Online Image Content Analysis of Political Figures: An Exploratory Study*

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Abstract

This research examines the emotional content contained in facial pictures of South Korean politicians. The data were collected from official homepages of 18^{th} National Assembly members in South Korea. We classified the types of facial expressions (smiling, frowning, no expression) using the official photographs on the members' homepages. Our analyses show that a smiling image is the most prevalent facial expression on Web pages of South Korean politicians regardless of distribution of their socio-political-demographic attributes. Furthermore, our analyses suggest that existence and strength of a smiling image has statistically significant positive correlation with politicians' Web visibility counts. Opposition parties significantly exhibit more prevalent frowning faces and expressionless faces compared to ruling party. Besides, our findings hint that more experienced politicians, contrary to their less experienced colleagues of similar generations, keep smiling.

Keywords: visual content analysis, emotional content analysis, online visibility, web-based campaigns, facial expressions, candidate websites.

1 Introduction

In new attention-creation cyberspace (e.g., McAllister & Turow, 2009), one aim of individual and organizational websites is to induce active responses (e.g., click,

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post, trackback, etc.) from visitors. Because the public's interest in politics has been decreasing, political strategies have been increasingly focused on achieving people's attention and turning it into their participation and, ultimately, votes. One objective of homepage maintenance, from the politician perspective, is to present people with current news, policy reports, and photos so that they could verify and appreciate politicians' performance (Foot & Schneider, 2006). Accordingly, politicians have been increasingly uploading visual content (e.g., snapshots, video clips, etc.) in either the static or dynamic format on their websites to interact more effectively with their electorate.

The use of images can be a powerful strategy for a politician because people could copy and modify the images freely by using versatile computer-based and networked systems, spreading the politician's message (Druckman *et al.* , Forthcoming; Heaney *et al.* , 2010; Druckman *et al.* , 2007). Online images empower young "born-digitals" (Palfrey & Gasser, 2008) by allowing them to share political information more efficiently. Online visuals are critical when website visitors are relatively unfamiliar with places, objects, and activities displayed on the site (Hellemans and Govers, 2005).

Therefore, in this digital era, politicians can benefit online photo images in terms of civic engagement and mobilization. A website can enable politicians in the effective dissemination of political messages. Previous studies have focused mostly on the content of online communication and political services of politicians[1]. However, few have examined the effects of photographic images displayed on politicians' websites, which is the topic of this research.

There are many different types of visual content on political websites. This paper examines the emotional content embodied in facial pictures of Korean politicians. Facial expressions are important in web-based campaigns because a smiling photo can be immensely useful for promoting a positive image to voters. On the other hand, negative online facial images can be easily copied, manipulated, and distributed. Negative facial images could draw unwanted attention to politicians. However, previous studies have not systematically examined the effects of smiling and/or frowning faces on the level of voters' political interest and voting intentions. In this regard, this research does not report linear causality between the number of certain facial expressions and political performance in the Korean context. Rather, this study represents a preliminary attempt to apply an image-based content analysis technique to the political process to better understand the topology of online campaigns. More specifically, this study addresses the following interrelated set of research questions, which are exploratory in nature and require future empirical analysis in future:

- **What types of facial expressions are displayed on official homepages of politicians?**
- **More specifically, how do facial images differ among politicians in terms of politicians' socio-political-demographic attributes?**

[1] e.g., for a comparison of political website features across countries, see Kluver *et al.* 2007

- **To what extent type of prevalent facial expression of an individual politician and his/her Web visibility is correlated?**

2 Related Literature

Prior image research has focused mostly on the content analysis of photographic images in the media and communication fields (e.g., for the complete review, see Bauer 2000); studies on online images represent a relatively recent phenomenon. With respect to these studies on online image content analysis, social scientists have generally taken two approaches while those in the computer and information science community have taken one. The two approaches of social scientists are as follows: (i) descriptive studies investigating the usage practice of digital photos (e.g., to improve the presentation quality of messages and to provide rich and contextual information) and (ii) a theoretical perspective based on the (statistically tested) relationship between the intended strategy of website producers and the specific use of online images for a particular purpose.

The third stream of studies, which take a technical approach to the study of online images, is usually methodological in nature including digitizing images and organizing databases (e.g., parsing based on the use of new algorithms and digital tools available online). Angus *et al.* (2011) is a representative example for the third approach. However, we do not deal with technical literature because such discussions are beyond the scope of our study.

More specifically, the first social science approach addresses mainly the existence and/or prevalence of online images on websites. In a pioneering study on web campaigns, Foot & Schneider (2006) examined the frequency of political event photos on U.S. campaign websites from 1998 to 2004. They found that both political parties and individual politicians have gradually embraced the adoption of digital images on their websites. Further, they argued that the practice of displaying many campaign activity photos facilitates cognitive affiliation between the site producer and site visitors. Similarly, Park & Bae (2007) performed a content analysis of 277 Korean National Assembly members in 2004. They classified images into four categories and found that portraits of individual politicians were the most prevalent (87.4%). The next image category was political activities (53.4%). Cartoons/Comics (23.1%) followed. One notable finding was that the progressive party (DLP; Democratic Labor Party), members (66.7%) included "political activities" photos more than other party members. Kim *et al.* (2006)'s study is similar to our research. They compared website images of major Korean political figures and found that the number of smiling images of current President Myung-Bak Lee was slightly lower than that of his female competitor, Geun-Hye Park (29.3% and 32.8%, respectively), although the difference was not statistically significant.

Whereas the first social science approach focuses on online images to discern the adoption of digital photos by websites, the second applies the existing social science theories to examine the ways through which website authors use im-

ages to induce the involvement of site visitors in the activities promoted by the sites. Verser & Wicks (2006) examined the role of visual images during the 2000 electoral campaigns in the U.S. by taking the impression management theory perspective. They found that Gore and Bush used their websites to improve negative media portrayals. Whereas Gore presented campaign photographs that might have looked less serious, Bush focused on developing a respectable figure. In a study on the use of web technologies among U.S. congressmen, Druckman *et al.* (2007) found that politicians chose visual technologies (e.g., static photos, dynamic images, etc.) by considering practical and strategic political implications, reflecting the Technology Acceptance Model (Davis, 1989). Electoral candidates in a tight contest tended to present more visual images on their websites to better covey their central campaign messages. In other words, online images served as an important means to present political activities. More recently, Page & Duffy (n.d.) evaluated the visual strategies the candidates employed in the 2008 U.S. presidential campaign. They selected photographic images found on biographical sections of the sites and analyzed the overall themes of the images by considering Symbolic Convergence Theory. Their research showed that politicians used online images to build intimate relationships with various electorates. More specifically, candidates, regardless of their political affiliations, tried to boost positive image attributes such as patriotism, family, heritage, multi-culturalism, and populism.

Content analysis of images found on websites is conducted in different fields as well mainly at some studies on tourism industry (e.g., Choi *et al.* , 2007; Govers & Go, 2004). For instance, although Govers & Go (2004) did not examine political figures in cyberspace, the content analysis of digital images extracted from 20 Dubai based tourism websites enabled them to examine the digitalized characteristics of the tourism industry.

Some other recent studies have started to recognize the potential of online image content analysis. However, efforts have been largely limited to the English-speaking webosphere. Further, prior research has suggested that Internet researchers seek detailed evidence to gain a deeper and richer understanding of visual strategies of political sites within/across party lines. However, few efforts have been made to examine the relationship between socio-demographic attributes of political figures and the presentation style of visual images on websites. It is in this regard that the current study focuses on Korean congressional members' facial images on their official campaign websites.

3 Method

The images for this research are drawn from official homepages maintained by members of South Korea's 18^{th} National Assembly, which was elected in April 2008. This study analyzed 277 out of a total of 292 members, as of 13 August 2009. Eight members did not have homepages at the time of this research; sites of seven members were not accessible due to technical maintenance. We obtained all the photos from these homepages through a freely available computer

program (Teleport Pro) and then manually collected a list of images posted only to the front pages of the politicians' homepages. During the combination process of computer-assisted collection and manual verification, we minimized the possible exclusion of some photographic images due to the use of single software. All forms of images including static photos and dynamic Flash animations on the front pages were gathered. Later, images contained on video files were excluded from further examinations.

We then classified the types of facial expressions as smiling, frowning, and no expression. Coding schemes were drawn from previous studies (Coleman & Wasike, 2004; Verser & Wicks, 2006). Given that this is an exploratory research, one coder was employed. During this process, we used the criterion given in Table 1.

Table 1: Classification of facial expressions.

Types	**Content**
Smiling face	Turning up the corners of the mouth, usually showing their teeth; an upward curving of the corners of the mouth, revealing pleasure, happiness, or amusement; a downward curving of the corners of the eyes, expressing moderate joy.
Frowning face	Wrinkling of the brow, showing displeasure, anger, unrest, disapproval, and tiredness; a downward curving of the corners of the mouth; staring at something with anger, discontent, or unkindness.
No-expression	No movement around mouth, eyes, or brow, revealing no emotional information.

R statistical tool and programming environment is used for all of the analysis and graphical visualizations[2].

4 Results

The number and ratio of facial expressions are summarized in Table 2. A total of 1,879 facial images were collected; 1,254 or 66.74 percent of the photos were smiling, while more than 25 percent of the photos were frowning.

Table 2: Number and percentage of facial images by type.

	Types			
	Frowning	No-expression	Smiling	Sum
Frequency	154	471	1,254	1,879
(Percent)	(8.20)	(25.07)	(66.74)	(100.00)

It is widely acknowledged that inter-coder reliability is a critical component of content analysis: "Without the establishment of reliability, content analysis

[2] R is a free software environment for statistical computing and graphics. See `http://www.r-project.org/`

measures are useless" (Neuendorf, 2002, p. 141). To assess the reliability of the coding system we have set up an experiment. 10 random facial images, as of 16 February 2010, of each legislator is used. Images per legislator were downloaded randomly from the Naver[3] and were coded according to three types of facial expressions. In total we have formed a set of 2,920 images. The set of images were given to 2 separate coders along with classification scheme as outlined in Table 1. Independently, they have coded each single image. Four different numeric labels are used to classify each image. See Table 3. Note that a prevalent facial expression other than a *smiling* or *frowning* is classified as *other*.

Table 3: Coding labels for facial expressions.

`Expression`	`Label`
frowning	1
no-expression	2
smiling	3
other	4

Labelings of two independent coders are then compared. We have employed two different inter-rater reliability method: `Percent agreement` (Riffe *et al.* , 1998) and `Krippendorff's Alpha`(Krippendorff, 2004). Our choice of `Percent agreement` stems from its being most widely used method. However, literature suggests that although it is intuitively appealing and simple to calculate, it should be accompanied with a more robust method (White & Marsh, 2006). `Krippendorff's Alpha` is known to be the most conservative producing lower values compared to other methods; yet it remains valid with multiple coders, different sample sizes and missing data, in that sense, it is regarded and recommended (Hayes & Krippendorff, 2007).

As of three facial expression of our research interest, `Percent agreement` measure has suggested 0.71 level of reliability for the coding scheme, which is over accepted 0.70 threshold (Riffe *et al.* , 1998). While our results in Table 2 reveals that smiling expressions are prevalent, it also suggests that number of frowning and no-expression images are relatively rare. Based on this observations we have dichotomized classifications as smiling and non-smiling in order to further examine reliability of our findings. Both of the methods, `Krippendorff's Alpha` ($= 0.81$) and `Percent agreement` ($= 0.92$), have suggested supportive indices.

[3] Naver is the most popular portal/search engine in South Korea. See `http://www.naver.com`

5 Analysis and Discussions

5.1 Age Distribution

As of time of data collection, ages of assembly members are exhibiting a normal-like distribution with a mean and median around 56. Figure 1 displays normal Q-Q plot and box plot of age distribution. The distribution plots together confirms normal-like age distribution of the assembly. The youngest member is 38 years old whereas the oldest member is 79 years old.

The gender distribution of the assembly shows that it is male dominated. Out of 292 members there are only 41 female legislators.

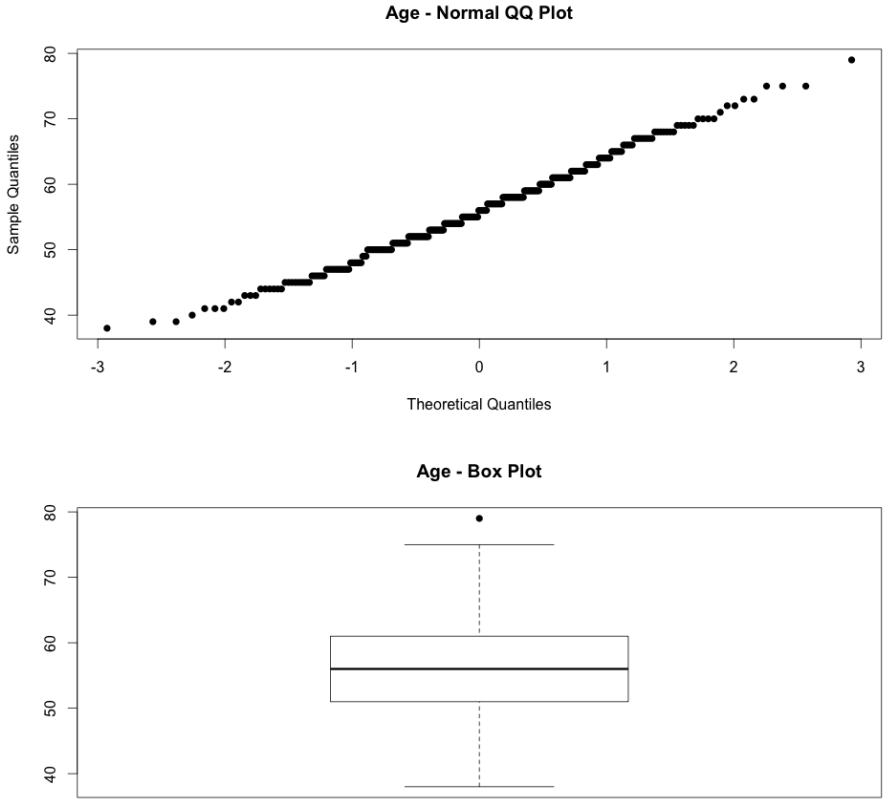

Figure 1: Age distribution of 18^{th} National Assembly members in South Korea in September 2009.

5.2 Distribution of Facial Expressions

Our data show that smiling image is the most prevalent facial expression on Web pages of South Korean politicians regardless of their socio-political-demographic attributes. Table 2 presents prevalence of smiling images at an aggregate level without looking at its prevalence for each individual. This can also be seen with box whisker plots of Figure 2, which displays distribution of values attributed with each category of facial expressions. Thus, it further examines frequency of expressions comparatively. In other words, it checks prevalence of each expression on the Web site of each individual. It is seen that distribution of number of smiling images on members' sites are bell shaped with a tail for large values. On the average each assembly have around 5 smiling images. Expressionless or frowning images, however, compared to smiling images are very much skewed emphasizing their rarity.

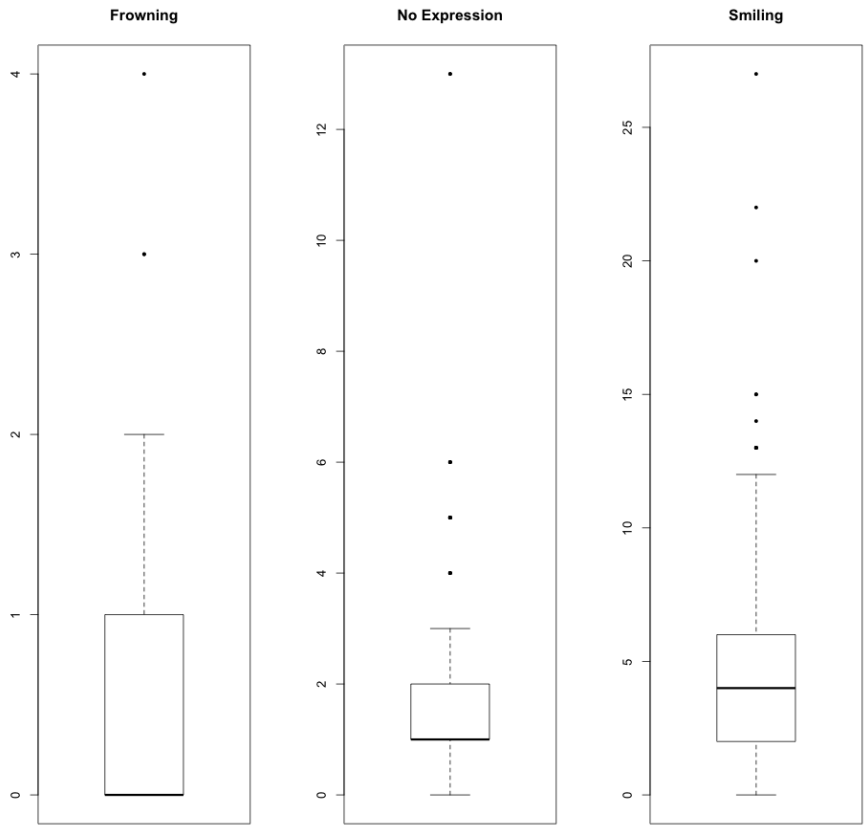

Figure 2: Distribution of values for each facial expression category.

5.3 Experience and Facial Expressions

Table 4: Correlation tests on experience.

		Age	Site Size	Naver
Experience	df	290	278	290
	t	6.8376	3.0476	3.9037
	p-value	4.762e-11	0.0025	0.0001
	cor	0.3726	0.1798	0.2234

Next we have examined whether there is any pattern in between members ages and the facial expressions on their pictures they have picked to post on their web pages. We have used occurrence frequency of each facial expression of a member as its intensity. First, we have examined their exact ages. We have not observed any correlation in between ages and existence or intensity of any particular facial expressions. Then, we have categorized each ages into groups of decades to examine if there is any significant differences in between age groups regarding facial expressions. Although our statistical tests did not produce very significant correlations, there are signs of patterns in between age decades and preference of a particular facial expression. The box plots of Figure 3 reveals that members are opting to wear a facial expression on their public images on the Web. Younger age groups dominantly prefer to have a smiling image, as age groups get older its intensity is getting decreased and more and more frowning faces are shoring up. Observing sign of a pattern of relations in between age decades and facial expressions, we have tested if members' age decade is correlated to their experience as common sense suggests. Experience is measured by number of terms they have served so far. Our test result has supported the age and experience relation very significantly. The details of the test statistics is tabulated in Table 5. Next, we have tested if there is any correlation in between experience and preference of facial expressions. Our results show that prevalence of only smiling faces are correlated to experience level. The more experienced a member the more smiling he/she is. Sign of decreasing smiling expressions at older age decades but increasing smiling expressions with increased experience along with age-experience common sense suggests that more experienced politicians, contrary to their less experienced colleagues of similar generations, keep posting smiling pictures.

Table 5: Correlation tests on facial expressions.

		Log (Naver)	Experience
Smiling	df	275	275
	t	3.2484	2.0934
	p-value	0.0013	0.0372
	cor	0.1922	0.1253

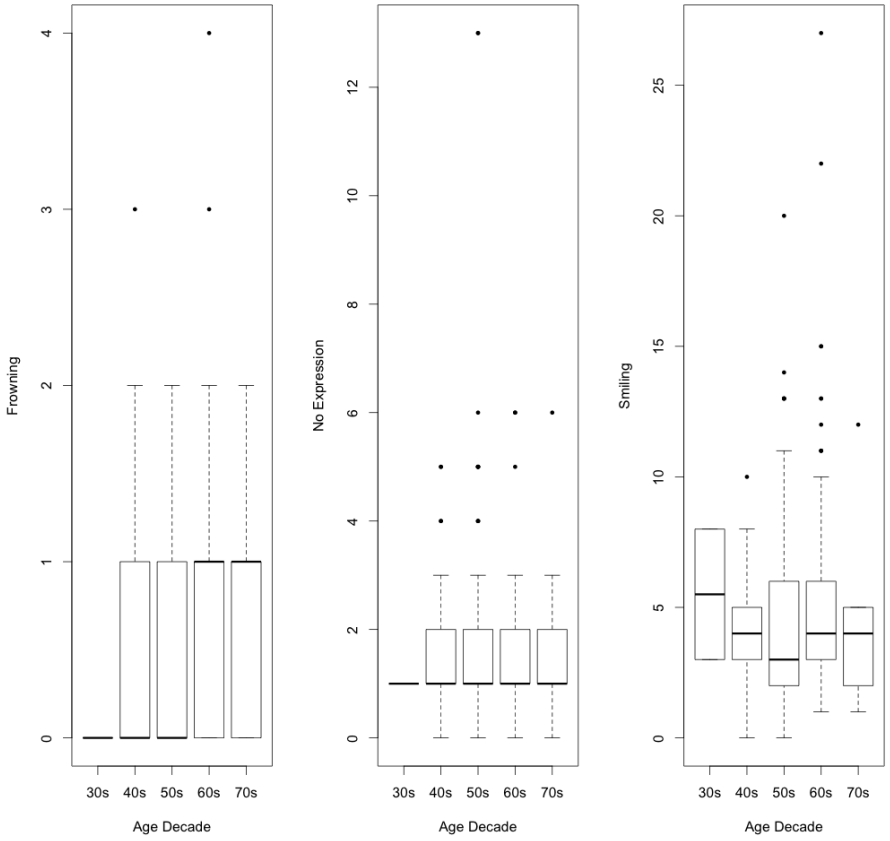

Figure 3: Facial expressions over age decades.

5.4 Gender, Hometown, and Constituency

We have also explored if there is any gender differences on facial expressions. We were not able to observe any significant gender difference. As of members' hometown, amongst all three facial expressions only occurrences of smiling pictures reveal significance (p-value = 0.012). Members original election provinces does not impose any facial expression differences either. However, when we compare Seoul to other provinces, we observe significant differences in between smiling rates. Members from Seoul metropolitan area are exhibiting more smiling expressions.

5.5 Party Affiliation

Figure 4 depicts distribution of political parties represented in the assembly regarding presence of their members' smiling and frowning pictures. Although visual depiction of distributions may hint differences from one political party to another, Kruskal-Wallis rank sum test on our current data do suggest a significant difference (p-value = 0.034) only for differences on frequency of frowning expressions.

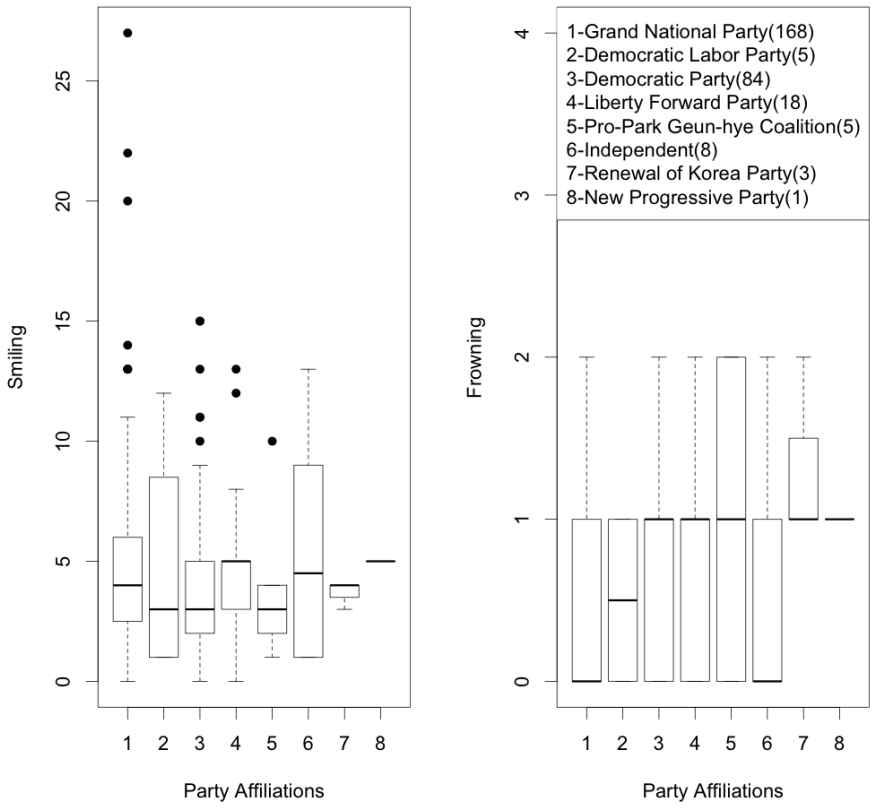

Figure 4: Smiling and frowning pictures regarding party affiliations.

However, when we compare ruling party to the opposition (all other parties), we catch statistically significant differences. Opposition groups exhibit more prevalent frowning faces (p-value = 0.0014) or expressionless faces (p-value = 0.0415) compared to ruling party. On the other hand, although it is not very significant, yet ruling party has more smiling faces (p-value = 0.1159) opposition group. See Figure 5 for comparisons.

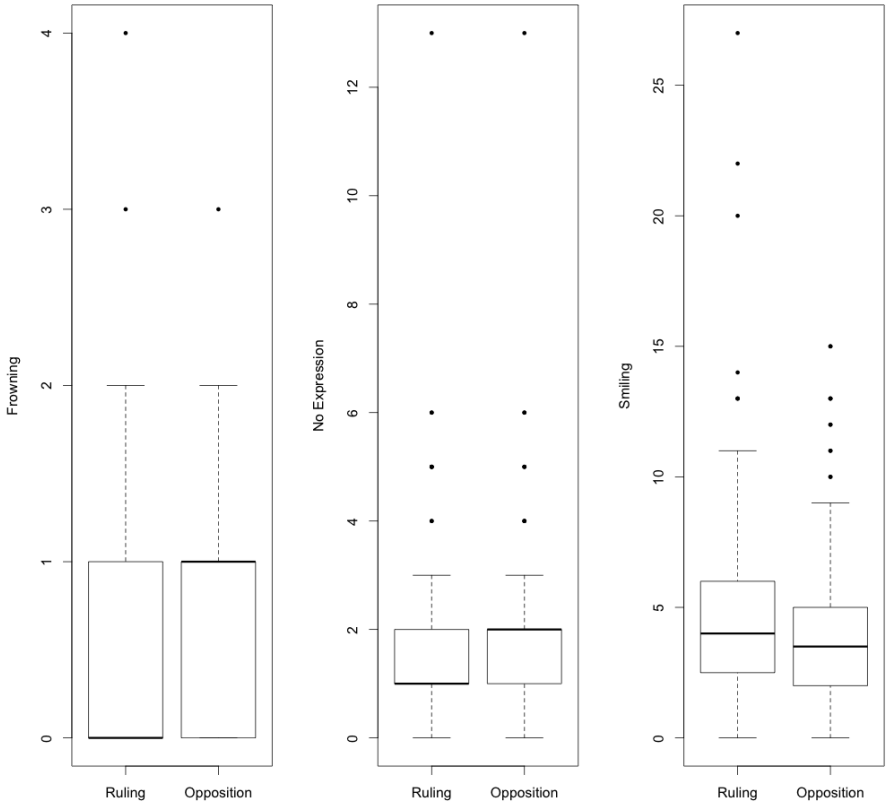

Figure 5: Ruling Party vs opposition groups.

5.6 Visibilities and Facial Expressions

Having explored the relation in between members socio-political demographies and their facial expressions on the pictures they have on their personal homepages, next, we have investigated if there is any relation in between politicians Web visibility and their facial expressions which is identified with their pictures on their own Web sites. Web visibilities of members are estimated by members in-link counts and their Naver visibilities. The in-link counts are an estimate of number of links their personal homepages receive externally. The number of links given by Yahoo is used. Naver visibility on the other hand estimates how many times one's name has been mentioned in Naver. In addition, we have estimated size of one's Web page by number sub-webpages within one's homepage. Again, we have employed Yahoo to estimate site sizes.

Rows in Figure 6 display distributions of members' Web presence and visi-

bilities. They are, from top to down, number of Web pages on one's site, counts of one's name mentioned in Naver, and number of in-links to one's site, respectively. It is seen that all of these distributions are very skewed. There are few members with very large in-links, Naver visibilities, and site sizes.

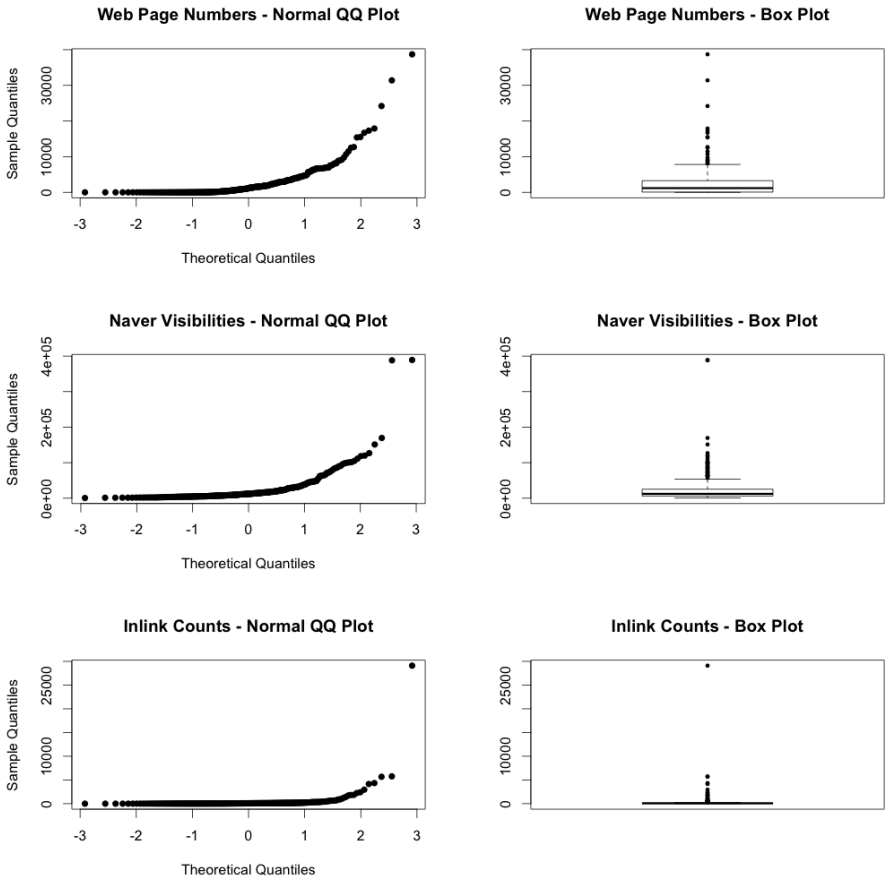

Figure 6: Web visibilities.

Our first attempt has been to examine if there is any statistically positive correlation in between parameters. Results in Table 6 suggest that pairwise they are correlated positively. However, one's Naver visibility is most significantly correlated to in-link counts but not to the size of one's Web site.

Finally, we have tested pairwise correlations in between different facial expressions and Web visibility parameters. We have been able to observe a positive correlation in between having more smiling pictures posted at one's Web site and one's Naver visibility counts. Relevant test results can be seen in Table 4. On the other hand, there is no statistically significant association in between

Table 6: Pairwise correlations of visibility parameters.

	Site Size	In-link
Naver	0.183*	0.536**
Site Size	-	0.251**
* p=0.002, **p$\ll$0.001		

one's site Size or in-link counts and one's facial expression in his/her pictures on his site.

6 Conclusions

6.1 Summary

Our analyses show that a smiling image is the most prevalent facial expression on Web pages of South Korean politicians regardless of distribution of their socio-political-demographic attributes. Furthermore, our analyses suggest that existence and strength of a smiling image has statistically significant positive correlation with politicians' visibility counts received from the most popular Korean portal but not with their personal Web page counts or in-link counts to their sites. Any negative or positive associations were not possible to observe for other facial expressions.

Additionally, it is seen that opposition parties significantly exhibit more prevalent frowning faces and expressionless faces compared to ruling party, however, ruling party has relatively more smiling members than opposition groups.

Although the Assembly members reveal significantly different facial expressions regarding their hometown and election provinces, there is no gender based differences.

It is also observed that experience level is positively correlated to smiling face pictures. Besides, our findings hint that more experienced politicians, contrary to their less experienced colleagues of similar generations, keep smiling.

6.2 Limitations and Future Directions

This investigation of facial expressions on politicians' homepages generated very interesting results. However, to improve the validity of the findings an odd number of multiple coders can be employed for the classification. On the other hand, in order to develop more elaborate discussions that seek to understand relations between images communicated online and socio-political-demographic attributes of the owners' facial expression categories can be extended.

Lastly, a set of research questions for future directions can be itemized as follows:

- A longitudinal analysis: What facial expressions did oppositional politicians make when they were in power?

- International comparison: How socio-political-demographic attributes of legislators in different regions differ in terms of regionally primed facial expression to be conveyed online?
- Image vs Text: How do expressive content of profile images and content of textual narration found on legislators website couple or decouple?

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