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Western Illinois University

Twitter Conversations of Lawmakers in Illinois: Do Lawmakers' Verbal Behaviors Predict Their Political Affiliation?

Adee Athiyaman
Professor of Marketing and Public Policy & Economic Development

1.0.   Introduction

What people have done often they are likely to do again[1]. This regularity in behavior is used in this paper to model the structure of Twitter communications of Illinois lawmakers[2]. Specifically, the postulate that verbal behavior is shaped and maintained by environmental consequences informs the research question, "are there patterns in legislators' Twitter communications that can be used to predict a legislator's party affiliation". Section 2 elaborates on the theoretical aspects of verbal behavior; the methodology of the study is given in Section 3. Section 4 highlights the results of the study.

2.0.   Verbal Behavior

Behavior is shaped by environment; verbal behavior is reinforced through social processes[3]. The forms or types of control of verbal behavior are *intraverbals* and *tact*[4]. Intraverbals are under the discriminative control of other words; for example, often, the word "Kiwi" would produce the response a "New Zealander", at least among people in the Australasian region. What controls the production of the words that are discriminative stimuli for intraverbals? Tacts, descriptive

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[1] This concept is labeled "path dependency"; for applications of this concept in business research, see, for example, Athiyaman, A (2021). *Economic Development, Primer*. Available online: http://www.instituteintelligence.com/CED_Models/img_3_0.html

[2] Verbal behavior also confirms to path dependency; see for example, Oah, S., and Dickinson, A. M. (1989). A review of empirical studies of behavior, *The Analysis of Verbal Behavior*, 7, 53-68.

[3] See, for example, Hilgard, E. R., & Bower, G. H. (1966). *Theories of learning* (3rd ed.). Appleton-Century-Crofts.

[4] See Skinner, B. F. (1978). *Reflections on Behaviorism and Society*, Englewood Cliffs, NJ: Prentice-Hall.

statements about ourselves and the environment that are controlled and maintained by generalized social consequences; generalized consequences are ones in the past that have led to a variety of functional consequences that can control behavior. For example, for politicians, 'job approval' is a generalized social consequence, it leads to a variety of other reinforcers such as votes and campaign contributions.

Although the verbal community that maintains the use of the English language is very large, language use among politicians is expected to be under the control of smaller verbal communities, the political party that they belong to. For example, the belief among liberals that the nation is spending too much money on defense as opposed to social programs could lead to intraverbals such as "America has been drifting to the right"[5]. Note that even fictions can be maintained by a subcommunity that reinforces verbal behavior.

In summary, verbal behavior usually occurs only in the presence of other people. Particular verbal behaviors can be maintained by small groups of people who act as discriminative contexts for producing those verbal behaviors. Translated to the problem at hand, the question becomes to what extent do verbal behaviors differ between Democrat and Republican lawmakers and whether one could use the differences in verbal behavior among the lawmakers in Illinois to predict their political affiliation.

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[5] See, for example, https://www.bostonherald.com/2020/10/26/young-voters-favor-biden-turning-out-to-vote-in-record-numbers-harvard-poll-shows/.

3.0. Methodology

The Twitter handles of Illinois state legislators were sourced online, using Google search (Appendix 1). The Tweets were extracted[6] and formatted as follows:

Whitespace was removed. URLs were normalized; for example, http://www.iira.org/2021-publications/ was normalized to http://www.iira.org. Text artifacts from encoding, for example, from Unicode to ASCII, were removed, inflected forms of words were lemmatized, stop words and numbers and symbols were removed, and retweets deleted.

For example, Representative Fred Crespo[7] Tweeted,

> 'Did you know several U.S. presidents have ties to Illinois, including Ulysses S. Grant, Ronald Reagan, Barack Obama\xe2\x80\xa6 https://t.co/aAMfIxmHYu'

After cleaning, the message appeared as:

> "know several president tie including ulysses grant ronald reagan barack Obama"

The 'cleaned' Tweets were converted into a matrix of tokens, rows contained the lawmakers and columns listed the word tokens. The cells of the matrix were filled with frequency counts, the number of times that the corresponding token appeared in all the Tweets.

Next, TF-IDF scores were computed[8]. The scores increase with the number of

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[6] A total of 365 Tweets for each lawmaker listed in Appendix 1 were extracted using the Twitter API.
[7] Represents the 44th District in Illinois.

appearances that it makes in the Tweets of all the lawmakers. Thus, extremely common words are assigned a lower score.

Finally, a machine learning algorithm was used to predict the political affiliation of of the lawmakers based on the words of their Tweets; a Linear Support Vector Classifier was used[9].

4.0.   Results and Discussion

Our theoretical discussion suggests that Democrats and Republicans are identifiable via their Tweets. A listing of the most frequently used words by lawmakers of both the parties should confirm or deny this assertion.

Table 1 lists the most common words for the two parties. Republicans use words such as "great" and "bill" frequently in their Tweets whereas Democrats tend to use the words "family" and "community" frequently in Tweets.

Table 1: Words Used the Most in Tweets, Democrats and Republicans

| Political Party	Common Words
Democratic	community, family, help, please, and school.
Republican	bill, friend, great, new, and parade.

When the words given in Table 1 were 'trained' to predict the political affiliation of the lawmakers, the results were "perfect fit" for Democrats, but not for Republicans; the model accuracy was 63%. Put simply, in Illinois, some Republican lawmakers are identical in their verbal behavior to that of their Democratic counterparts[10]. Figure 1 shows the machine learning algorithm's classifications of the lawmakers, predictions based on verbal behaviors.

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[9]   See Athiyaman, A. (2018). Faculty hiring in the deep learning era: Using machine learning to structure faculty selection process. Working Paper, Macomb, IL: IIRA.

[10]   Since the model fit, 63%, is only marginally better than a random classification (50%), we do not list the names of the Republican lawmakers whose verbal behaviors are similar to Democrats.

Figure 1: Predictive Validity of the Machine Learning Algorithm: Democratic and Republican Lawmakers
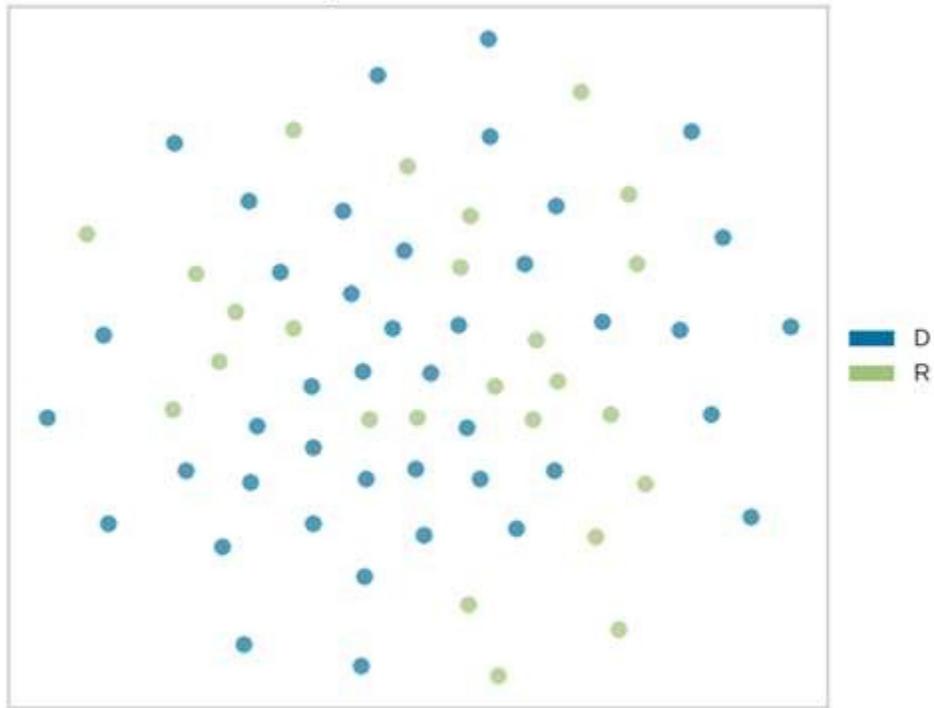
5.0.   Summary and Conclusion

This paper explores the verbal behaviors of Illinois lawmakers using their Tweets as the unit of analysis. Empirical analysis suggests that reinforcement history within the two major political parties has resulted in production of verbal units such as "family" by Democrats and "great" by Republicans. The research also highlights some similarities in verbal behaviors among the lawmakers. It could be that Covid-19 is impacting lawmakers' behaviors, to be united in the fight against the pandemic. Future research should test this assertion, explore the stability of intraverbals between the subgroups.

Appendix 1: The Study Sample

Twitter Handle	Party	Twitter Handle	Party	Twitter Handle	Party
AndradeRep40	D	mbatinick	R	replilly78	D
annamoeller	D	mccombieforilli	R	repMorrison	R
AveryBourne	R	mjzalewski	D	RepSeverin	R
barbara_isabel	D	ortizstaterep	D	repsmith34	D
BlaineWilhour	R	P_Windhorst	R	repsosnowski	R
BobMorganIL	D	RepAnnWilliams	D	RepThapedi	D
BradHalbrook	R	RepBobRita	D	RepTimButler	R
ChicagoTM	D	RepCD	R	repwillis77	D
dan_caulkins	R	RepCharlieMeier	R	RitaMayfield	D
DavidAWelter	R	RepChrisWelch	D	RobynGabel	D
deannemazzochi	R	repdanbrady	R	ryan_spain	R
Delia4StateRep	D	RepDidech	D	Sam4Rep	D
ElectFrese	R	Repevans33	D	SonyaMHarper	D
il29cand	D	RepFord8	D	StateRepAmmons	D
JeffKeicher	R	repfranhurley35	D	StateRepCrespo	D
jimdurkin82	R	repgregharris	D	StateRepManley	D
Kam_Buckner	D	RepHalpin	D	SwansonStrong	R
keithwheeler	R	RepHernandez	D	Tarver25th	D
LamontJRobinson	D	repjcarroll	D	TCHfor48	D
LanceYednock	D	RepJGB	D	TeamStavaMurray	D
MarkWalker4IL	D	RepJSlaughter	D	ThomasMBennett	R
marron_104	R	RepKellyCassidy	D	tomdemmer	R
MauriceAWestII	D	RepKifowit	D	VoteConroy	D
				VoteJoyceMason	D
				WillGuzzardi	D