Who Picks the Hits in Radio

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for the
Emerging Scholars in Cultural Policy conference,
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[DRAFT: 5/05/04]
[DO NOT CITE W/O PERMISSION]

Abstract:
Many studies have tracked the diffusion of innovation but these studies typically track only successful innovations and only one innovation at a time. This paper creates a new metric of "sticky innovation" in order to summarize a firm's contribution to its field's level of innovation. Radio programming makes a convenient test case as radio programmers pick which songs to put in heavy rotation on a weekly basis. The analysis shows that songs do not diffuse according to any noticeable pattern of corporate ownership or geographic centrality. Further interpretation of the results suggests that these results may be consistent with the "all hits are flukes" theory of cultural innovation.

Both organizational and cultural sociology have drawn from and contributed to the inter-disciplinary field of the diffusion of innovation (Wejnert 2002). An innovation is a new product, idea, or practice, and studying them typically involves how fast they spread through a social system and how quickly and for what reasons different types of actors adopt them.

This line of research began with the Iowa hybrid corn study, which examined why farmers adopted an expensive but high yield variety of corn (Ryan and Gross 1943). This study developed the s-curve technique, which involves plotting the cumulative distribution of adoption for the innovation on time, and based on changes in the curve's slope, dividing the actors into innovators, early adopters, early majority, late majority, and laggards. One can then compare the traits of these different groups. For instance, in most studies, early adopters are relatively high status cosmopolitans who make decisions through travel and mass media information whereas the late majority is usually composed of relatively low status and parochial members who adopt innovations only through interpersonal network recommendations (Rogers 2003).

Organizational sociologists as a rule do not use the traditional s-curve methodology of dividing adopters into discrete classes and comparing their traits. Rather they use event-history analysis, a regression model borrowed from demographic mortality studies, in which the data is divided into "spells" of actor-time (e.g. organization-years) and the dependent variable consists of whether actor j has adopted the innovation in question by time t (e.g. Kelly and Dobbin 1999). While event-history analysis is more methodologically elegant than s-curve analysis, it does nothing to address a fundamental flaw of the diffusion tradition.

Due to a combination of methodological, ideological, and theoretical limitations, innovation research focuses almost exclusively on innovations that have become moderately to highly successful. Failed innovations are largely ignored, and to the extent that they are studied are treated as aberrations rather than fully valid cases for analysis. Likewise, innovation studies examine only one innovation, or at most, a handful of innovations at a time. Even, if one were to estimate several event-history analyses simultaneously through latent growth curve modeling (and no one has), this would not entirely solve the pro-success bias. Rather, one must simultaneously address the full array of innovations in a field, not just one, or even a few.

One more global way to treat innovation is through examining the diversity of a firm's repertoire. Diversity is the fuel from which innovation occurs and thus many innovation studies operationalize innovation by diversity (e.g. DiMaggio and Stenberg 1983, Rossman 2003). However beyond a certain point diversity becomes noise. While some fields are stagnant and could probably benefit from diversity, others suffer from a crisis of creative over-production. For instance in each of the last five years for non-profit theatre, there was a ratio of approximately two scripts for every three productions, meaning that few plays are ever performed more than once.

The hole in the literature is thus to study innovation as a whole, but do so in a way that distinguishes innovation from mere diversity, as innovation is not just doing something different but doing something different that has some merit. Based on the logic of s-curve and event history analysis, but with the scope of diversity research, I aim to measure a firm's role in its field's innovation.

Radio makes a good test case to explore these theories since radio programmers continually face decisions about whether to adopt innovations on a routine basis as singles are released weekly. In modern commercial radio, the decision as to what songs to play, how often, and when, is made by the program director, often with the assistance of a music director (Lynch and Gillespie 1998). Practices and doctrines vary between stations greatly (Ahlkvist 2001). These practices are correlated with ownership (Ahlkvist and Fisher 2000). Industry wisdom has it that stations owned by the industry leader, Clear Channel, intentionally reduces its playlist turnover as a way to appeal to listeners' desire for familiarity (WNYC 2002).

In 1996, Congress effectively eliminated ownership caps, such that whereas previously a firm could own only 20 FM and 20 AM stations nationally, there is now no limit to the number of stations a firm can own nationally. The largest firm, Clear Channel, owns about 1,200 stations and several competitors, such as Cumulus and Citadel, own over a hundred each. Annual turnover in the *Billboard* Hot 100 is negatively correlated with concentration, which suggests that concentrated corporate ownership may be causing stagnation in pop music (Lee 2001). At the micro-level, radio stations owned by large chains have playlists that are more repetitive and less locally idiosyncratic than stations owned by small chains and independents (Rossman 2003).

My dataset is composed of playlists gathered from the website of the trade journal *Radio and Records*. These playlists consist of lists of the thirty most frequently played songs on that station. Radio stations are programmed by "format," a blend of genres of music which is calculated to appeal to a particular demographic. Most of the variance in radio station demographics is between formats, not between stations within formats

(Lynch and Gillespie 1998). I purposively sampled the formats, alternative rock, active rock, country, contemporary hits radio (CHR), CHR – Rhythmic, and urban. Active rock stations play metal, CHR stations play top 40 pop, urban stations play hip hop and R & B, and CHR-R stations are a cross between urban and CHR which have more white crossover appeal than urban stations. For each of these formats, I collected eight consecutive weeks of playlists for each station available on the website.

I summarize this information with a new index of innovation, sticky innovation (S_{jt}). This index is designed to measure how good *firms* are at picking or developing *titles* which are adopted by other firms in subsequent *time* intervals. In the case of radio, the firm is a station, the title is a song, and the time interval is a week. Generating the index requires data from at least five consecutive time periods describing the catalogs of titles offered by each firm in a sample or population of a field. If one has more than five periods of data, one can calculate sticky for t-4 time periods. As I have eight weeks of data, I can calculate four consecutive observation of sticky innovation. For the purposes of calculating S_{jt}, only stations within a single format are considered to be peers.[1]

$$S_{jt} = \sum_{i=1}^{n_j} \frac{\sum_{t=-2}^{2} t X_{it}}{X_{i0}^2}$$

i is title (song) level
j is firm (station) level
t is time (week) level
S_{jt} = the level of sticky innovation produced by firm j at time t
X_{it} = the number of firms in j's field offering title i at time t

A high sticky score indicates that in that week the station in question picked previously obscure songs which in subsequent weeks went on to become popular. In

[1] Further analysis may allow me to relax this assumption. There is substantial overlap among the following dyads: alternative and active rock, CHR and CHR-R, and CHR-R and urban.

terms of s-curve analysis, this corresponds to consistently being on the left-hand side of large curves, i.e., an innovator or early adopter. The observed values of sticky innovation range from -41 to 40, with a mean of about zero and a standard deviation of about four. As seen in figure 1, the metric is normal and tight.

Figure 1 about here

My independent variables are defined by station or by the station's market (town). The first station level trait is the log size of the chain that owns the station. I collected this data from the *Broadcasting and Cable Factbook*. The other station-level trait is the presence of a music director, or programmer's assistant. One might expect that a station with two programmers would be better at spotting new songs that were destined for popularity. For analysis of the pooled sample, I also have dummy variables indicating to which format the station belonged.

The market-level traits are all from Arbitron (2004), a major market research firm which is best known for calculating radio station ratings. The first trait is the logged size of the market's age twelve and older population. The other two are flags indicating that Arbitron deems the market to contain substantial numbers of blacks or Hispanics, respectively.

For my analysis, I use regression with robust standard errors clustered by station. The unit of analysis is the station-week. I model the stations both pooled and disaggregated by format.

Table 1 about here

The first thing to notice about each model is the extremely low percentage of variance explained. Neither the pooled sample nor any of the format sub-samples is adequately explained by the model. Second, aside from the time trend, constant, and format variables – all of which are meaningless controls in this context – there are no significant predictors. The size of the chain owning the station, the population of the station's town, and the size of the station's programming staff all fail to predict S_{jt}. The only significant predictor is the black variable in the urban format sub-sample. This result is difficult to interpret since, if taken at face value, it means that black-targeted stations in black areas are imitating black-targeted stations in white areas. All in all, the model almost completely fails to explain S_{jt}.

There are three possibilities for why this may be so. The first is that the sticky metric is simply improperly specified. The metric was designed to identify innovators and early adopters while ignoring the early majority. It may be that this process is essentially unknown in radio since major record labels use independent radio promoters to get waves of adds for new singles. In effect, this changes the shape of the curve so that there are no early adopters, only an early majority. On the other hand, while this may occur, less luminous singles still spread the old-fashioned way. Nonetheless, respecifying the metric in some way may provide more fruitful results, although to do so may change the theoretical focus.

The second possibility is that the sample is too small. On average, each format only sees one song per week that starts small and then grows, the type of song that powers the sticky metric. Since a song that starts small can only be attached to a small number of stations, usually just one station, then very few stations are identified per

week. In effect, rather than being a continuous variable, stickiness is a dichotomous variable that is observed only rarely. Rare events usually require large amounts of data from which to discern patterns, and thus answering the questions posed by this paper would require not a handful, but scores of time periods.

The third possibility is that cultural innovation is a purely stochastic process from which it is impossible to accurately identify patterns, no matter how much data on accrues or how well one interprets it. This alleged property of cultural fields is known as the "nobody knows" (Caves 2000) or "all hits are flukes" (Bielby and Bielby 1994) property. This theory is essentially a variant of the "efficient market hypothesis" from economics (Samuelson 1965, Malkiel 1973) which holds that in a securities market, price rapidly assimilates all available information and therefore, net of current price, nothing should be correlated with future price. In cultural fields, all gatekeepers have essentially the same information, or more accurately, lack of information, and follow similar heuristics. Therefore, with no meaningful differences between actors, all differences in outcomes of their behavior will be random. Nonetheless, this seems unlikely for radio if for no other reason than that stations are known to program in different ways (Ahlkvist 2001) and systematically vary in the diversity of their playlists (Rossman 2003). Although I do not specify programming philosophy, but only correlates of it, it seems extremely unlikely that fundamentally different programming strategies would have no effect on contribution to innovation. Nonetheless, the "flukes" hypothesis is supported by low inter-week correlations of S_{jt} for each station. With six weeks of data, the Cronbach's alpha is only .54.

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Figure 1: Distribution of Sticky Innovation Index

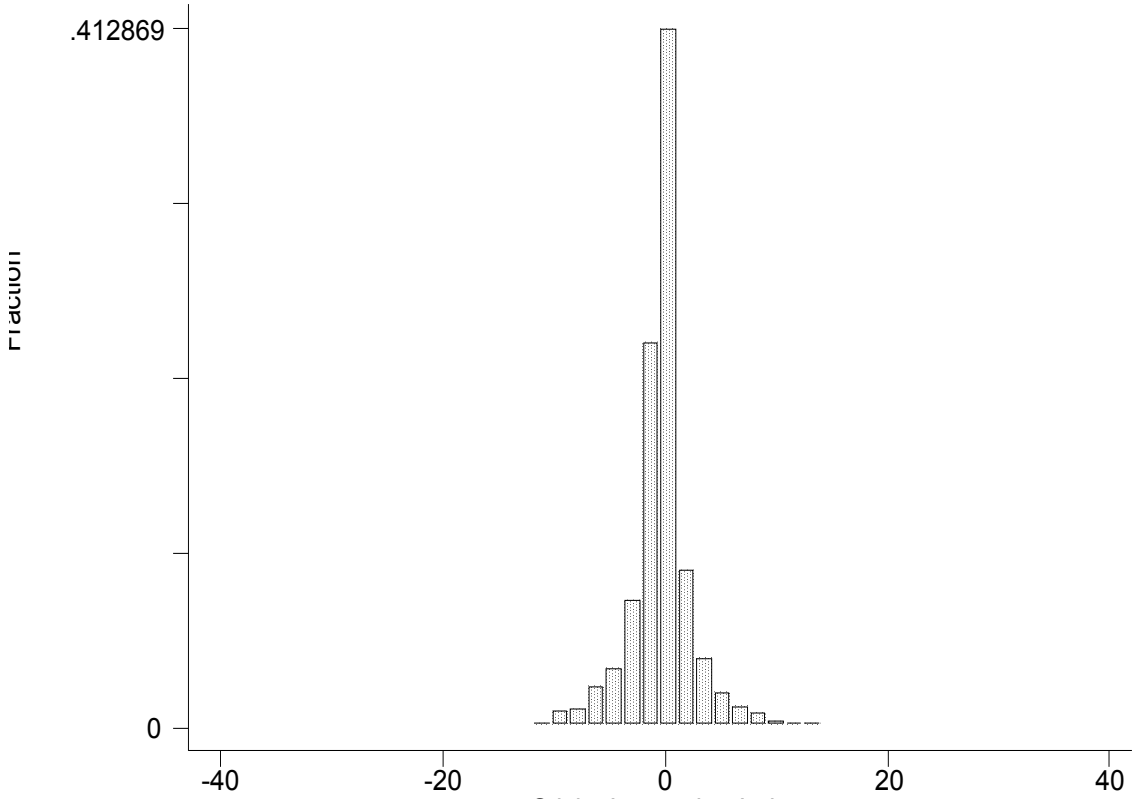

Table 1. Regression of Sticky Innovation, Clustered by Station

		Sub-Sample					
	Pooled	**Alternative**	**Active Rock**	**Country**	**CHR**	**CHR - Rhythmic**	**Urban**
R^2	0.026	0.032	0.018	0.004	0.007	0.073	0.072
MSE	3.887	4.978	4.076	2.555	3.490	4.698	4.802
N (spells)	2984	349	331	896	700	389	319
N (stations)	750	89	84	224	176	99	80
	b	b	b	b	b	b	b
	(s.e.)	(s.e.)	(s.e.)	(s.e.)	(s.e.)	(s.e.)	(s.e.)
Station Traits							
Chain Size (log)	-0.04	-0.01	-0.21	-0.06	-0.07	-0.12	0.32
	(0.06)	(0.19)	(0.14)	(0.07)	(0.10)	(0.16)	(0.24)
Music Director	0.13	0.33	-0.21	-0.14	0.25	0.32	0.69
	(0.20)	(0.78)	(0.58)	(0.25)	(0.37)	(0.60)	(0.75)
Market Traits							
Population (log)	0.20	0.46	0.17	0.07	0.22	0.38	0.19
	(0.14)	(0.54)	(0.50)	(0.14)	(0.26)	(0.59)	(0.44)
Black	-0.25	-0.89	0.18	-0.25	-0.24	0.18	-3.30 ***
	0.21	0.72	0.79	0.22	0.44	0.66	0.90
Hispanic	-0.14	0.20	0.68	-0.07	-0.31	-0.50	-1.22
	0.22	0.75	0.54	0.26	0.36	0.67	1.38
Format[a]							
Alternative	-0.56						
	(0.35)						
Active Rock	0.20						
	(0.30)						
CHR	-0.09						
	(0.21)						
CHR-R	-0.52						
	(0.32)						
Urban	-1.55 ***						
	(0.41)						
Time Trend	0.33 ***	0.66 **	0.02	0.01	0.11	1.08 ***	0.74 ***
	(0.06)	(0.22)	(0.18)	(0.07)	(0.11)	(0.24)	(0.22)
Constant	-3.74 *	-9.47	-1.47	-0.39	-3.13	-10.03	-5.39
	(1.80)	(7.56)	(6.01)	(1.88)	(3.21)	(7.81)	(5.92)

a. The reference category is composed of country stations.
b. † <.10, * <.05, **<.01, ***<.001