

Boussalis, Constantine; Dukalskis, Alexander; Gerschewski, Johannes

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Why It Matters What Autocrats Say: Assessing Competing Theories of Propaganda

Problems of Post-Communism

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Supplementary materials for “Why it matters what autocrats say: Evidence from an extreme and least likely case”

Appendix A. Description of estimated topics.

In the following, *Table A1* displays the full list of estimated topics, the topic identification number, assigned label, assigned meta-topic label, attraction/distraction classification and top five classified terms for each of the 85 topics estimated by the dynamic topic model. *Table A2* displays the full list of super-topics along with a list of underlying topics (and topic identification numbers) which make up each super-topic. Further, each super-topic is classified as being largely distractive or attractive. The prevalence of each super-topic is also listed.

Topic ID	Topic Label	Super-Topic Label	Attract/Distract	Top 5 Terms
0	Dance	Culture	D	spirit general song loyalty revolution
1	US/SK Exercises	External Threat	A	war korean south military korea
2	Global Socialism	Ideology, Revolutionary Legacy	A	socialism independence imperialist struggle cause
3	KPA Inspections	Internal Power Structure	A	soldier unit kpa kim say
4	Korean War Treaty	Reunification	A	korea korean peace peninsula south
5	JPN Colonialism	Japanese Politics	D	korea japanese korean history japan
6	Holidays	Culture	D	pyongyang people city day north
7	Tech. Exhibits	Domestic Development	A	science technology scientific develop national
8	SK Pro-NK Groups	South Korean Politics	D	south student hanchongryon korean law
9	For. Military Deleg.	Foreign Affairs	A	army people kpa force armed
10	Kim Generosity	Personality Cult	A	suk child jong family say
11	For. Support for Reunif.	Reunification	A	people korean support korea solidarity
12	For. Satellites	Foreign Affairs	A	missile launch threat system artificial_satellite
13	NK Development	Domestic Development	A	production build construction factory worker
14	Historical Relics	Culture	D	korea korean metre mountain long
15	US Mil. in SK	South Korean Politics	D	seoul south organization korea hold
16	Rev. Heroes	Ideology, Revolutionary Legacy	A	people official party senior state
17	Acrobats	Culture	D	china chinese friendship korean dprk
18	SK Elite Criticism	South Korean Politics	D	government say commentary note add
19	North-South Coop.	Reunification	A	side talk south north hold
20	Taekwon-do	Culture	D	mongolia mongolian germany italy poland
21	For. Praise Kim	Personality Cult	A	kim jong great sing president
22	Chongryon Events	Japanese Politics	D	japan korean chongryon resident general
23	Natural Disasters	Natural Disaster	N/A	nuclear nuclear_weapon case secret investigation

24	Educ. Achievements	Domestic Development	A	university school education student teacher
25	Football	Culture	D	sport team game world hold
26	For. Supporters	Ideology, Revolutionary Legacy	A	group british britain swiss study
27	Kim Publishing	Ideology, Revolutionary Legacy	A	juche work idea character revolution
28	SK Conserv. Criticism	South Korean Politics	D	traitor pro power force conservative
29	Party Org. Meetings	Internal Power Structure	A	year meeting new make call
30	Deleg. & Visits	Ceremonial Diplomacy	D	delegation head lead visit member
31	For. Leader Msg.	Personality Cult	A	cuba cuban president people cambodia
32	For. Holiday/Events	Ceremonial Diplomacy	D	korea friendship embassy vice present
33	For. Visit Mangyongdae	Personality Cult	A	visit president sing palace museum
34	Kim Birthday Celeb.	Personality Cult	A	meeting committee hold chairman kim
35	For. Ambassadors	Ceremonial Diplomacy	D	people dprk korea assembly president
36	Maritime Trade	Domestic Development	A	company ship sea trade maritime
37	Healthcare	Domestic Development	A	service hospital health people medical
38	Iran	Foreign Affairs	A	iran iranian child tourist camp
39	Intl. Festivals	Culture	D	festival film exhibition award show
40	SK Uprisings	South Korean Politics	D	south people struggle korea korean
41	For. Detained in NK	Foreign Affairs	A	dprk case smear_campaign incident anti
42	Appointments & Elect.	Internal Power Structure	A	kim jong yong song pak
43	For. Kim News	Personality Cult	A	paper article report news carry
44	Capitalism Problems	North Korea Criticism of International Politics	D	south year economic economy korea
45	Friendly Diplomacy	Ceremonial Diplomacy	D	relation dprk friendship develop country
46	Korean War Victory	Ideology, Revolutionary Legacy	A	war korean people victory enemy
47	Chongryon Repression	Japanese Politics	D	dprk japan japanese korean authority
48	Kim Publishing2	Personality Cult	A	reunification national great unity proposal
49	Land Mangement	Domestic Development	A	area plant korea water year
50	Mt. Paektu	Ideology, Revolutionary Legacy	A	revolutionary site activity monument kim
51	For. Leader Greetings	Ceremonial Diplomacy	D	people president message greeting country
52	SK Reunif. Criticism	South Korean Politics	D	south korean north korea authority
53	CHN Anti-JPN	Japanese Politics	D	japanese anti liberation revolutionary struggle

	Fighters			
54	For. Greeting to Kim	Personality Cult	A	party communist secretary general chairman
55	NK in Intl Orgs	Foreign Affairs	A	country international development develop principle
56	Imperialism	Ideology, Revolutionary Legacy	A	world country imperialist article today
57	Farming	Domestic Development	A	agricultural farm farmer field agriculture
58	US Aerial Spying	External Threat	A	plane air area line dprk
59	Lee Myung Bak	South Korean Politics	D	people enemy army dprk blow
60	Prisoners in SK	South Korean Politics	D	south letter korean korea unconverted_long
61	SK Dom. Politics	South Korean Politics	D	kim young_sam national ansp people
62	NK Materials in SK	Ideology, Revolutionary Legacy	A	book publish national seoul korea
63	NK Ideology	Ideology, Revolutionary Legacy	A	people powerful nation korean socialist
64	JPN War Denialism	Japanese Politics	D	japan japanese crime make compensation
65	June 15 Declaration	Reunification	A	reunification south national north festival
66	KEDO	Reunification	A	agreement agreed_framework facility implementation supply
67	WPK Intl Relations	Ceremonial Diplomacy	D	party committee secretary central worker
68	Korean Cuisine	Culture	D	food framework_agreement ton korean make
69	US Human Rights	North Korea Criticism of International Politics	D	human_right right international law human_rights
70	NK Tech/Medical Adv.	Domestic Development	A	method make produce medicine new
71	SK Labor Movement	South Korean Politics	D	worker south trade_union seoul strike
72	US-NK Policy	Nuclear Issue	A	dprk united_state issue united_states stifle
73	Dem. Women's Union	Internal Power Structure	A	woman movement union social society
74	Youth League	Internal Power Structure	A	youth student young youth_league symposium
75	For. Ministry Talks	Foreign Affairs	A	minister foreign talk dprk government
76	National Unity & Reun.	Reunification	A	national nation reunification unity country
77	Floral Tribute to Kim	Personality Cult	A	kim jong secretary president general
78	SK-US Policy Criticism	North Korea Criticism of International Politics	D	statement korean authority spokesman committee
79	Music & Dance Perform	Culture	D	art song performance korean artiste
80	Juche Study	Ideology,	A	idea juche study seminar institute

	Abroad	Revolutionary Legacy		
81	Ideology Faith	Ideology, Revolutionary Legacy	A	people korean life say country
82	JPN Aggression	External Threat	A	japan military japanese_reactionary aggression japanese
83	Disease in SK	South Korean Politics	D	korean south war korea kill
84	For. Msg Sympathy	Ceremonial Diplomacy	D	people assistance damage government suffer

Table A1. *Full list of estimated topics.* This table displays the topic identification number, assigned label, assigned meta-topic label, attraction/distraction classification and top five classified terms for each of the 85 topics estimated by the dynamic topic model.

Super-Topic Label	Attract/Distract	Super-Topic Prevalence	Underlying Topics [ID]
<i>International issues</i>			
<i>Ceremonial Diplomacy</i>	Distract	0.084	[30] Delegations and Visits, [32] Receptions to Mark Foreign Holidays/Events, [35] Foreign Ambassadors Presenting Credentials, [45] Friendly Diplomatic Exchanges, [51] Greetings to Foreign Leaders, [67] WPK Relations with Friendly Foreign Parties, [84] Messages of Sympathy to Foreign Leaders
<i>External Threat</i>	Attract	0.05	[1] US & South Korea Military Exercises, [58] Aerial Spying by US, [82] Japanese Aggression
<i>Foreign Affairs</i>	Attract	0.048	[9] Foreign Military Delegations, [12] Foreign satellites, [38] Iran, [41] Foreigners Detained in NK, [55] North Korea in International Organizations, [75] Foreign Ministry Talks
<i>Nuclear Issue</i>	Attract	0.035	[72] Criticism of US North Korea Policies
<i>South Korean Politics</i>	Distract	0.144	[8] Repression of Pro-NK Groups in South Korea, [15] US Military in South Korea, [18] Criticism of South Korean Elites, [28] Criticism of South Korean Conservatives, [40] Anniversaries of Uprisings in South Korea, [52] Criticism of South Korea's Reunification Policies, [59] Destroying Lee Myung Bak & Allies, [60] Repatriation of Long-term Prisoners in South Korea, [61] South Korean Domestic Politics, [71] South Korean Labor Movement, [83] Disease & Epidemics in South Korea
<i>Japanese Politics</i>	Distract	0.043	[5] Japanese Colonialism, [22] Chongryon Events, [47] Repression of Chongryon, [53] Chinese Families of Anti-Japanese Fighters Visiting DPRK, [64] Japan Denying Wartime Past
<i>NK Criticism of Int'l Politics</i>	Distract	0.025	[44] Economic Problems of Capitalist Countries, [69] Criticism of US Human Rights, [78] Criticism of South Korean & US Policies; International Legitimacy of NK Policies
<i>Natural Disaster</i>	N/A	0.004	[23] Natural Disasters
<i>Reunification</i>	Attract	0.086	[4] Korean War Peace Treaty, [11] Foreign Support for Korean Reunification, [19] North-South Dialogue & Cooperation, [65] Support for June 15 Declaration Abroad, [66] KEDO, [76] National Unity & Reunification
<i>Domestic issues</i>			
<i>Domestic Development</i>	Attract	0.077	[7] Technology Exhibitions, [13] NK Development Progress, [24] Educational Achievements and Improvements, [36] Maritime Trade, [37] Healthcare, [49] Land Management & Weather in DPRK, [57] Farming (Planting & Harvest), [70] Technological & Medical Advances in DPRK
<i>Ideology/Rev. Legacy</i>	Attract	0.138	[2] Global Socialism, [16] Wreaths for Revolutionary Heroes, [26] Foreign Supporters, [27] Kim Jong Il's Writings Published Abroad, [46] Korean War Victory, [50] Study Tours of Mt. Paektu, [56] Imperialism, [62] NK Materials Read in South Korea, [63] North Korean Ideology, [80] Juche Study Groups Abroad, [81] Ideological Faith & Devotion
<i>Personality Cult</i>	Attract	0.15	[10] Care & Generosity of Kims, [21] Foreigners

			Praising Kims, [31] Messages to Kim Jong Un from Foreign Leaders, [33] Foreigners Visiting Mangyongdae, [34] Birthdays of Kims Celebrated Abroad, [43] News About Kims Reported Abroad, [48] Kim Jong Il's Writings Published Abroad, [54] Foreign Greetings to Kims & Party Organizations, [77] Foreigners Paying Floral Tribute to Kims
<i>Internal Power Structure</i>	Attract	0.046	[3] Kim Jong Il KPA Inspections, [29] Party & Mass Organization Meetings, [42] Appointments & Elections, [73] Democratic Women's Union of Korea (DWUK), [74] Youth League
<i>Culture</i>	Distract	0.07	[0] Dancing Celebrations, [6] Recreation & Holidays, [14] Historical Relics, [17] Acrobats, [20] Taekwon-do, [25] Football, [39] International Festivals & Exhibitions, [68] Korean Cooking & Food, [79] Music & Dance Performances

Table A2: *List of super-topics.* This displays the full list of super-topics along with a list of underlying topics (and topic identification numbers) which make up each super-topic. Further, each super-topic is classified as being largely distractive or attractive. The prevalence of each super-topic is also listed.

Appendix B. Detailed results of statistical model

Our study seeks to explain variation in six outcome variables that are derived from the output of a dynamic topic model of over 135,000 North Korean news agency articles. Specifically, we estimate the effect of the succession period on average weekly topic proportion for six aggregations of estimated topics: *Attraction*, *Distraction*, *Personality Cult*, *Domestic Development*, and *Ideology/Revolutionary Legacy*. We employ the following model:

$$(1)$$

Where, again, μ_{it} is the mean topic proportion for week t that is measured at equivalent intervals, i is the number of weeks since the beginning of the observation period, and D_{it} is a dichotomous variable which indicates the period following the transfer of power to Kim Jong Un.

	(1)	(2)
	Attraction	Distraction
T	-0.00001 (0.00002)	-0.00000 (0.00002)
X ₁	0.04928** (0.01503)	-0.04448** (0.01462)
X ₁ T	-0.00001 (0.00006)	0.00003 (0.00006)
Intercept	0.57043*** (0.00943)	0.43025*** (0.00934)
R ²	0.023	0.056
Durbin-Watson Statistic	2.157	2.168
N	1090	1090

Table B.1 Prais-Winsten regression results for *Attraction* and *Distraction*. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	(4)	(5)	(6)
	Personality Cult	Domestic Development	Ideology / Revolutionary Legacy
T	-0.00002 (0.00002)	0.00004*** (0.00001)	0.00002** (0.00001)
X ₁	0.09026*** (0.01942)	-0.01559** (0.00552)	-0.00412 (0.00533)
X ₁ T	-0.00004 (0.00009)	-0.00000 (0.00003)	-0.00006* (0.00002)
Intercept	0.13535*** (0.00855)	0.05682*** (0.00314)	0.10833*** (0.00338)
R ²	0.077	0.034	0.011
Durbin-Watson Statistic	1.769	2.039	2.121
N	1090	1090	1090

Table B.2 Prais-Winsten regression results for *Personality Cult*, *Domestic Development*, and *Ideology and Revolutionary Legacy*. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The results of these models are also presented graphically below. We find a statistically significant increase in *Attraction* messaging ($p < 0.05$) and decrease in *Distraction* ($p < 0.05$) discussion following the transition of leadership. Further, a drastic increase in *Personality Cult* messaging ($p < 0.01$) within the official North Korean news is also demonstrated. Lastly, a more modest decrease in the post-treatment period is recorded for *Domestic Development* ($p < 0.05$), whereas no difference in messaging on *Ideology/Revolutionary Legacy* is found between the two periods.

Appendix C. Permutation tests

Even though the succession date of Kim Jong Un to the North Korean leadership is well known, a reasonable concern exists that the observed effect of the succession on communication of *Attraction*, *Distraction*, *Personality Cult*, and *Domestic Development* themes might also be observed when using alternative cutoff dates. To further demonstrate that the observed effect of succession is not simply an artefact of the data, we perform a placebo test for all models reported in the study. Specifically, we run an interrupted time series model for each week prior to the actual succession period being assigned as the beginning of the treatment period. *Figure C.1* displays the distributions of the coefficients for X_1 for each of these hypothetical cutoff dates, as well as the estimated effect from a model with the actual succession period. The plots show how the effect of the actual succession period (solid vertical line) falls outside the middle 95% of these null distributions (dashed vertical lines) for the *Attraction*, *Distraction*, and *Personality Cult*, and *Domestic Development* models.

Figure C.1 *Permutation test results.* These plots display the observed effect of the actual succession period (solid vertical line) and null distributions based on alternative treatment periods estimated from all pre-succession weeks. The dashed vertical lines represent 95% of the null distribution.

Appendix D. Alternative Treatment Periods

This section provides alternative model specifications for the statistical tests employed in the main text of the study. More precisely, we provide results of interrupted time series models which analyze the effect of the lead-up to and actual succession on North Korean propaganda communication. Specifically, we estimate a set of models that include two succession treatments---namely, (1) the decision by Kim Jong Il to appoint Kim Jong Un as his successor (2 June 2009)¹ and (2) the actual succession of Kim Jong Un (19 December 2011). We employ the following model:

(1)

Where μ_t is the mean topic proportion for week t measured at equally spaced intervals, T is the number of weeks since the beginning of the observation period, D_1 is a dichotomous variable which measures the first succession period (decision by Kim Jong Il to appoint Kim Jong Un as successor), and D_2 is a comparable variable which indicates the second succession period (succession of Kim Jong Un). We estimate these statistical models using a user-written implementation in Stata (Linden, 2015). The results are displayed in the tables below.

	(1)	(2)
	Attraction	Distraction
T	-0.00004 (0.00003)	0.00004 (0.00003)
X ₁	0.05753*** (0.01737)	-0.05562** (0.01700)
X ₁ T	-0.00050** (0.00019)	0.00032 (0.00019)
X ₂	0.07083*** (0.01902)	-0.05124** (0.01799)
X ₂ T	0.00052** (0.00020)	-0.00033 (0.00019)
Intercept	0.57565*** (0.01039)	0.42200*** (0.01032)
R ²	0.032	0.065
Durbin-Watson Statistic	2.149	2.158
N	1090	1090

Table D.1 Prais-Winsten regression results for Attraction and Distraction. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	(4)	(5)	(6)
	Personality Cult	Domestic Development	Ideology / Revolutionary Legacy
T	-0.00005 (0.00003)	0.00002 (0.00001)	0.00004*** (0.00001)
X ₁	0.03787* (0.01806)	0.01849* (0.00723)	0.02531** (0.00830)
X ₁ T	-0.00026 (0.00020)	0.00006 (0.00008)	-0.00055*** (0.00009)
X ₂	0.09821*** (0.02359)	-0.02840*** (0.00727)	0.03508*** (0.00675)
X ₂ T	0.00024 (0.00021)	-0.00004 (0.00008)	0.00048*** (0.00009)
Intercept	0.14018*** (0.00946)	0.06279*** (0.00328)	0.10431*** (0.00347)
R ²	0.082	0.052	0.044
Durbin-Watson Statistic	1.768	2.025	2.091
N	1090	1090	1090

Table D.2 Prais-Winsten regression results for Personality Cult, Domestic Development, and Ideology and Revolutionary Legacy. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The results of these analyses are also illustrated in *Figure D.1* below. Table D.1 shows how an average document in the post-announcement period, relative to the pre-treatment period, contains 5.7% more words related to *Attraction* and 5.5% less terms related to *Distraction*. Further, relative to Kim Jong Il's succession decision, *Attraction* messaging increased ($p < 0.01$) and *Distraction* discussions decreased ($p < 0.05$) following the succession of Kim Jong Un. Table D.2 shows a significant increase in *Personality Cult* communication following the succession decision and a much more pronounced positive and statistically significant increase ($p < 0.01$) in the second treatment period when compared to both the pre-treatment and first treatment periods. Lastly, in the case of *Domestic Development*, the initial news of Kim Jong Un's accession was accompanied by a boost in the prevalence of stories on this theme ($p < 0.1$). However, following the transition of Kim Jong Un, we observe a drop in this messaging ($p < 0.01$). A similar pattern in terms of initial treatment trends can be seen with regard to ideology and revolutionary legacy, however a small increase in discussion occurs following the actual transition relative to the announcement ($p < 0.01$).

Figure D.1: *Interrupted time-series analysis results.* This figure displays the average weekly topic proportions for (a) *Attraction*, (b) *Distraction*, (c) *Personality Cult*, (d) *Domestic Development*, (e) *Ideology and Revolutionary Legacy* over the period 26 May 1997 – 10 May 2018. The dashed vertical lines represent (1) the decision by Kim Jong Il to appoint Kim Jong Un as his successor in June 2009 and (2) the actual succession of Kim Jong Un in December 2011. Predicted values for the pre-treatment and succession treatment periods are represented by the solid lines.

Appendix E. Details on Concurrent Validity

We further explore the validity of the model output by estimating the concurrent validity of the labeled topics by comparing the predicted topic classifications provided by the algorithm to a human-coded gold standard. If the model is performing well and if the interpretation of the output is correct, we would expect there to be high levels of agreement between the predicted primary topics for a given document and those classified by human coders. To estimate this level of agreement, two researchers were tasked with selecting which of the 14 super-topics listed in *Table A2* is the primary theme for a given document in a randomly selected set of 600 articles. In the first instance, a pilot phase was conducted where the researchers independently coded 25 documents and discussed coding decisions. The inter-coder reliability for this pilot phase was calculated (Krippendorff’s $\alpha = 0.96$). Satisfied with the high level of inter-coder reliability, the two researchers split the remaining set of articles and coded their shares independently.

Super-topic Label	F1 Score	
	Top	Top 3
<i>Ceremonial Diplomacy</i>	0.72	0.91
<i>Culture</i>	0.80	0.90
<i>Domestic Development</i>	0.79	0.90
<i>External Threat</i>	0.50	0.77
<i>Foreign Affairs</i>	0.33	0.55
<i>Internal Power Structure</i>	0.40	0.85
<i>Ideology / Revolutionary</i>		
<i>Legacy</i>	0.79	0.97
<i>Japanese Politics</i>	0.69	0.85
<i>Natural Disaster</i>	0.69	0.71
<i>NK Criticism of Int’l Politics</i>	0.59	0.69
<i>Nuclear Issue</i>	0.64	0.79
<i>Personality Cult</i>	0.57	0.89
<i>Reunification</i>	0.52	0.90
<i>South Korean Politics</i>	0.69	0.88
Micro-Average F1	0.63	0.85

Table E1: *Super-topics and classification predictive accuracy.* This table displays two measures of predictive accuracy employing the F1 score for matches between human judgments and the top topic as well as matches within the top three most prevalent topics of a given document.

Having developed a reliable human-coded test set, we then used these annotations to estimate the model’s validity by using them as a “gold standard” comparison to the model predictions. In particular, we calculate the harmonic mean of precision and recall (F1 Score) to determine classification accuracy. The results of this procedure are displayed in *Table E1*. As a first cut, we estimate the super-topic-wise F1 Score for comparisons between the primary (“Top”) super-topic predicted by the model to the primary super-topic coded by the researchers. As is clear from the table, there is significant variation in classification accuracy, ranging from poor accuracy (0.33, *Foreign Affairs*) to very good performance (0.80, *Culture*). In general, however, we found moderate agreement between the human-coded and computer predicted *primary* super-topics when measuring agreement on the top topic, as evidenced by the micro-averaged F1 Score of 0.63 for the top topic comparisons.

Nevertheless, these classification metrics should be viewed as very conservative estimates of model accuracy. Typically, the news articles in the corpus discuss multiple topics and oftentimes it is difficult to discern which topic is “primary”. There may be roughly equal amounts of discussion for multiple topics in a single article. We therefore use a more relaxed metric whereby the human-

coded primary super-topic is compared to the three most probable (“Top 3”) super-topics predicted by the model. In doing so, we observe a much better overall level of performance, with the F1 Score of nine of the fourteen super-topics scoring above 0.80. While there is clearly a range of model validity across the fourteen super-topics, overall there is reasonable classification accuracy; and this is especially true for the themes which are theoretically meaningful for the research objectives of the study.

References

Linden, A. (2015). Conducting interrupted time-series analysis for single-and multiple-group comparisons. *Stata Journal*, 15(2), 480-500.