two main institutions in the city. There are other economic activities which are mainly sales and services in orientation. The nature of the economy however, has a key influence on the configuration of the city roads especially in terms of business publicity. For instance, virtually every business unit puts up any sort of signage to publicize its service or product.



Fig. 1: Some pictures from the study locations---**A & B** were taken at Mayfair Roundabout. At the background (note the distant black object) is a digital billboard. **C** was taken at Lagere Roundabout with digital billboard right at the heart of the intersections.

This comes usually in small roadside street-level, raised-level boards. Because there is absence of controlling agency, some of these roadside advert signs especially the street-level signs are placed directly by the roadside thereby reducing available space for road users. Often times, most of these street-level signs carry the inscription 'Do not remove, By Order, the Police'. Also, the raised-level

signs which are mostly erected around round-about or intersections, proliferate the city without any order of erection. In some instances, some of the RASs are not of any significance because the businesses may have changed location or no longer existing. However, the two digital billboards in the study area were erected recently (2017) as a means of advertising the major annual festival in the study area (Fig. 1). The erection of digital billboard is evident of its emergence as delectable trend in outdoor advertising, made popular by advancement in electronics and lighting technology.

METHODS

The intention of this study was to determine the influence of roadside advertising signs on drivers' decision making at some selected locations in the study area. Major locations of high concentration of roadside advertising signs were selected. Opinions of drivers on the effect of RASs were explored through questionnaire administration. 150 questionnaire were purposively administered to respondents who claimed they have high level of familiarity with all the selected turnings in the study area. The understanding of respondents' familiarity with these locations was derived from initial contact made with residents and shop/property owners in the selected locations who were said to be frequent in these areas. At this point, options were given to those without adequate knowledge of any of the selected areas to decline the administration of the questionnaire. The questionnaire was self-administered in order to achieve 100 per cent return as well as to ensure some person-to-person interactions which may engender the exposition of some information not captured by the questionnaire. Six undergraduate students were instructed to administer the questionnaire and to take further notes of extraneous information which could be of help to the study. The questionnaire was divided into three sections—the socio-demographic attributes of the respondents (age, sex, education); the observation or awareness of the presence of RASs in the selected road turnings, location with highest concentration and the purpose of the signs; the third section included questions on respondents' interaction with the RASs and its influence of such interaction to general safe driving performance in the city.

Descriptive statistics (frequency tables and chart) were used to represent the responses of the respondents, cross-tabulations were generated to identify variations within and between group responses while chi-square analysis were used to identify the relationship between combinations of certain variables.

RESULTS AND DISCUSSION

Respondents' socio-economic characteristics

About 28.7% of the respondents were between the ages of 20 and 29, 54.7% were between the ages of 30 and 39 while 10.7% and 6.0% were between the ages of 40 and 49 and 50 and 59 respectively. 106 (70.7%) of the respondents were male while 44 (29.3%) were female. Out of the total 150 respondents, 124 (82.7%) owned any of car and bus, 23 (15.3%) owned motorcycle while 3 (2.0%) owned bicycle. Out of the 124 respondents who owned car or bus, 95 (76.6%) used it daily, while 15 (12.1%) and 14 (11.3%) used it on weekends and few days of the week. Meanwhile, 82.6% of those who owned motorcycle used it daily, 13.0% few days of the week and 4.3%, weekends only (see Table 1).

Table 1: Respondents' socio-economic characteristics

Variables	Frequency	% Freq
Age		
20-29	43	28.7
30-39	82	54.7
40-49	16	10.7
50-59	9	6.0
Sex		
Male	106	70.7
Female	44	29.3
Education		
Primary	8	5.4
Secondary	6	4.0
Post-Secondary	136	90.6
Ownership of means of transport		
Bicycle	3	2.0
Motorcycle	23	15.3
Car/Bus	124	82.7

Frequency of use of means of transport			
For bicycle owner	daily	2	66.7
	few days of the week	0	0.0
	weekends only	1	33.3
For motorcycle owner	daily	19	82.6
	few days of the week	3	13.0
	weekends	1	4.3
For car/bus owner	daily	95	76.6
	few days of the week	14	11.3
	weekends	15	12.1

Respondents' interaction with roadside advertising signs

From Table 2, all the respondents (150) agreed to have observed roadside advert signs at all the selected road turnings. However, 8.0% believed that the signs were for educational advert, 9.3% believed that it was for religion, 6.7% politics, 30.7% believed it was for commercial advert. However, 45.3% believed that the purposes of most signs were equal in representation across all the selected turnings. In terms of turnings with highest concentration of roadside advert signs, 34.0% of respondents reported that the highest concentration was around Mayfair Round-About, 20.0% OUI Round-About, 15.3% Parakin Junction. 12.7%, 10.0% and 8.0% of the respondents reported that concentration were high at OAU Gate, Lagere Round-About and Sabo areas of the study area.

For all who agreed to have observed roadside advert signs, 78.0% (117) were induced to read the roadside signs at critical turnings. Analysis further showed that 94.93% (110) of those induced to read the roadside signs had post-secondary education while 2.5% and 3.41% had primary and secondary education respectively. However, Chi-square analysis ($\chi^2 = 10.043$; d.f. = 4; $p = 0.040$) showed a significant relationship between level of education and respondents' inducement to read the roadside advert signs. In a similar vein, 56.4% of those who were induced to read the roadside signs were distracted when trying to read the signs at critical turnings, while 43.6% were not. Again, Chi-square analysis ($\chi^2 = 12.765$; d.f. = 1; $p = 0.001$) showed a significant relationship between inducement to read

roadside signs and respondents' distraction when taking driving decision at critical turnings.

Results of the analysis further showed that driving decisions were generally hindered by roadside advert signs. For instance, 40.7% and 33.3% of the respondents revealed that roadside adverts constituted little and much hindrance respectively to general driving decision in the city. As a runner up to this, 53.3% of all respondents agreed that incessant placement of roadside signs have significant influence on safe driving activities in the study area. However, 84.7% of respondents believed that roadside advert signs could be positioned without obstructing urban driving especially when regulatory agency gives a design as well as definite point within the city beyond which roadside signs cannot be erected.

Table 2: Responses to roadside advert signs

Variables	Frequency	% Frequency
Observation of roadside advert sign		
Yes	150	100.0
Location of concentration		
Sabo	12	8.0
Lagere R/A	15	10.0
Mayfair R/A	51	34.0
Parakin Junction	23	15.3
OAU Gate	19	12.7
OUI R/A	30	20.0
Purpose of the signs		
Educational	12	8.0
Religious	14	9.3
Political	10	6.7
Commercial	46	30.7
Combination of all the above purposes	68	45.3
$\chi^2 = 35.593$; @ d.f= 40; $p= 0.669$		
Do you get induced to read any sign at critical turning?		
Yes	117	78.0
No	33	22.0
Level of education and inducement to read roadside signs		
Primary	3	2.56
Secondary	4	3.41
Post-Secondary	110	94.93
$\chi^2 = 10.043$; @ d.f= 4; $p= 0.040$		

Do you get distracted at when trying to read the signs at critical turning?		
Yes	66	56.4
No	51	43.6

$\chi^2 = 12.765; @ d.f= 1; p= 0.001$

Does roadside advert sign hinder your driving decision generally?		
No hindrance	39	26.0
Little hindrance	61	40.7
Much hindrance	50	33.3

Does roadside advert sign affect safe driving decision in the city?		
Yes	80	53.3
No	70	46.7

Do you think roadside advert signs could be positioned without obstructing urban driving?		
Yes	127	84.7
No	23	15.3

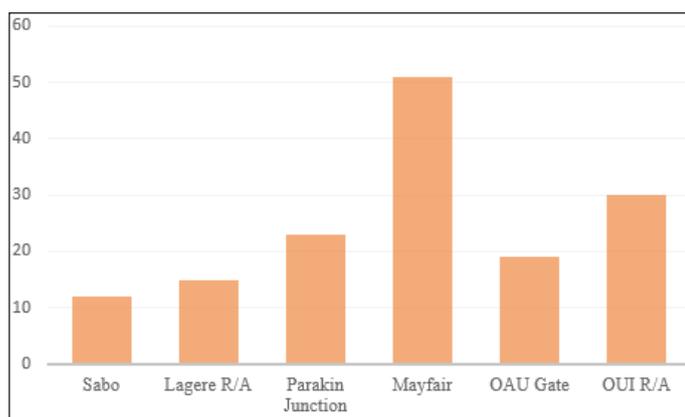


Fig. 2: Location of concentration

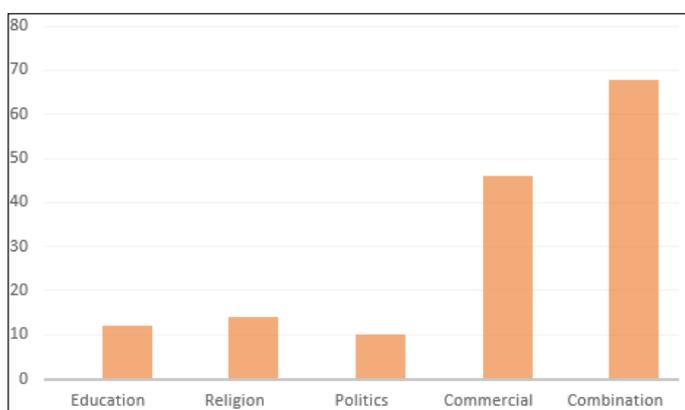


Fig. 3: Purposes of RASs

Extraneous information from respondents

Some extraneous information were recorded during questionnaire administration. Three (3) of the information gathered from the respondents are given below:

❖ *T'aja t'eran lo n se signboard, ati eyi to wulo ati eyi ti ko wulo.*

Meaning: Every Tom, Dick and Harry now erects roadside advertising signs with no concern for its needfulness.

The statement underscores the lack of regulation on the erection of RASs; a condition that encouraged proliferation of RASs in the study area.

❖ *Nje telefisan itagbangba yii yoo je ki awako koju si ibi t'o nlo bi?*

Meaning: Will this outdoor television (Digital Billboard) allow drivers to concentrate on driving task?

The above statement was made particularly at Lagere Roundabout where a new digital billboard was erected in the course of this study especially for the purpose of advertising the major annual cultural festival called Olojo (a festival in remembrance of Ogun--god of iron) in the study area.

❖ *Ati jade ni Iyana Parakin a maa fun mi ni wahala ni opolopo igba.*

Meaning: Exiting Parakin Junction gives me tough time most often.

The statement underscores the level of obstruction created by RASs at one of the locations in the study area.

Generally, however, the three statements provided additional proof to the influence of RASs on safe driving in the study area just as it is the case with findings in many other cities around the globe.

To the best of our knowledge, this study was the first of its kind to be carried out in any city of South-western Nigeria and by extension in any part of the country. The finding from the results indicated that RASs are a commonplace in the study area and are especially located at intersections and road bends. For

instance, the concentration of the RASs was seen to be highest at Mayfair Roundabout area of the study area. This is because, Mayfair Roundabout is found in one of the central business districts in the study area and the only location with highest level of intersections of roads leading in different directions. It represents a location where driving decision making could be critically hampered depending on the attractiveness and emotional content of the signs and many other factors such as traffic density (Miura, 1990)^[19], speed (Harms, 1986)^[20] and other roadway environmental sceneries. This conspicuousness and location preference is in accordance with findings from other studies which stated that optimum location or positioning is key to roadside advertisement for attracting the attention of passing drivers (Birdsall, 2008; Crundall *et al.* 2006; Underwood, 2007)^{[1], [11], [21]}.

Further, evidence from this study showed that RASs exerted inducing influence on the respondents while driving. This inducement to read the RASs at critical turnings could not be dissociated from the content of the advert signs which may appeal to respondents' emotional stimuli. This is in agreement with studies by Pessoa *et al.* (2002)^[22] and Vuilleumier (2005)^[23], who stated that drivers may be induced to read the roadside advert because of the emotional stimuli created by the emotional content of the advertisement. The study further revealed an association between level of education and inducement to read the RASs. This finding to the best of our knowledge has not been established by any study on roadside advertisement and driving distraction.

Again, the study showed a significant relationship between inducement to read RASs and distraction to drivers when taking driving decision. This finding further established the claim that inducement to read a sign is first initiated by ocular exploration by drivers which may lend his emotional stimuli to reading the content of the advert hence eventual distraction (Stutts *et al.* 2001; Crundall *et al.* 2006; Lee *et al.* 2007)^{[9], [11], [10]}. This thus, further established the findings from other studies that distraction, whether from in-vehicle objects or out-of-vehicle objects or sceneries are of significant global road safety concern (Young and Lenne, 2010)^[24]. However, the respondents' opinion on the influence of

RASs on driving decision generally in the study area showed a considerably high allusion to the hindrance which RASs constituted to driving decision among which are visual obstruction (whereby, drivers are hindered from clearly seeing the road either while entering or exiting any intersection); physical obstruction which reduces available space for road sharing (this is specifically in the study area, where some street-level RASs are visibly put on the roadside). As a runner up to the obstruction created by RASs, the respondents' submission that incessant placement of RASs in the study area has significant influence on safe driving activities in the study area. This result strengthens the argument that RASs have the potential to degrade driving performance and jeopardize driving safety (Liu, 2005)^[25] especially where relevant signage and hazards need to be detected (Engstrom, Johansson & Ostlund, 2005)^[26]. This is a growing threat which has not been acknowledged by advertising industry (Crundall, Van Loon & Underwood, 2006)^{[11], [21]} in locations where RASs are regulated; and in this study area where erection of RASs are mostly at the discretion of individuals without adherence to any legal regulations. However, the suggestion made by respondents that RASs could be positioned without creating any obstruction to urban driving will require strict regulation, enforcement from concerned agencies as well as penalties for any defaulting owners of the RASs located in any unsuitable site.

CONCLUSION

The findings of this study show that RASs have an established impact on driving activities especially from the distraction caused to drivers who were induced to read the content of the RASs and hindrances constituted in terms of difficulty in visibility as found out by other studies carried out in other parts of the world. However, the rate at which RASs impact driving in the study area can be reduced where erection of signs are well regulated. Further research, especially one that involves the use of high-tech simulation may be required to determine whether reduction in density of advertising signs may reduce drivers' inducement to read signs content and a consequent reduction in distraction level.

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