

A Survey of the Use of National Weather Service Forecasts by Television Weather Forecasters in the United States

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ABSTRACT

This investigation was undertaken to determine how different the weather forecasts of telecasters are from those of the National Weather Service for the same areas and times, and the sources of information telecasters use when they modify the NWS forecast or develop their own. Questionnaires were mailed to 453 television weatherpersons, most of whom were seal holders of the AMS; 67 percent were returned. It was determined that 1) only 6% of all respondents do not consider the NWS forecast at all, whereas for almost 60% this consideration is moderate or heavy; 2) the percentages of those who transmit a forecast different from that of the NWS 0–10%, 40–60% and 90–100% of the time are 16, 30 and 8, respectively; 3) when the forecast issued was different from that of the NWS, the elements most likely to be different were precipitation (84%), temperature (82), state of sky (66), and wind speed and direction (34); 4) the factors that influence the telecaster to issue a different forecast are, in order, current weather, local conditions, the telecaster's own analysis of forecast models, the telecaster's experience, satellite photographs, radar, and colleagues. The responses to each of these four items were further stratified by whether or not the respondent held the AMS Seal of Approval, whether he/she had a bachelor's degree, years as a telecaster, and the size of the market area. The division of responses by the first two of these stratifiers produced the largest changes from the percentages for all respondents given in 1 and 2 above and also produced relatively large differences within that stratifier. For example, forecasters who are least likely to consider the NWS forecast, and who issue a forecast different from that of the NWS a large percentage of the time, are seal holders with a degree and 6 to 10 yr experience who work in one of the top twenty market areas.

1. Introduction

The source of weather information for the American public, and short-range forecasts in particular, has changed in the last few decades. Prior to the late 1940s forecasts were simply transmitted from the United States Weather Bureau to the public via newspapers and radio. There were few weather radio programs, as such (Fidler, 1941). The advent of television brought an intermediary, the telecaster, defined here as any person who routinely presents weather forecasts on television. Some of these had meteorological credentials—degrees in meteorology or atmospheric science or prior operational experience in forecasting. These professional meteorologists interpreted the weather and gave reasons for the forecast; indeed, this was seen as their responsibility (Fidler, 1948). But at many stations, especially in the 1950s and 1960s, these intermediaries were broadcast journalists, or announcers, with little or no knowledge of meteorology, who simply transmitted the forecast; there was no attempt to expand upon or modify the forecast, except possibly when time constraints required abbreviating it.

In the early 1950s two trends began to develop. An increasing number of nonmeteorologists began doing more than simply transmitting the forecast. They too

attempted to interpret and explain the weather, often with procedures and devices that were more entertaining than informative (Bates, 1976). Such levity was not viewed favorably by the professionals (Fidler, 1957; Culbertson, 1955). Television is essentially an entertainment medium, however, and objections by meteorologists had little or no effect. An editorial in the *Philadelphia Inquirer* in February 1975 (as quoted by Davis, 1976) put the trend this way: "The weather report, once a serious scientific affair frequently dispensed by a trained meteorologist, has become a light, airy, chatty, joshing performance by television personalities who don't know much more about the weather than their viewers."

The other trend was an increasing tendency of broadcasters to alter the Weather Bureau (after 1972 the National Weather Service) forecast. On some such occasions it clearly was inadvisable to transmit the official forecast, for example, when there was no mention of rain when it was, in reality, occurring. However, media forecasters in general, and especially those with meteorological expertise, had no reservations about changing the forecast to reflect current conditions or when they had information that was not available to the Weather Bureau. Indeed, many must have considered it their responsibility to do so, especially when

they were convinced that their forecast would turn out better. Furthermore, there were no legal or governmental prohibitions or restrictions; federal communications regulations do not restrict the media from presenting any forecast they choose (Walls, 1977). The False Weather Report Statute (18 U.S.C.-2974) of 1948 states that if a forecast is acknowledged as originating with the WB/NWS then it must not be altered. This means, of course, that a telecaster can modify a forecast as long as he or she does not specify its source.

In this decade the first trend has, fortunately, been arrested, whereas the other is still much in evidence. It is quite likely that we have seen the last of telecasters as entertainers, with perhaps a few exceptions. This benefits both professions, meteorology and broadcast journalism. At the same time, telecasters continue to modify the NWS forecast, and some even prepare their forecasts independently of the NWS.

An additional development, one apparent in the 1970s as well as this decade, is the growth of private forecasting firms that provide specialized forecasts for interests such as aviation and agriculture, as well as conventional forecasts for the general public. In addition, television stations, especially those in the largest markets (the largest urban areas) may now employ a staff of meteorologists, some of whom are on-the-air personalities whereas others are involved only in forecast preparation. Characteristics of the staff of these stations, and of the communication facilities employed in forecasting, have been specified by Lazalier (1982). The weather predictions of such organizations, while ostensibly prepared independently of the NWS—or more particularly of the National Meteorological Center (NMC) and the local Weather Service Forecast Offices (WSFOs)—still depend on the products of this center, especially the prognoses prepared from various numerical prediction products of the NMC.

In the mid-1980s Americans learn of the short-range weather forecasts for their area most often—in fact overwhelmingly so—via television (Ryan, 1982). The person or persons responsible for the dissemination of these forecasts (and in some cases their preparation as well) can be characterized as follows:

- telecasters with no training or experience in meteorology who simply transmit the forecast;
- telecasters with no academic training in meteorology and with little or no experience in forecasting who occasionally modify the NWS forecast when it is obvious—at least to them—that such changes are necessary and are highly likely to produce a better forecast;
- telecasters who are professional meteorologists, and who, working alone with NWS products and facilities, either modify the NWS forecast as necessary or prepare their own without knowledge—except perhaps as a check afterwards—of the NWS forecast; and
- professional meteorologists who are employed by a private firm, or are part of a weather staff at a tele-

vision station, who prepare their own forecasts, but probably are aware of the NWS forecast and rely on its products and facilities.

It is clear, then, that the forecast of tomorrow's maximum and minimum temperatures, and of the likelihood of rain we hear from the local television weather personality, may not be that of the NWS. We must then ask: How well does the telecaster serve the public? How often does he or she give a forecast that is different from the zone or city forecast of the NWS? When the NWS forecast is modified, what prompts the telecaster to do this, and to what extent does he or she, as well as those who prepare their forecast without knowledge of that of the NWS, use NMC products, or local radar, or satellite photographs? And, most importantly, is the telecaster's forecast more accurate than that of the NWS, and what difference does it make if the telecaster is not a professional meteorologist? Is it true, as Walls (1977) suggested, that modification of the NWS forecast by nonprofessionals produces an inferior product?

The first set of questions, those relating to the frequency of modification of NWS forecasts and to those factors that prompt such modification, is considered in this report. In a following study we address the question of forecast accuracy.

2. Information sources

A questionnaire (Fig. 1) was developed to solicit answers to the questions just raised. Since it was to be answered, presumably, by persons in all of the four categories of telecasters given above, question 1 was necessary so that we could determine which of the respondents had access to the NWS forecast for the time and area for which he or she was forecasting. If "No" was circled there was obviously no need to continue. Questions 2 and 3 inquired about similarities between the telecaster's forecast and that of the NWS, whereas with 4 we tried to determine for which elements forecasts were most likely to be altered. Question 5 inquired about the information sources utilized when forecasts were modified, 6 asked whether the telecaster (or the station he/she worked for) engaged the services of a private forecasting firm, whereas 7 and 8 provided additional background data and were used to stratify the responses.

This questionnaire was mailed, during the period 26 February to 12 April 1985, to two categories of telecasters. The first was all current holders of the Seal of Approval for Radio and Television of the American Meteorological Society; there were 251 people in this category. We excluded those who according to their addresses were employed by private forecasting firms, or by radio stations, and those who had been awarded an honorary seal. The second category consisted of telecasters at commercial television stations in the top 211 markets of the 50 states plus the District of Co-

Fig. 1: QUESTIONNAIRE

1. When you (or your staff) prepare a weather forecast for your viewers, do you have access to the zone or city forecast of the National Weather Service for your area and time? By forecast we mean a prediction of the weather elements listed in 4. below, for periods out to 36 hours (for example, today, tonight, and tomorrow).

Yes No (circle one)

If you circled "No" there is no need to answer the remaining questions. Sign at the bottom and return. If yes, please continue.

2. What is the extent of the consideration you give to the National Weather Service (NWS) forecast in preparing your own?

none at all slight moderate heavy

3. About what percent of the time, over the past year, did you transmit to your viewers a forecast different from that of the NWS?

0 10 20 30 40 50 60 70 80 90 100

4. When you gave a forecast that was not exactly that of the NWS, which element(s) were involved? Please circle those that apply.

temperature state of sky
precipitation probability wind speed and direction
or statement

If you circled two or more of these, which element was most frequently altered? _____

5. What factors are important in influencing you, or those who assist you, to transmit a forecast different from that of the NWS? Please rank these by putting a number next to the factor (1 = most important).

_____ your knowledge of current weather _____ your colleagues
_____ your knowledge of local conditions, _____ satellite photographs
e.g., water bodies, topography
_____ radar other (specify and rank) _____

6. Do you utilize the forecasts of other agencies (e.g., private forecasting firms)? Yes No

7. Please indicate the length of time you have been employed as a television weather forecaster _____

8. Do you have a Bachelors Degree in meteorology or atmospheric science? Yes No

Signature _____ Television station call letters _____
Date _____ City _____

lumbia as listed in the "Designated Market Areas" section of *Spot Television Rates and Data*, 15 December 1984 issue (Standard Rate and Data Service, Inc., 1984). When there was more than one such station in a market area the one to which the questionnaire was sent was chosen at random. The letter was addressed to the station manager, whose name was given in this directory; he or she was requested to forward the questionnaire to the principal telecaster at that station. We excluded stations that were specified in the addresses of seal holders since this would obviously result in duplication. The number of questionnaires mailed in this category was 202; the total in both categories was 453.

3. Results

The response was quite good: 182 (72%) of the seal holders and 122 (60%) of those in the second category returned the questionnaire. The second category response was actually a little higher because if two questionnaires were sent to an individual—because he or she was both a seal holder and was chosen in the random selection process—the reply was counted only in the seal holder category. Replies were received from the District of Columbia, Puerto Rico, and all states except New Hampshire, Delaware, New Jersey, Nevada, and Vermont. A response was not received from

only one market area in the top 30; among the top 10, 7 replies were from one city, and from all 10 the total was 29. From the top 25 there were 81 replies, and from the top 50, 126.

Of course, not all returned questionnaires had complete information. Six indicated there was no such weather person at that station, and five of the seal holders indicated they were inactive. All but three of those who answered question 1 circled "yes." Replies were received from seal holders at two stations that were not ranked in the top 211. The seal holders who replied were at commercial stations, including the Weather Channel, with only one exception (a Public Broadcasting Station). All numerical results of the survey are shown in Tables 1 and 2.

a. Consideration of the NWS forecast

For all respondents the consideration given to the NWS forecast is as follows: slight and moderate a third each, heavy somewhat less, and not at all quite small. Nonseal holders (NSH), however, are four times as likely to give heavy consideration to this forecast as seal holders (SH), and better than twice the percentage of SH as NSH give it slight consideration. The responses in the stratification by education, B.S. recipients versus those without the degree (BS-NBS), were very similar to those of the SH versus NSH, but with an even greater difference in the heavy category, and a ten to one ratio (BS over NBS) in the "not at all" category.

Telecasters with over 20 years of experience tend to give more consideration to the NWS forecast than those who are newer to the profession, and none of these veterans ignored it entirely. The proportion of those affording slight consideration decreases, whereas heavy consideration increases, with market number. Note that market number increases with decreasing market size.

b. Frequency of modification of the NWS forecast

Direct, unmodified transmission of the NWS forecast is very infrequent, applying to less than 6% of those we sampled. A little over half indicated that they did so from 20 to 50% of the time; frequencies generally decreased away from these values. Among seal holders and those without it the chief difference is in the 0-10% category, with the latter about six times as likely to transmit the forecast essentially unchanged. Also, the distribution for SH is approximately bell-shaped, that for NSH strongly skewed toward the low percentages. The BS-NBS distinction produces similar results, respectively.

The more recent a person is on the job, the less likely that the forecast has been modified, although the differences by seniority are not great. An exception occurs for those with over 20 years; the 22% that rarely alter the forecast is anomalously large. Market number ap-

pears to have no influence on the responses to this question. In stratifying responses by market number, responses from those employed by the Weather Channel were not used; all replies from stations not ranked by *Spot Television Rates and Data* were included in the market number >100 category.

The question about frequency of modification of the NWS forecast should have been written differently. It should have been pointed out to the respondents that their forecast will be the same as that of the NWS some percentage of the time due simply to shared experience, expertise, training, etc. Thus, forecasts made completely independently of one another can be expected to be the same occasionally. The question, therefore, should have been written as "Keeping in mind that there are times when two independently prepared forecasts will be the same, about what percent of the time, over the past year, did you transmit to your viewers a forecast different from that of the NWS?" Or, we could have asked: "Excluding the times when you prepared a forecast without knowing of the NWS forecast, and the two turned out to be the same, about what percentage" This oversight notwithstanding, it is unlikely that our results would have been greatly changed if the question had been better phrased.

c. Elements modified

When the telecaster gave a forecast that was not that of the NWS, the element most frequently modified by all respondents was precipitation (84% of the time), although temperature was a close second (82%). State of sky was changed two-thirds of the time, wind speed and direction about one-third. The rankings for the NSH and NBS categories are the same, but for the SH and BS respondents the ranking of temperature and precipitation is reversed. State of sky and wind speed and direction are much more likely to be modified by telecasters with these distinctions.

The percentage of telecasters who change the NWS forecast of these elements increases quite consistently with years on the job except for those with over 20 yr, whose frequency of alteration is fairly similar to those newest on the job. This corroborates the findings in the previous section. There is a slight tendency for the percentages to decrease with increasing market number, that is, these weather elements are somewhat more likely to be changed at television stations with the most viewers.

Of those who circled two or more elements in the questionnaire and then responded to the inquiry about which element was most frequently altered, a plurality chose temperature, with precipitation a fairly close second, and the other two far behind. The stratifications did not change this ranking, except that those with over 20 yr of experience reversed temperature and precipitation.

TABLE 1. Questionnaire results.

	Question 2				Question 3										Question 4																					
	Not at all	Slight	Moderate	Heavy	0		10		20		30		40		50		60		70		80		90		100		Temperature	Precipitation	State of sky	Wind speed and dilation						
					6	4*	6	10	12	18	10	12	6	10	6	10	14	8	2	6	6	2	2	2	2	2					2	2	2			
All	6	34	32	26	6	10	12	18	10	12	6	10	6	10	6	6	6	2	84	82	66	34														
SH	8	44	34	12	4*	30	24	22	24	22	14	4	4	94	88	76	42																			
NSH	4	20	26	48	30	30	20	6	8	2	2	2	2	62	78	48	24																			
BS	12	46	34	8	4	22	30	24	14	2	14	2	2	92	88	80	46																			
NBS	2	22	28	48	30	36	14	8	16	2	16	2	2	70	80	50	24																			
Experience (years)																																				
≤5	4	38	30	28	16	26	22	18	14	2	14	2	2	78	82	60	26																			
6-10	12	38	24	24	14	24	32	12	12	4	12	4	4	88	86	74	46																			
11-20	6	34	34	22	6	40	18	24	10	0	10	0	0	94	92	72	44																			
>20	0	22	44	34	22	42	18	10	2	2	2	2	2	70	82	52	26																			
Market size																																				
Number ≤20	8	42	36	14	18	32	20	22	2	4	2	4	4	86	92	74	44																			
21-50	8	40	32	18	8	36	26	12	14	4	14	4	4	96	84	76	36																			
51-100	6	32	34	28	18	24	18	16	18	4	18	4	4	86	82	60	40																			
>100	4	24	26	44	28	24	26	10	10	0	10	0	0	70	90	62	28																			

	Question 6				Question 7 (years)				Mean
	Percent of yes answers								
	1-3	4-6	7-10	11-20	>20				
All	18	24	24	18	12	10	10	10	10
SH	10	30	28	20	10	10	10	10	10
NSH	32	18	18	16	16	10	10	10	10
BS	20	28	30	16	6	8	8	8	8
NBS	18	18	22	20	20	10	10	10	10
Experience (years)									
≤5	14	20	30	32	16	12	12	12	12
6-10	8	20	32	10	28	12	12	12	12
11-20	18	20	32	10	28	12	12	12	12
>20	26	20	30	10	22	12	12	12	12
Market size									
Number ≤20	2	20	30	32	16	12	12	12	12
21-50	6	20	32	10	28	12	12	12	12
51-100	24	20	30	10	20	10	10	10	10
>100	38	18	22	6	12	8	8	8	8

* Average for 0-10, 20-30, etc.

TABLE 2. Information on degree holders. Figures are percentage of respondents who have a degree in meteorology or atmospheric science, stratified by years of experience, market size number (higher number is smaller market), and whether they hold the AMS Seal of Approval.

Years	Seal holders	Nonseal holders	Total
1-5	81	29	57
6-10	78	21	59
11-20	63	15	49
>20	33	9	22
Market size number			
Top 20	66	38	62
21-50	72	25	62
51-100	76	30	54
>100	64	14	29
All	71	22	51

d. Influential factors

The responses to this question (number 5 in Fig. 1) are not shown in Table 1 because they are simple enough to be given only in writing. The various factors were clearly ordered, and average rank and number of first choice votes produced the same hierarchy. These are, with average rank given first and first choice, given as a percentage of all who ranked the factors, given second:

current weather	1.8, 42
local conditions	2.3, 29
satellite photographs	3.0, 8
radar	3.5, 4
colleagues	4.5, 0.

The remaining percentage, 17%, is comprised of those who indicated that something else ("other" on the questionnaire) was first choice, putting this catch-all factor in third place in the percentage rankings. When this happened, and when the "other" category was filled in and given a rank other than one, the following factors, in order of importance, were specified as contributing to modification of the NWS forecast:

- Forecast models: different (from the NWS) interpretation of, or analysis of; about half of those who filled in the "other" category, regardless of how they ranked it, mentioned models.
- The telecaster's own expertise and experience, including "common sense," and the realization that the NWS forecast often is for a larger area than that for which the telecaster is responsible.
- Access to more recent information than that available to NWS personnel.
- The perception that the NWS is too conservative.

Again, we stress that stratifying the replies, as was done for the previous questions, did not change the results (ranking and first choice selections) as specified

above. The only exception, and a slight one, is that those with over 20 yr of experience changed both rankings and number of first choice selections so that local conditions and current weather reversed rankings, as did radar and satellite photographs.

On the other hand, those who gave an additional factor for "other," and especially those who ranked this additional factor first, were predominantly seal (83%) and degree (67%) holders. Also, these telecasters were not different from all respondents in terms of years on the job, but were strongly concentrated in the largest metropolitan areas.

e. Use of private weather service forecasts

Fifteen percent of the respondents transmitted the forecasts of private weather services. The greatest departure from this occurs in the SH-NSH distinction: the latter are four-and-one-half times as likely to do so, whereas telecasters without the bachelor's degree are almost three times as likely to as those who have earned it. Those with six to ten yr of experience in telecasting rely the least on such services, those with over 20 yr the most. Of the 69 respondents employed by stations in the top 20 market areas, 7 (10%) have chosen to transmit forecasts from private weather services; this proportion rises to about 22% for markets numbered 100 and higher.

f. Years as telecaster

Four categories of years on the job have been used to this point to stratify questions numbered 2 to 6. In examining this aspect by itself, the number of categories was increased to five (Table 1). The mean ages were calculated by a weighted average; the >20 category was assumed to have a mean of 25.

The average number of years as a telecaster is just under ten. The SH-NSH distinction makes very little difference, although there are three times as many NSH as SH in the 1-3 years category; this is compensated by reversed ratios in the remaining brackets except the >20 category. The average tenure tends to decrease with increasing market number, and only about one percent of the telecasters in the top 20 have been at it three years or less. On the contrary, almost 40% of those in markets numbered over 100 have this limited tenure.

g. Number with Bachelor of Science degree

Table 2 indicates that slightly over one-half of the respondents have a Bachelor of Science degree in Meteorology or Atmospheric Science. Comparing years of experience, only those with over 20 have a significantly lower proportion, about one in five. Market number makes some difference, and the smaller the market number, the more highly educated the telecas-

ter; only three in ten telecasters in markets with the largest numbers have the degree.

The highest proportion of degree recipients is among seal holders who have less than 5 yr on the job eight of ten have the seal. As experience increases the ratio of seal holders drops to one in three for those with over 20 yr experience. The proportion among nonseal holders also decreases with tenure, but the decrease is from three in ten to one in ten. Among seal holders, those with the degree are fairly evenly distributed by market number, and the same holds for nonseal holders, although the percentage is comparatively lower in the highest numbered markets. Here again, the percentage of degree holders among nonseal holders drops from 4 in 10 to 3 in 20 as market number increases.

One additional figure worth noting, and not shown in Table 2, is that 83% of degree recipients hold the Seal of Approval.

h. Additional information

Our respondents were not reluctant to write in comments when they felt that so doing might clarify their answers, and some used the questionnaire to air gripes and areas of dissatisfaction. Others took the opportunity to point out positive aspects of their work. The most frequently noted comments concerned the utilization and worth of NWS forecasts and other products, and NWS policies and procedures. Many complained or were critical. These comments are typical: "If they were doing the job, private firms would not be doing so well;" "the NWS does not seem to update forecasts often enough;" "overdependence on the LFM (Limited-Area Fine Mesh Model);" and "slow in adjusting to newly developing weather events."

On the other hand, a few (definitely a minority) defended the NWS. From a moderate-size market in Pennsylvania: "I have always used the National Weather Service as a basic source for all our TV weather programs. The dedicated professionals at our local NOAA office are always helpful in every way." And from the northeast: "The (city) office and MIC (Meteorologist in Charge) is the best and most cooperative I've worked with." Such favorable comments tended to come from markets numbered over 100; conversely, complaints about the NWS came from telecasters in larger metropolitan areas, who were more likely to be both degree and seal holders.

Several of the respondents took umbrage at the suggestion that they modified, or altered, the NWS forecast. Their indignation was clear in comments such as "No element is altered. We produce a forecast independent of the NWS forecast," and "my professional background (enables me) to generate a forecast somewhat different from (that of) the NWS most of the time." Some indicated, less stridently, that they pre-

pared their forecasts first, to some extent using the model prognoses, discussion bulletins, hourly reports, satellite imagery, radar, and even MOS guidance, and then referred to the zone or city forecast for their areas as a check. Lazalier (1982) has provided more detail on sources of information utilized in the telecasters' preparation of a forecast, as well as an accounting of the particular forecast methods employed. In retrospect, then, the questionnaire would have been better worded if we had used, say, "different" instead of "altered" in the second part of Question 4.

Aside from comments on the NWS, the use of its forecasts and other products, and whether or not the NWS forecasts were altered or simply used as a check, the respondents told us of ways to make better forecasts. From the West Coast came the suggestion that the NWS can be "beaten" if one uses all current data available after model initialization times. Others are convinced that timing is crucial, and that the telecaster is better able than the models to determine when various weather systems will affect their area. One telecaster noted that he can nowcast, that is, modify the forecast—whether prepared by him or the NWS—right up to the time it is released and suggested that this is why his forecasts are better. Still another noted that his WSFO prepared forecasts for areas lower in elevation than that in which most of his viewers lived and implied that his temperature forecasts are better, or at least more appropriate, especially on clear winter nights.

Eleven of the respondents made a point of telling us that they did not use percentage probabilities in their precipitation forecasts. It is possible that many more, those who indicated that their forecast of precipitation was not the same as that of the NWS (question 4), also do not use probabilities. One senses a hostility toward this way of expressing uncertainty in remarks such as "Don't believe in it, neither does the public." This attitude is not at all indicative of the how the public feels about numerical versus verbal statements, at least according to recent surveys (Curtis and Murphy, 1985).

Finally, many of the telecasters who returned the questionnaire qualified their negative response to the question about a Bachelor of Science degree by noting they were close to it, or that their degree was in geography, or physics, or that they had the equivalent training in the military.

4. Summary and comment

A questionnaire was mailed to about 450 telecasters in the United States. We sought information on 1) the reliance they place on the National Weather Service short-range forecast; 2) how often they issue a forecast different from that of the NWS; 3) when they do issue such a forecast, which weather elements are most likely to be different; and 4) what factors are important in

prompting them to issue a different forecast. Additional questions concerned seniority, whether or not they had a degree in meteorology or atmospheric science, and whether or not they utilized the forecasts of agencies other than the NWS. Replies were received from 304 telecasters (67% of those queried); these were predominantly from the largest markets (10% from the top 10 markets—of about 220 nationwide—and 41% from the top 50).

Irrespective of his or her credentials, or of desiderata (Seal of Approval, degree, experience), the telecaster does issue a forecast that is different from that of the National Weather Service. Only about 6% transmit the latter directly. There are, of course, differences in the extent of this modification according to these three desiderata. In general, it is the seal holder with a degree in meteorology or atmospheric science who places less reliance on the NWS forecast and who, we infer, is most likely to think he or she can improve on it. Seniority makes some difference, and the more recent one is to the job the less likely he or she is to modify, although veterans with over 20 yr of experience are an exception. Not only are they more likely to leave the forecast essentially unaltered, but they also tend more than their juniors to give the NWS forecast serious consideration.

In this connection we should also acknowledge that there may be a tendency among all telecasters, to one degree or another, to inflate the frequency with which they issue a forecast different from that of the NWS. Professional meteorologists may aspire to be independent of the NWS, to improve to the point that the forecast they issue is entirely their own. Similarly, the nonprofessionals may take pride in their presumed ability to modify a forecast on occasion and, subconsciously or not, exaggerate the number of times this occurs. This would, of course, have the effect of biasing the responses away from the "heavy" and toward the "not at all" in question 2, and toward higher percentages in question 3.

Of the four weather elements routinely forecast out to 36 hours—temperature, precipitation, state of sky, and wind speed and direction—the first two are far more likely than the others to be different from the NWS forecast, and somewhat more than eight of ten telecasters who issue a forecast different from that of the NWS modify these elements (or, alternatively, develop a forecast of these elements that is different from that of the NWS). State of sky and wind speed and direction are different about two-thirds and one-third of the time, respectively. Those who hold the Seal of Approval and those with the degree reverse the ordering of the first two elements by a slight degree, so that temperature is different somewhat more frequently than precipitation.

The factors that influence the telecaster to issue a different forecast are (in order) current weather, local

conditions, "other," satellite photographs, radar, and colleagues. The factors most often specified in the "other" response were analyses and interpretations of forecast models by the telecaster which lead to different conclusions, and thus a different forecast, than that of the NWS, and the telecaster's experience. This "other" response was most likely to be completed by those with the seal, a degree, or both. Also mentioned fairly frequently were access to more recent information than that available to the NWS and the perception that the NWS is too conservative. Another stratification which made a difference was that those with over 20 yr of experience reversed both local conditions and current weather, and radar and satellite photographs.

The average number of years as a telecaster is just under ten. Slightly over one-half of those replying have the bachelor's degree. This distinction is most common among those who are seal holders with less than five years on the job, least likely among those with over 20 yr of experience. Fifteen % of the respondents transmitted the forecasts of private weather services; those with the degree and/or the seal of approval are less likely to do this.

Some additional observations can be made about how the telecasting profession has changed over the last 25 yr or so, as gleaned from information obtained from the questionnaires. In the 1950s and 1960s it included for the most part both meteorologists with military experience in weather forecasting gained during and just after World War II and the announcers, or broadcast journalists, who did little more than relay the Weather Bureau forecast. There were few degree and seal holders. This era was followed by a period in which university-trained young people began assuming more and more prominence in the industry and became known to their viewers not just as weather announcers or broadcasters, but as meteorologists. This lent an air of professionalism to the nightly weather broadcast which, except for that imparted by the military veterans, had been largely missing. Most of these telecasters applied for and were granted the Seal of Approval after an apprentice period of a few years. A large majority of degree holders who responded to our questionnaire have the seal (83% do; of the non-degree holders this is true of 36%). Of the seal holders, 70% have the degree; of the nonseal holders 22% do.

We looked at the first names of the 300-odd respondents and counted those that clearly were feminine. There were 15, or just about 5%, and these averaged 3.7 years on the job, as contrasted with about ten yr for all respondents. The difference in the years of experience between men and women may mean that women do not remain as television weather forecasters as long as men or the percentage of women television forecasters may have increased in recent years.

Finally, a comment on the representativeness of our sample is appropriate. The results reported here were

not obtained from a random sample of telecasters in the United States. Questionnaires were mailed to a station chosen randomly in each of the top 211 market areas as of December 1984, and had our sample been restricted to these, some such claim could have been made (stations in market areas other than the top 211 are increasingly unlikely to have a telecaster, per se). But we wanted a much larger sample, such as could be obtained by addressing seal holders, and thereby biased our sample so that it disproportionately represented the professional meteorologist as telecaster, rather than the announcer or broadcast journalist.

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