Appendix for: “Shared Identity Schemas Shape Incumbent Responses to New Entrants”

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Appendix 1. Procedures for measuring the shared identity schema and assessing the degree of consensus on it

In order to determine the identity features that audiences perceive as defining categories, we use card sorting techniques. In structured interviews, we handed informants cards with names of 30 universities and asked them to form clusters, name each cluster, and describe its characteristics, explaining its difference from the others. During this process, we recorded features informants mentioned as important. We asked informants to attempt different cluster solutions and name relevant features until they could not come up with any more cluster solutions with the available cards. We then asked them whether they would come up with alternative clustering solutions or distinguishing features if we were to give them the whole list of Turkish universities. We recorded any additional clusters or features that the informants mentioned.

We conducted interviews with five faculty members and five counselors for two samples of 30 universities each, ending up with 20 interviews in total. Faculty members varied in tenure (1 to 42 years, mean=14.7, sd=14.1), location of university (three in small and seven in large cities), gender (six females, four males), and discipline (six in social sciences, two in natural sciences, and one each from medicine and school of languages). High school counselors varied in tenure (5 to 18 years, mean=10.5, sd=3.6), gender (eight females, two males), location (two informants from small and eight from large cities), and school type (three from public and seven from private high schools).

All informants mentioned the three ancestral identities (Classical, Technical, American-modeled) that emerged in the earlier modern history of Turkish universities. We assessed consensus among informants separately for the two university samples, following the procedure in Medin, Lynch, Colley, and Atran (1997). For each university sample, we first aggregated the clusters solutions that each informant made during the card-sorting interviews, and created a matrix representing the likelihood of each pair of universities being in the same category according to that informant. We then constructed a correlation matrix where informants are the rows and columns and each cell corresponds to a QAP correlation between the classification matrices of each dyad. Consensus among informants is suggested if an exploratory factor analysis of this matrix of inter-subject agreement results in a single factor solution (first factor explains more than 50% of variance in the data). Negative factor loadings on the first dimension or a multiple factor solution indicates a failure of consensus.

Exploratory factor analysis of the QAP correlation matrix of inter-subject agreement using the principle component method shows that the first factor of the solution explains more than 50% of the variance in the data matrix of both university samples (56.6% and 59.2% for sample 1 and sample 2 respectively), and the next factor explains only about 18% of the variance (18.1% and 17.8% for sample 1 and sample 2 respectively). Although there are three other factors with eigenvalues more than one, examination of the scree plot suggests that a single factor solution is most valid. A varimax rotation of factors does not result in interpretable subgroups of informants. We conclude that there is considerable consensus among informants in their categorizations of Turkish universities.

We also found a high degree of agreement on the feature dimensions that informants saw as defining the categorical identities. Each of our informants mentioned six to 14 features (mean=9.1, sd=3.8). We combined these into 10 unique dimensions based on the explanations provided by the informants: disciplinary range of faculties, specialization in technical disciplines, English-medium instruction, research orientation, quality orientation in teaching, presence of a faculty of medicine, location, private (foundation) ownership, political stance, and financial resources. The first three of these features are the ones that differentiate the three ancestral identities of Classical, Technical and American-modeled universities. Our informants had substantial agreement on these features with a kappa statistic of .75. The latter seven help divide ancestral categories into sub-categories (such as provincial classical) or define other categories. Faculty and counselors agreed on these dimensions, except for research orientation, which counselors did not mention.

References

Medin, D. L., Lynch, E. B., Coley, J. D., & Atran, S. 1997. Categorization and reasoning among tree experts: Do all roads lead to Rome? Cognitive Psychology, 32: 49-96.

Appendix 2. Locating new entrants in and outside of ancestral identity categories

We used the characteristic features of ancestral identities to locate universities at their founding within one of the ancestral categories or outside them. We conducted cluster analyses for each year between 1983-2014 on the entire set of universities, using the university features that characterize the three ancestral identities: disciplinary range of faculties for *Classical*, specialism in technical disciplines for *Technical*, and English-medium instruction for *American.* We measure them as follows:

Disciplinary range: Total number of disciplinary areas represented across a university's faculties, according to the classification used by the Inter-university Assembly (such as education, natural sciences and mathematics, health sciences, law, social sciences etc.).

Specialism in technical disciplines: proportion of faculties in technical disciplines (engineering and architecture).

English-medium instruction: proportion of departments in the university in which instruction is in English.

We ran average-linkage hierarchical clustering procedure in Stata 15, which minimizes within-cluster variance (Hair et al., 2006) for each year on the entire set of organizations, using the z-standardized scores for each identity-relevant feature dimension. The clustering results are robust when we apply the Ward's procedure. We identify clustering solutions for each year through an analysis of the dendrograms together with the clustering indexes provided by Caliński and Harabasz (1974) and Duda, Hart and Stork (2001). Our yearly cluster analyses show that ancestral identities (Classical, Technical and American) continued to exist as separate clusters over the whole period of our study, in line with the historical monographs of this field (Barblan et al. 2008; Öncü, 1993) and our informant interviews.

References

Caliński T and Harabasz J (1974) A dendrite method for cluster analysis. Communications in Statistics 3: 1-27.

Duda RO, Hart PE, and Stork DG (2001) Pattern Classification. New York: John Wiley and Sons.

Hair J, Anderson R, Tatham R, et al. (2006) Multivariate data analysis. Essex, England: Pearson Education Limited.

Appendix 3. Robustness check

Table R1. Comparison of entrants into and outside ancestral categories

	N (outside ancestral)	N (ancestral)	Mean (outside ancestral)	Mean (ancestral)	diff	std err	t	p
Number of faculties / schools	38	103	3.58	3.65	-.07	.35	-.2	.837
Number of academic staff	38	103	69.95	56.86	13.09	14.33	.91	.362
Number of associate and full professors	38	103	29.05	24.64	4.41	7.81	0.56	.573
Research publications (z-score)	38	103	-.09	-.47	.39	.18	2.15	.034

Table R2. Differences in Incumbent Responses to Entries into Other Ancestral and Non-ancestral categories

	Identity-affirming tactics			Identity-extending tactics		
	Classical: # of disciplines (Negative Binomial)	Technical: Proportion of technical faculties (Fractional logit)	American: # of programs with instruction in English (Negative binomial)	Teaching: Faculty-student ratio (Fractional logit)	Research: Prop of PhD students (Fractional logit)	Research: Grant applications (Negative binomial)
	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*
Number of universities founded in the incumbent's category (t-1)	.04 (.08)	N/A	-.09 (.07)	.18* (.05)	.51* (.12)	.73* (.06)
Number of universities founded in other ancestral categories (t-1)	-.01 (.06)	.20* (.08)	.30* (.10)	.18* (.05)	.51* (.12)	.72* (.07)
Number of universities founded outside ancestral categories (t-1)	-.003 (.01)	-.11* (.06)	.02 (.01)	-.08* (.04)	-.46* (12)	-.47* (.05)
Proximity of universities founded in other categories (based on the entire set of identity-relevant features) (t-1)	.12 (.10)	-.17 (.15)	-.21* (.08)	-.05 (.03)	-.12* (.05)	-.25* (.05)
Number of students (divided by 10,000, t-1)	.04 (.08)	.79 (.49)	-1.15 (.66)			.40* (.09)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
University fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	1.83 (.13)	1.21 (.18)	3.26 (.18)	-2.91 (.09)	-5.65 (.18)	1.82 (.14)
Observations	954	51	178	1183	1183	1183
χ^2	282.25*		356.63*			480.42*
Log pseudolikelihood		-17.97		-270.35	-82.85	
Deviance		.12		6.06	4.84	

Standard errors are in parentheses
* p<.05

Appendix 4. Supplemental Analyses

Table S1. Incumbents' response to organizations in other categories adopting distinguishing feature of incumbents' category

	Classical		Technical		American	
	Affirmation: # of disciplines (Negative Binomial)	Deepening: Average # of programs (OLS)	Affirmation: Proportion of technical faculties (Fractional logit)	Deepening: # of technical programs (Negative Binomial)	Affirmation: # of programs with instruction in English (N. Binomial)	Deepening: students going on exchange programs (N. binomial)
	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*
Disciplinary range of universities outside the Classical category (t-1)	4.08* (1.85)	8.64* (2.92)				
Technical focus of universities outside the Technical category (t-1)			5.60* (.83)	11.08* (5.18)		
English instruction in universities outside the American category (t-1)					3.65* (1.58)	77.33* (6.22)
Number of students (divided by 10,000; t-1)	.05 (.08)	.12 (.14)	.89 (.52)	-.67 (.86)	-1.05 (.65)	.21 (.69)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
University fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Intercept	18.18 (143.11)	2.27* (.55)	.35 (.05)	1.50 (1.03)	3.19* (.20)	-5.33* (.77)
Observations	954	954	51	51	178	123
χ^2	280.68*			93.95*	717.45*	672.56*
F		8.19*				
Log pseudolikelihood			-17.97			
Deviance			.12			

Standard errors are in parentheses
** p<.05*

Table S2. Incumbents' use of identity-extending tactics by cohort

	Orientation to quality in teaching: ratio of faculty members to students (Fractional logit)	Orientation to research: proportion of PhD students (Fractional logit)	Orientation to research: grant proposals (Negative binomial)
	Model 1	*Model 2*	*Model 3*
Number of universities founded in the incumbent's category (t-1)	.25*	.57*	.56*
	(.04)	(.10)	(.05)
Number of universities founded in other ancestral categories (t-1)	.25*	.57*	.54*
	(.04)	(.10)	(.06)
Number of universities founded outside of ancestral categories (t-1)	-1.17*	-4.32*	-1.28
	(.32)	(.75)	(.41)
University founding year X Number of universities founded outside of ancestral categories (t-1)	.001*	.002*	.0005*
	(0)	(0)	(.0)
Number of students (divided by 10,000; t-1)	-.57*	-100.16*	.14
	(.05)	(38.08)	(.11)
Year fixed effects	Yes	Yes	Yes
University fixed effects	Yes	Yes	Yes
Intercept	-44.64*	.08*	316.11
	(19.04)	(.01)	(37.42)
Observations	1183	1183	667
Log pseudolikelihood	-270.05	-82.62	
Deviance	5.46	4.38	
χ^2			1868.10*

Standard errors are in parentheses

* *p<.05*