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THE MYTH OF THE FIVE-DAY FORECAST: A STUDY OF TELEVISION
WEATHER ACCURACY AND AUDIENCE PERCEPTIONS OF ACCURACY IN
COLUMBUS, OHIO

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Abstract

Television weather has not been studied in a communication journal since 1982, despite technological advances and a reliance on forecasts by a transient public. This study measured accuracy of weather forecasts in central Ohio and found that stations were very accurate in predicting within 48 hours, but extended forecasts were quite inaccurate. Interviews with local television weathercasters revealed that they use the extended forecast as a marketing tool. Telephone interviews with 315 central Ohio residents revealed that they not only rely on the five-day forecasts, but believe them to be accurate. Television was cited as the dominant resource for weather information, and a majority of respondents said they choose weather forecasts for reasons other than perceived accuracy.

Reasons for this Study

Justifying a study of television weathercasting may be a trifle daunting given that it has been treated as a somewhat frivolous segment of both local and national newscasts over the years. It has been presented by a cartoon character named Woolly Lamb, delivered by a jovial national weather anchor dressed as Carmen Miranda and has even spawned one of America's most successful late-night comedians and talk show hosts. (see Henson, 1990 and Monmonier, 1999) Yet despite its frivolous nature and its presentations as a form of entertainment, weather has become serious business during the past two decades.

Moreover, the importance to its audience has remained constant throughout the history of television. Weather has not only outdrawn both local news and sports, its viewers in Los Angeles chose it "as their favorite news subject over crime, Hollywood, and 15 other topics." (Shaw, 1981) The national weather service in 1980 polled personnel at five television stations, each of which unanimously named weather "the major reason that people watch the news program." (Henson, 1990)

The same holds true of local weather today. News directors and weathercasters from all three network-affiliated stations in Columbus, OH, said weather is still the primary reason people tune in their newscasts. News Director John Cardenas of WBNS-TV (CBS) said that it is not unusual to outlay a million dollars or more as start up capital for a major market weather budget. Cardenas added he is not sure what portion of his budget is spent each year on weather (upgrades and personnel), but "I don't think the amount of money you spend on your weather department reflects the emphasis and the importance that you put in your product." (J. Cardenas, personal communication, February 9, 2002)

Another reason to study this often overlooked portion of television news is that while many weather anchors are still entertaining, they treat weather as serious business, especially when it comes to inclemency. Chief Meteorologist Jym Ganahl of WCMH-TV (NBC) said he remembers the very day weather became serious business for his station:

The day before the blizzard of 1978, Jerry Razor was doing the weather at the time, and, uh, he did not realize the enormity of the blizzard. The station seemed to, uh, changed its philosophy overnight, and started going toward more college-

educated meteorologists. (J.Ganahl, personal communication, February 10, 2002)

Channel 4 now has four weathercasters, three full time, each of whom are certified meteorologists. In the 1950s, the American Meteorological Society began to certify weather anchors, and had given about a thousand of them the seal of approval by 1959. The anchors had to complete a core of courses and submit a tape of weathercasts for three consecutive days. (Monmonier, 1999) Weathercasters also must be skilled in computers, familiar with base maps, topography and geography, in addition to being a personable narrator that can make complex information intelligible to non-technical viewers. (Monmonier, 1999) WBNS-TV Chief Meteorologist Mike Davis said "many people don't have any idea what I do all day. Sometimes I'm just a glorified computer operator." (M. Davis, personal communication, February 10, 2002)

In fact, thanks to the technology and television innovativeness that has accompanied the science of weather prediction since the 1980s, television meteorologists are capable of giving a fairly accurate and comprehensive forecast, at least to within 48 hours of the telecast. The addition of the Weather Channel and other cable services has increased the competitiveness for viewers as well.

Herein lies the problem and the catalyst for this study. Television executives have realized that as with any other program, including the news, they must market and promote weather to increase the number of viewers and thereby advertising revenue. According to Matthew Kerbel (2000), author of *If It Bleeds, It Leads*:

The problem is you can say it all in about 4 seconds. This, of course, normally would be an asset. But, because weather reports are so inherently entertaining, they're the one place where the brevity clause in the Fundamental Rule doesn't apply. In fact, weather reports draw such a large audience that they need to be drawn out as much as possible and repeated throughout the show. Enter the Weather Corollary to the Fundamental Rule: Successful weather reports should contain as much extraneous information as possible.

At the end of this two and a half to four minute presentation generally is the extended forecast, usually a five-day outlook. According to the Columbus meteorologists, there is no scientific reason for peering five days into the future, nor can they do it with any confidence of accuracy. All three weathercasters admitted freely that

they are confident of their predictions anywhere from 48 to 72 hours and anything beyond that is an educated guess, but too many factors can influence the weather over four or five days. All three also admitted with candor that the five-day forecast is a marketing tool. In fact, WSYX-TV (ABC) incorporates a six-day forecast to give the appearance of giving the viewer an extra day's weather, and it helps to promote channel six. (C. Gillespie personal communication, February 5, 2002)

From the viewers' perspective, however, the extended forecast may be far more important. WBNS Chief Meteorologist Mike Davis said about their audience research, "The number one thing they want is the five-day." (M. Davis, personal communication February 10, 2002) The question then becomes "How much does the viewer rely on this extended information and how accurate does he or she perceive it to be?" Chuck Gillespie of WSYX said that the six-day forecast is designed to "push people to the weekend," even though he knows the forecast is usually wrong. According to Gillespie, it is still an informed account, but fronts may be stalling and the jet flow will change, running the weather in front or behind the prediction. (C. Gillespie, personal communication, February 5, 2002)

All three weathercasters agreed that the majority of their phone calls and "street talk" if they are related to weather at all are either about "What do I need to wear tomorrow?" or "Is the weather going to affect my travel plans for the weekend?" Ganahl said many viewers just think of their weathercaster as a friend to talk to. He said he has received calls like, "My mouth tastes salty. What does that mean?" and one woman who said her sump pump was off and wanted to know if she should turn it on. (J. Ganahl, personal communication, February 9, 2002)

The meteorologists interviewed said they all are using similar tools and maps and will be fairly consistent and accurate. Viewers may perceive one station as more accurate than another, but the reality is that there will not be a great disparity on tomorrow's forecast among the stations. The consensus was that viewers will often choose a weather forecast based on habit (the person or station they've always watched) or because they like a particular presentation best. Sometimes it is nothing more than the lead-in -- the show that precedes the news -- that drives the decision. Gillespie's assessment of the audience was that "It comes down to who you like telling you the story." (C. Gillespie, personal communication, February 5, 2002)

Review of Literature

Perhaps the most compelling reason for this study is that there has not been a comprehensive study of television weather published in a communication journal since 1982. Before that, only a few scattered studies were completed about television and/or newspaper weather, yet each study indicated that editors and news directors appeared to underestimate the importance of weather to their respective consumers.

Bogart (1968) found that television was preferred by more than half of the probability sample, and concluded "It must be the personality of the weathercasters who make this mundane subject come to life." Tan (1976) determined that television was used more often (53 percent of the respondents) than any other medium to obtain weather information. However, even though respondents used television more often, only 41 percent (41 for radio also) considered it their *preferred* source for weather. Tan accounted for the difference by surmising that people preferred telephone and radio because it "might reasonably be interpreted to indicate preference for weather information that is readily available and on conveniently accessible media." This might apply today to the Weather

Channel, which supplies constant information and provides local forecasts "on the eights."

Hyatt et. al. (1978) tested recall of television weather reports, and concluded that the "amount of weather information retained from a forecast seems to be minimal indeed." Because this information is a quarter of a century old, however, the researchers tested recall of such information as barometric pressure and wind conditions, which are not necessarily staples of modern forecasts. The authors did pose an interesting question: "If most viewers remember little about the weather report, why is so much time devoted to weather in local newscasts?"

Gantz (1982) finally attempted a study of accuracy, as well as redundancy, in weathercasts in Indianapolis, a city not unlike Columbus, the test area for this study. The data from this research suggested that forecasts frequently vary from station to station, contradictory to what the meteorologists interviewed for this study have suggested. Gantz further noted that the forecast was not likely to change from the six p.m. to the 11 p.m. newscast. Remember that at this time Doppler and NEXRAD weather information was not readily available. Many stations, especially in large markets, now boast of a "First Alert" system that can pinpoint weather conditions up to the minute. It is logical

to assume that updating the 11 p.m. forecast might be an easier task today.

Even as early as 1982, however, Gantz realized that "long-range predictions may represent television's effort to present as much weather data as is available, to keep up with competing news media and to meet the public's needs and expectations in the area." Gantz' analysis revealed that only 41 percent of four-day predictions were accurate within five degrees, compared to 73 percent for the next day.

These studies indicate that several areas of analysis need to be revisited because weather technology, budgets and even personnel have changed so much during the past twenty years. Some new areas need to be explored as well. Based on these studies and the information provided by the interviewed weathercasters, this study will attempt to test the following hypotheses:

H1 Weather forecasts beyond two days will be significantly less accurate than weather predicted for two days or less.

H2 Weather forecasts among the three stations will not vary significantly among next-day or two-day predictions.

H3 A majority of respondents will indicate that the extended forecast is at least somewhat important to them.

H4 A majority of respondents will indicate that they believe that extended forecast is at least somewhat accurate.

H5a A majority of respondents will choose a favorite station for weather based on habit or personality rather than perceived accuracy.

H5b A majority of respondents will choose a favorite weathercaster based on habit or personality rather than perceived accuracy.

Methodology

The methodology for this research entailed three basic components. First, interviews were conducted with three central Ohio meteorologists and a news director to ascertain information about accuracy, marketing of weather, audience feedback and weathercasters' perceptions of their own audience. The information gleaned from these interviews

was particularly useful in designing the second and third components of the study.

The second component was an analysis of the extended forecasts of each of the three network-affiliated stations. Six p.m. weather forecasts were videotaped for a 30-day period beginning February 15, 2002. The six p.m. forecast was chosen because meteorologists indicated that it is most likely to be used for extended information. Five-day predictions (or in the case of channel six, six-day predictions) were recorded each day up through day 25. In the final five days, only the day's actual high temperature, amount of precipitation and cloud cover were recorded for each station to assess the previous extended forecast predictions. Each forecast prediction was coded as a "hit" or a "miss" based on high temperature, amount of precipitation and cloud cover. The accuracy was based on factors provided by the weathercasters themselves. Temperature was considered accurate if the prediction was within five degrees in either direction of the actual temperature. Precipitation amount was considered accurate if the prediction was within a half inch of the actual amount. Cloud cover was divided into four ordinal categories: sunny, partly cloudy, mix of clouds and sun, and cloudy. The prediction was considered accurate (based

on the meteorologists' own account) if it was within one category of the actual condition, e.g., a partly cloudy forecast was considered accurate if sunny was predicted, but a sunny forecast was considered inaccurate if a mix was predicted. The high temperature was also coded as degrees different from the actual (an absolute value) to more effectively assess the differences among day-one to day-five predictions.

The third component was a telephone survey conducted during a four-day period from February 18 to February 21. Three upper class students were trained to conduct the interviews, consisting of 20 questions, the final five of which were demographic information. Some were open-ended questions, such as "Why did you choose the station you most often watch for weather?" and "What factor is most important to you in tomorrow's (same question about five-day) weather?" Other questions were multiple choice with gradient scale answers, such as "How accurate do you think the five-day forecast is?" Answers ranged from "very accurate" to "not accurate at all."

Random-digit dialing was used to obtain a sample population of central Ohio. Respondents were called on weeknights between 6:30 and 9:30 so that they would not be called during a newscast. Three hundred fifteen respondents

were reached and completed the survey. There were no age limits placed on respondents to the survey, as long as they were old enough to access weather information and understood the questions. The youngest respondent was 14 and the oldest was 86. Demographic statistics revealed that there were no significant differences in average age, gender and racial makeup between the sample and actual statistics from the 2000 census for Columbus.

The first question asked was what source(s) the respondent relied upon most for weather. If television was not mentioned as one of the sources, interviewers skipped the questions regarding specific television weathercasts, but coded demographic information. This question was designed to compare use of media for weather information to the Tan study.

Results

Apparently the choice of medium has changed dramatically since 1976, at least for a large television market. One hundred ninety-three respondents (61 percent) chose television as the medium they most relied upon for weather. Surprisingly, only 44 (14 percent) listed multiple sources, and only 40 (12.7 percent) listed radio, while

just 16 (5 percent) listed the Internet, despite the immediate availability of the latter two. The accessibility of television in the workplace and eateries may have contributed to its popularity.

In response to the first hypothesis, two measures were used. The mean difference in temperature between day-one predictions and the actual temperature was 2.72 degrees (N=75, SD=2.9296). The mean difference for day-two predictions was slightly under four, indicating that temperature predictions for both days among all stations were aggregately accurate to within five degrees. The day three through five predictions varied six to ten degrees on the average, considered a miss by the local meteorologists.

Table 1
Five-day predictions by high temperature
difference and forecast accuracy

	Mean high temp. dif.	SD	Percent accurate
Day 1	2.72	2.9296	84.0
Day 2	3.97	3.8449	72.0
Day 3	6.09	5.2817	40.0
Day 4	8.47	7.3931	25.3
Day 5	9.73	7.1684	21.3
Day 6*	10.88	6.6353	20.0

*WSYX only, N = 25.
All others, N = 75.

The second measure for testing hypothesis one was the actual weather conditions. For day-one predictions, the stations accurately predicted 63 of 75 forecasts, for 84 percent. Hits and misses were based on the criteria mentioned in the methodology. Day-two predictions were correct 54 times, or 72 percent. Day-three forecasts were accurate 30 of 75 times, or 40 percent of the time. Day-four predictions were accurate about 25 percent of the time and day-five forecasts 21 percent. WSYX, the only station to provide a six-day prediction, was accurate on 20 percent of those. Table 1 lists a summary of the extended predictions for both high temperatures and weather conditions.

To test hypothesis two, Pearson R correlations were calculated for the three stations on all five days. As expected, there were high correlations among all three stations for days one and two. What was unexpected was that the correlations among the stations for days three, four and five actually increased. See Table 2 for the correlations for all five days. One possible explanation is that meteorologists tend to rely on multiple sources for interpreting the conditions for the immediate forecast. They are not as diligent for the extended forecast,

however, and may all rely on the same National Weather Service map (or perhaps each other) for the five-day predictions.

Table 2
Correlations among stations' extended forecasts

	WCMH - WSYX	WCMH - WBNS	WSYX - WBNS
Day 1	.688	.513	.864
Day 2	.502	.560	.523
Day 3	.615	.779	.674
Day 4	.866	.897	.971
Day 5	.845	.836	.956

N = 75

All correlations 2-tailed sig. $p < .01$.

Hypothesis three suggested that at least half of the respondents would consider the extended forecast somewhat important to them. This was supported as shown in Table 3. More than 80 percent of those interviewed said the five-day forecast was somewhat or very important to them. In fact, 104 respondents, almost 41 percent, said it was very important.

Hypothesis four explored whether the majority of respondents would perceive the five-day forecast to be at least somewhat accurate. Again, the evidence supports this contention. Only 12 respondents, 4.7 percent, believed the

extended forecast was very accurate. However, 123, or more than 48 percent, believed the extended forecast to be somewhat accurate. Only six, or 2.4 percent, believed it was not accurate at all. Complete results are compiled in Table 4.

Table 3
How important is the five-day forecast to you?

Response	Number	Percent
Very important	104	40.8
Somewhat important	102	40.0
Not sure	6	2.3
Somewhat unimportant	34	13.4
Very unimportant	9	3.5

N = 255

Finally, hypothesis five supposed that respondents would choose a favorite station for weather and a favorite weathercaster based on habit or personality rather than perceived accuracy. To test H5a, respondents were asked on what basis they chose a television station for weather. More than 41 percent of the answers were categorized as force of habit or based on the lead-in (either the program preceding the news or their favorite newscast determined the decision). Thirty respondents, 19.4 percent, chose the

station based on perceived accuracy. Personalities of the weathercasters accounted for 10.4 percent of the choices.

Table 4
How accurate is the five-day forecast on the station you watch most often?

Response	Number	Percent
Very accurate	12	4.7
Somewhat accurate	123	48.2
Not sure	38	14.9
Not very accurate	76	29.8
Not accurate at all	6	2.4

To test H5b, respondents was asked who their favorite weathercaster was and why. One hundred ninety-three respondents, more than 61 percent, had no favorite. Of the ones who chose a favorite, 43.4 percent of the answers were categorized as "personable." This was more than double the 20.8 percent of respondents who gave answers categorized as "accuracy/knowledge." Results of hypothesis five are shows in Table 5.

Conclusions

In discussing the results, it must be made clear that there are limitations to this study. While the demographics

of the sample accurately reflected the population, this study is of course limited to a central Ohio audience and accuracy results are limited to a one-month study during winter. A winter month was chosen because winter weather is typically more volatile (Monmonier, 1999), but it should be noted that this was an unusually mild winter month according to the meteorologists interviewed.

Table 5
Reason for choosing...

...favorite station.*			...favorite weathercaster.**		
Reason	Number	Percent	Reason	Number	Percent
Habit	32	20.8	Personable	46	43.4
Lead-in	32	20.8	Accurate	22	20.8
Accur.	30	19.4	No nonsense	12	11.3
Urgency	22	14.3	Other	12	11.3
Other	22	14.3	Humor	8	7.5
Person	16	10.4	Habit	6	5.7

*N = 154

**N = 106

A second difficulty is that measuring weather predictions and conditions can be as precarious as predicting the weather itself. Although the measurements of accuracy were based on suggestions from readings and the meteorologists themselves, there is no standard for

measuring weather accuracy. Certain anomalies can occur, especially in winter, such as temperatures falling during the day rather than rising. This phenomenon occurred only twice during the study period, however, and did not appear to skew the results.

A third concern was that the weather may have varied within the market's area of dominant influence. The central Ohio market is geographically massive, and temperatures and weather conditions were based on downtown Columbus readings, even though conditions may have been quite different throughout the region.

Limitations notwithstanding, there are things to be learned from this research. As suggested, television pundits may implement the extended forecast as a marketing tool, but they have appeared to underestimate its importance and believability to the audience. This is vital considering that television is still the dominant medium of choice for weather information.

Viewers apparently choose their television weather forecasts based on habits, personalities and lead-in shows rather than perceived accuracy. This may not be problematic, however, because the data suggest that the source of information does not vary widely from station to station. An additional question that was asked but not used

statistically was the choice for favorite weathercaster. Interestingly, the two top choices were the weathercasters with the most tenure in the Columbus market, which again suggests viewing by habit.

There is a myriad of information that can be obtained relating to television weather. Suggestions for future research would include qualitative studies to find out more about why audiences believe what they believe and make the choices they make. Future quantitative studies could include a comparison of market to market, season to season, or both. There is reason to believe that winter weather in Fargo, North Dakota, may be far more important to its audience than spring weather in Los Angeles, California.

Those who pursue research in the area of uses and gratifications may want to resume and expound upon the work done by Tan. Continued work in the area of television weather, as well as exploration of weather use in other media, should be important to the consumers of media, producers of media and to those who study the media.

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