Gender and Journalistic "Place-Making" in Televised Tornado Coverage

Scout M. Key

National Weather Center Research Experience for Undergraduates (REU), The University of Oklahoma, Norman, Oklahoma
scoutkey222@gmail.com

Victoria A. Johnson

Department of Geography and Environmental Sustainability, The University of Oklahoma, Norman, Oklahoma

Darren E. Purcell

Department of Geography and Environmental Sustainability, The University of Oklahoma, Norman, Oklahoma

ABSTRACT

Place-making is a concept used to understand and describe how meaningful places emerge from interactions between people and their environments. In journalism, this refers to a journalists' ability to create and convey a sense of place through their reporting to foster connections between audiences and the locations and contexts of their stories. This paper presents a first attempt at identifying gender-sensitive journalistic place-making processes in the provision of weather news, particularly in connection to broadcast meteorologists' coverage of the 2-3 March 2020 tornado outbreak in Nashville, Tennessee. A qualitative content analysis (QCA) is pursued to isolate the effects of gender on WSMV's local television coverage of the outbreak. Preliminary findings indicate that journalistic place-making varied by gender of the meteorologist: female meteorologists tend to foster a sense of place by emphasizing broad-level information, such as appropriate protective actions at the city/county scale, whereas male meteorologists offer more detailed, street-level reports to enhance the audience's understanding of a storm's path and potential risk to specific areas. Our results suggest that broadcast meteorologists are not merely reporters but are active place-makers who help construct and convey the significance of severe weather in relation to the places where people live. These findings open the door to further explorations of how gender nuances in the place-making process shape media coverage and the costs associated with meteorologists' gender on the representation of places.

Keywords: Broadcast meteorology; Broadcasting; Tornadoes; Communications/decision-making

1. INTRODUCTION

The term "place" refers to a space that gains significance through individual, collective, or cultural processes (Stedman 2003; Tuan 1975). This significance arises from multi-sensory memories, symbols, and lived experiences, capturing what Tuan (1975) describes as "all the modes by which a person knows and constructs reality" (p. 8). Similarly, Relph (2001) views place as a set of spaces that are transformed into meaningful locations through human experiences and interpretations. Consequently, "place" serves as a concept encompassing subjective dimensions of the relationship between people and their environment (Relph 2001; Tuan 1975). Stated differently, the concept of place integrates spatial structures with human experiences, reflecting the intrinsic connection between people and their surroundings.

In contemporary journalism, this notion of place extends to include digital environments. Journalists operate within digital spaces to disseminate their stories, thereby creating a sense of place by projecting aspects of life in the digital

---

[1]Scout Key, University of Texas at Austin, 120 David L. Boren Blvd. Norman, OK 73072 U.S.A., scoutkey222@gmail.com.

realm. This underscores that media portrayals are embedded with meaning and are affective constructs. Accordingly, journalists "transmit images of space and place through communication, so space and place are part of the 'content' of media" (Adams 2010, p. 37).

In the same token, "place-making" involves actively shaping how audiences perceive and relate to places depicted in both physical and digital spaces (Basaraba 2023). Journalistic "place-making" thus refers to the role and influence journalists' have in representing place in the news. It encompasses how journalists add depth to knowledge about places through cultural and ideological processes (Gutsche 2014). It is often considered journalism's *meaning-making* function (Gutsche and Rafikova 2018), where the portrayal of geographic places through narratives, maps, and visual elements help shape public perception (Gutsche 2014). In this regard, journalists are not merely reporters of events but are active place-makers who help construct the significance of events in relation to the places where people live.

Broadcast meteorologists bring a unique skill set to newsrooms, combining communicative prowess with scientific expertise. Research shows that many meteorologists come from journalism programs with a minor in meteorology (Green et al. 2019). Despite their dual expertise, it is worth mentioning that gender disparities persist in the field, with systemic sexism contributing to a male-dominated profession. Historically, women were often hired based on appearance rather than qualifications, and professional meteorological credentials remain disproportionately held by men (Green et al. 2019). Nevertheless, their specialized training allows broadcast meteorologists to effectively shape and communicate the significance of geographic locations within their weather reports.

In previous works by Cairo (2016) and Ebner (2013), it has been shown that in times of severe weather, viewers who tune in to watch broadcast meteorologists often receive different levels of coverage depending on where they live. Both of these studies found that viewers in rural areas typically receive less and different information compared to those in urban areas. While these studies established the existence of this disparity, they did not provide concrete reasoning for the discrepancy. Studies have also identified gender-based inconsistencies in how broadcast meteorologists are perceived. Weibel et al. (2008) found that viewers tend to view female meteorologists as more credible, while news stations often consider male meteorologists to be more credible for branding purposes. Additionally, Rainear and Lachlan (2022) demonstrated that the gender of the meteorologist affects the audience's perception of trustworthiness. Our hope is to identify whether these gendered perceptions contribute to the observed disparities in coverage across different geographic locations.

It is within this lens of trust and credibility that this study focuses on the broadcast meteorologists themselves through the lens of journalistic place-making, focusing on whether gender influences the extent of risk information provided to specific audiences. Currently, there is a noticeable paucity of research examining the role of broadcast meteorologists in shaping perceptions of place. Extant research has observed that broadcast meteorologists offer varying levels of severe weather coverage based on their perceptions of place, with urban areas often receiving more attention than rural ones (Johnson 2020; Cairo 2016; Ebner 2013). This study represents a pioneering effort to delve deeper into the reason for disproportionate levels of coverage. We posit that place-specific disparities in severe weather coverage stem from the meteorologists' place-making practices, which influence their decisions on how and where to allocate their risk messages.

2. LITERATURE REVIEW

2.1. Place-Making

Place-Making in geography can be defined as the process of assigning meaning to a place (Gutsche and Hess 2020). These place-making processes take place using symbolic and imaginative power. Symbolic power is the

power to impose meanings through symbols and definitions of a space, whereas imaginative power is the power to impose meanings through evoking emotion or attention (Gutsche and Hess 2018).

The place-making process addresses the significance of place and how places are used and perceived by people. The process itself of creating place is shaped through experience and knowledge about a place (Tuan 1975). Thus, the dissemination of knowledge and personal or relayed experience of a place will impact the meaning assigned to a place.

The ways in which someone experiences a place can shape the meanings assigned to that place (Tuan 1975). Experience can be conducted in different ways; passive and active (Tuan 1975). Passive experience of place is something more subconscious and irrevocable, like smelling the coffee being brewed at a coffee shop, whereas an active experience of place is more thought about and easier to replicate through such things as pictures, paintings, audio recording, etc. (Tuan 1975). Thus, the experience of a place can be very subjective, but patterns of place-making, or the process of assigning meaning to spaces, are subject to those in the power to conduct placeification (Gutsche, Jr. and Hess 2020; Tuan 1975; Gutsche 2014). 'Placification' is a term meaning the act of turning spaces into areas where meaning and importance is assigned (Gutsche, Jr. and Hess 2020).

2.1.1. Digitally Defining 'Place'

Our world today is undeniably digital. New technologies – from the internet to mobile devices and social media – make it easier for people to stay connected and help us make sense of our world. This digital era has changed the way in which societies experience place and can influence how place-making happens. Place-making can now be influenced not only by physical characteristics of a space, but also by its presence in digital media.

2.1.2. Experiencing 'Place' in the Digital Era

According to Adams (2009, p. 5), 'without space and place as a framework of experience, communication is meaningless, and yet without communication, we would not be able to imagine space and place'. Thus, the process of assigning meaning to a place is vital in order to communicate knowledge of a place. Gutsche and Hess (2020) argue that, 'Current understandings of place in the news set a foundation for such understanding, though this work usually expresses meanings after a geography is demarcated and characterized whereas in digital journalism, newsmakers and users are frequently creating or reinforcing connection to "place" through mediated experience, interactivity, and amid new territories of online news environments.'

Within Gutsche's and Hess' article "Placeification: The Transformation of Digital News Spaces into "Places" of Meaning," they describe how placeification is tied to experiences felt by those interacting with digital news spaces, as those experiences, over time, gather strong feelings of safety and connection with spaces used often (Tuan 1975; Gutsche, Jr. and Hess 2020). This attachment through experience gives power to those in control of the space, and whilst in this case these spaces are on digital news sites, this also applies to broadcast news sites (Gutsche and Rafikova 2018; Gutsche, Jr. and Hess 2020).

2.2. Digital Representations of Place in Weather Media and Severe Weather Coverage

The process of place-making itself takes place when journalists use their power as communicators to create place, which includes newscasters like broadcast meteorologists (Gutsche and Rafikova 2018). This process addresses the significance of place and how places are used and perceived by people, which then influences what type of information viewers receive (Gutsche 2014).

Within the perspective of broadcast meteorology, the type of information disseminated to viewers impacts the risk perception those viewers then have in relation to the threat present (Ebner 2013). This can manifest in a multitude of different ways, including which areas are focused on, what instrumentation is used to cover what regions, and the language used when discussing certain areas. (Sherman-Morris and Ali 2024; Ebner 2013). When focusing on times of severe

weather outbreaks, these subtle differences in coverage can mean different outcomes, especially with convincing viewers to take cover from impending weather hazards. In one case study focusing on how two TV stations covered a tornado outbreak in Tennessee in March 2020, researchers found that different instrumentation was used when focusing on urban vs rural areas, with broadcast meteorologists focusing more on the street scale in urban areas vs in rural areas as well as doppler radar data being the predominant instrument used during the coverage (Sherman-Morris and Ali 2024). A similar study was done in Missouri after the Joplin EF 5 tornado to study the connection between viewers and broadcast meteorologists in two different TV broadcasting areas (Ebner 2013). These researchers found that when viewers heard and saw different types of instrumentation and language used by broadcast meteorologists, their willingness to take protective actions against severe weather changed, for better or worse, depending on the instrumentation or language used (Ebner 2013). However, instrumentation and language are not the only factors influencing risk perception among viewers; the trust and perceived credibility of the broadcast meteorologists play a substantial part in influencing viewers to take severe weather seriously (Zavattaro and Stevens 2022; Rainear and Lachlan 2022).

It has also been found that viewers in different areas that watch the same news station and broadcast meteorologist receive different information and levels of coverage despite being impacted by the same threat (Cairo 2016). Within Cairo's 2016 paper, he found that rural areas of the Oklahoma City Metro received different information and levels of coverage than the urban areas, even when impacted by the same storm or threat levels. This case study acts as an example of how broadcast meteorologists control how audiences see and experience place, and how the disparities between the ways they assign meanings to place impacts the types of information the viewers at home receive.

2.3.   Broadcast Meteorology and Gender

Studies have shown that the amount of trust and credibility broadcast meteorologists have is influenced by a multitude of factors, including gender, race, and personal branding (Zavattaro and Stevens 2022; Rainear and Lachlan 2022; Cario 2016). A study conducted in Switzerland found that age and gender influences the credibility of the broadcast meteorologist (Weibel et al. 2008). They concluded that from the viewer's perspective, a female meteorologist is seen as more credible, whereas from a news station branding perspective, a male meteorologist is seen as more credible. (Weibel et al. 2008)

This is not the only study examining how gender influences credibility, for other researchers have concluded that female broadcast meteorologists are generally perceived as less trustworthy and less credible than their male counterparts (Rainear and Lachlan 2022).

Gender also influences not only how broadcast meteorologists are perceived when providing live coverage, but it also influences when they are able to provide this coverage (Hallows; Cranford 2018). Two studies have found that female broadcast meteorologists tend to be put on the weekend or weekday morning coverage slots, widely considered to be the least desirable slots in tv broadcasting (Hallows; Cranford 2018). This is in stark contrast to men who not only tend to get weekday evening spots, the most coveted, but are also most often the ones who are the chief broadcast meteorologists (Hallows; Cranford 2018).

This gender imbalance within broadcast meteorology is rooted in a history of 'weathergirls'; a precursor to the modern day female broadcasting meteorologists (Rayne 2020). These 'weathergirls' were included in television broadcasts in order to add sex appeal to draw in viewers, giving them a stereotypical dumb sexy girl image (Rayne 2020). This stereotype still continues to haunt female weathercasters to this day, with many reporting facing more harassment due to this outdated view of female broadcast meteorologists. (Rayne 2020).

2.4.   Significance Statement and Research Question

The focus of this study on broadcast meteorologists is relevant as studies have shown the majority of people still receive their coverage of severe weather from broadcast meteorologists (Cario 2016;Ebner 2013). However, past research has concluded that even though different areas may be receiving their severe weather coverage from the same news station, there exist differences in level of coverage and information between them. The reasoning behind this, however, is unclear. We know from past research that the gender of the broadcast meteorologist matters, from the shifts they work to the level of credibility and trust they are perceived to have. This paper will be looking to analyze the disparity of coverage and if this disparity could be caused by the gender of the broadcast meteorologist.

Through this paper, we will demonstrate that notions about place play a central role in the way broadcast meteorologists discuss tornado risk during the tornadoes of 2-3 March 2020.

RQ: What does a gendered approach to place-making reveal about the ways in which broadcast meteorologists represent and discuss communities affected by severe weather?

3. DATA AND METHODS

3.1. Case Selection: 2-3 March 2020 Nashville, TN, Tornado Outbreak

Our research began with a purposive sampling approach to identify YouTube videos containing tornado warning coverage. We chose to focus on the 2-3 March 2020 tornado outbreak because of the availability of relevant coverage, selecting NBC-affiliate, WSMV (Channel 4), as the station of interest because it offered the most detailed and extensive coverage, featuring perspectives from both male and female meteorologists, in the videos we reviewed. We determined the gender of the newscasters by looking at their biography sections on the WMV Channel 4 website. The total coverage from WSMV is divided into four segments; however, at the time of writing, our analysis includes only the first two segments (see *data availability statement*). The first segment

lasted 1 hour, 46 minutes, and 19 seconds, starting with the issuance of the initial severe thunderstorm warning within the station's viewing area. The second segment lasted 8 hours, 0 minutes, and 7 seconds, concluding with coverage of the storm's aftermath and damage[2].

Three journalists drove the coverage of the tornado outbreak. Among them, two were broadcast meteorologists and one was a non-meteorological news anchor. It is important to note that the chief meteorologist was not present in any of the footage we reviewed. One male meteorologist served as the primary, on-air personnel, providing continuous updates and detailed analysis throughout the event. Meanwhile, two females – one broadcast meteorologist and one news anchor – supported the coverage off-camera, focusing on tasks such as data analysis, coordination, and verifying the accuracy of the information being broadcast. Our study focuses on male and female meteorologists because this is how they identify themselves on WSMV's station website biographies. We acknowledge the importance of other gender identities; however, our research relies on publicly available data that categorizes meteorologists as predominantly male or female.

The tornado outbreak occurred during the evening and overnight hours of 2-3 March 2020, when a series of 15 tornadoes struck central Tennessee, two of which were rated as strong to violent (i.e., EF-3 to EF-5 on the Enhanced Fujita scale, NSSL 2020). Among these, an EF-3 tornado directly hit the city of Nashville, resulting in 5 fatalities and 220 injuries. The tornado later intensified into an EF-4 in western Tennessee, causing 19 deaths and injuring 96 others outside the city of Cookeville (NWS 2020). These storms were particularly deadly due to their timing, with

---

[2] Parts 1 and 2 contain coverage of the EF-3 tornado that directly hit Nashville, TN, and concludes with reporting on the storm's aftermath and damage in the metropolitan area. Parts 3 and 4, which are not included in this analysis, cover the storm's continued intensity as it moved into western Tennessee, where it later produced an EF-4 outside the city of Cookeville, TN.

some of the strongest impacts occurring after dark while many people were asleep. Figure 1 maps the tornado tracks and ratings of this outbreak across WSMV's viewing area.
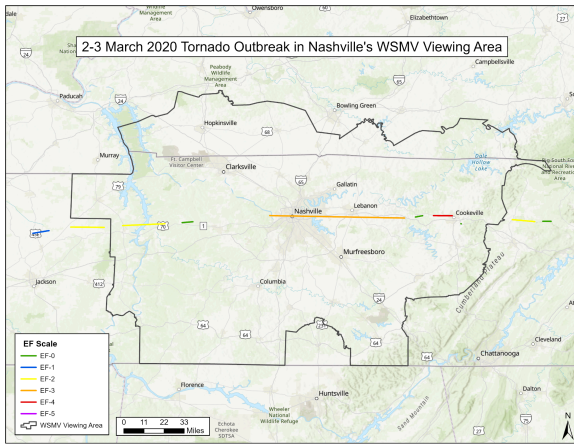
Figure 1. Map of the location, length, and strength of confirmed tornadoes during the 2-3 March 2020 outbreak that occurred within the WSMV viewing area.

3.2. Analytical Strategy: Qualitative Content Analysis

This research employed a qualitative content analysis (QCA) to understand how broadcast meteorologists use their reporting strategies to depict certain places as more or less at-risk to impending tornadoes (Elo and Kyngäs 2008, Fields 1988). This approach allowed us to isolate the effects of gender on WSMV's local television coverage. We constructed codes using the software package, MaxQDA, following Mayring's (2014) iterative coding procedure, which involved assigning theoretically-driven codes to textual and visual segments of WSMV's broadcast (see next section for details on the theoretical codebook). Our study employed a team-based coding approach that combined inductive and deductive methods to enhance the depth of our analysis (Cascio et al. 2019). Initially, team members applied a deductive coding scheme derived from the established theoretical framework. As the study progressed, we incorporated an inductive approach, identifying and coding new themes that emerged naturally from the broadcast content. This dual strategy enabled a balanced and comprehensive analysis, bridging theoretical insights with empirical observations. Additionally, our coding process mirrored Paul et al. 's (2021) concept of "pair coding," wherein one team member acted as the "driver" by coding segments of the coverage, while others served as "navigators" to ensure consistency and agreement with the codes being applied.

3.3. Developing a Codebook: Journalistic Place-Making

To assess broadcast meteorologists' ability to create and convey a *sense of place* relative to tornado risks, we borrow theoretical advancements from Gutsche and Hess (2018). This broader framework takes a critical look at how news media shapes perception of locales through verisimilitude, storytelling methods, and evidence-based reporting. Together, these elements reveal how broadcast meteorologists, as journalists, create a sense of reality that feels authentic and believable (i.e., verisimilitude) for the viewer. They achieve this by using various forms of evidence, including technical sources such as meteorological data from the National Weather Service (NWS), as well as testimonies from audience members impacted by severe weather, to influence public perception and portrayals of place. In this way, broadcast meteorologists play a critical role in shaping how audiences perceive certain locations by emphasizing certain communities more or less in their coverage. Studies have shown that broadcast meteorologists often disproportionately focus on urban areas compared to nearby rural places (Cario 2016, Ebner 2013), reflecting a tendency to allocate more attention to locations with higher viewing populations (Johnson 2020). This practice underscores how the media influences interpretations of socio-political issues by prioritizing coverage based on geographic relevance to their audience (Gutsche and Hess 2018).

3.3.1. Symbolic vs Imaginative Power

Central to Gutsche and Hess' (2018) theory of journalistic place-making are concepts of *symbolic* and *imaginative power*. In our application, we adopt *symbolic power* to analyze

how broadcast meteorologists use their authority to shape perceptions of places and weather risks through dominant narratives about place. Consequently, *imaginative power* is employed to understand how meteorologists use their creativity and journalistic methods to construct and present these narratives, thereby reinforcing or challenging existing assumptions about place. A broadcast meteorologist's *symbolic power* is thus a precondition for *imaginative power*, that is, "the power to not just name, but also to bring into being places via cultural imaginaries" (Usher 2019, p. 93).

To operationalize the theoretical concepts of place-making, we meticulously examined key components featured in broadcast meteorologists' coverage, noting their use of various tools, graphics, and verbal descriptors to communicate the tornado threat. For symbolic power, we code for the prominence of specific radar products, the scale of warning communication, and common place names. We define 'instrumentation' as the specific types of radar imagery used in tornado warning dissemination, focusing on three major types: 'reflectivity,' 'velocity,' and 'correlation coefficient.' An additional code, 'other,' accounts for less prominent radar products used, such as hail detector, rain rate, or other storm threats (Figure 2a, b). Visual elements that were not radar-based were coded as 'visualization,' which included graphic overlays to radar products depicting a storm's estimated time of arrival (ETA), tornado trajectory (coded as 'extended track'), lightning/hail counts, and tornado warning polygon (Figure 3). We also examined the geographic scale for all mapped products by recording the time spent in three geographic scales, which we refer to as 'state-level,' 'city/county-level,' and 'street-level.' We mirror Sherman-Morris and Ali (2024) definition of scale, categorizing "the widest screen distance less than 15 mi as street-level, between 15 and 65 mi as city/county-level, and anything larger than 65 mi as state-level" (p. 160). Complimentary to this code is the code for 'place names,' which tracks the specific types of locations mentioned when discussing tornado risk. This code includes references to 'cities/towns,'

'highways/roads,' and local 'landmarks.' By analyzing both the geographic scale and specific place names, we aim to uncover the geographic specificity of broadcast meteorologists' coverage, identifying who and what is emphasized, and when.

Figure 2a. Example from WSMV Nashville coverage demonstrating the 'other' instrumentation code, specifically for depictions of rain totals per hour.

Figure 2b. As in Figure 2a, but for depictions of hail and wind speeds.
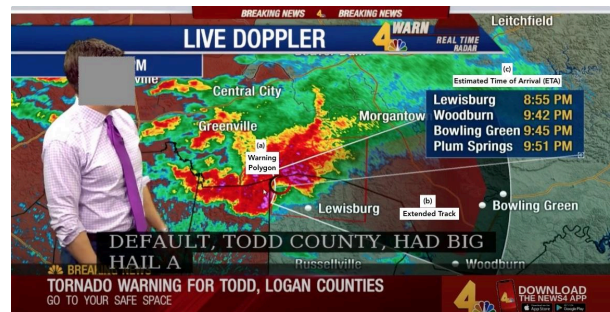
Figure 3. Example from WSMV Nashville coverage demonstrating the 'visualization' code, featuring codes for (a) 'warning polygon,' (b) 'extended track,' and (c) 'estimated time of arrival (ETA).'

For imaginative power, we code for the use of 'meteorological terminology,' 'protective action

advice,' and 'attempts to educate.' 'Meteorological terminology' refers to the technical language used to describe atmospheric phenomena. Examples from the coverage include terms like "rotation," "hook," "mesocyclone," and "rear flank downdraft (RDF)." While the use of complex scientific terminology can be important for accuracy, it may not always be helpful for viewers who lack specialized knowledge (Eachus and Keim 2020). To address this, we also coded for attempts to educate viewers, as understanding tornado risk information is critical to the warning process (Lindell and Perry 2012). Instances of education were coded when meteorologists made efforts to explain atmospheric conditions or provide guidance on appropriate safety measures. The protective action code captured the safety measures recommended to avoid or minimize potential threat from the tornado. For example, messages like "seek shelter in an interior room away from windows," "go to the lowest level of your home," and "avoid mobile homes," can help people protect themselves from tornadoes and minimize risk of harm.

Our coding frame and the resulting proportions of the coverage containing each code are presented in Table 1. We will further describe the results of gender-specific coding components in the following sections.

Code Elements	Number of occurrences in coverage	Percent of occurrence in coverage coded
Symbolic Power		
Instrumentation	21	83%
Reflectivity	85	75%
Velocity	33	7%
Correlation Coefficient	26	3%
'Other'	24	6%
Visualization	47	86%
Estimated Time of Arrival	26	10%
Extended Track	40	12%
Lightning/Hail Count	34	49%
Warning Polygon	61	76%

Code Elements	Number	Percent
Geographic Scale	19	91%
Street-level	44	11%
City/County-level	88	70%
State-level	33	6%
Place Names	506	5%
Cities/Towns	333	3%
Highways/Roads	49	1%
Landmarks	0	0%
Imaginative Power		
Meteorological Terminology	131	1%
Protective Action Advice	51	56%
Attempts to Educate	115	26%
Broadcast Role	67	97%
Chief Met.	0	0%
Supporting Met.	66	94%
Storm Chaser	0	0%
News Anchor	10	6%
Gender	47	97%
Male	240	81%
Female	157	32%

Table 1. Coding framework for journalistic place-making in WSVM's local coverage of the 2-3 March 2020 tornado outbreak in Nashville, Tennessee.

4. RESULTS AND DISCUSSION

We suspect gender to play a pivotal role in the place-making process. Our results are organized to discuss how broadcast meteorologists' reporting reflects notions of symbolic and imaginative power. Table 2 provides a comparison of how male and female meteorologists approach severe weather reporting.

Code Elements	Male		Female	
	n	%	n	%
Symbolic Power				
Instrumentation				
Reflectivity	111	29%	13	35%
Velocity	41	11%	3	6%

Correlation	29	8%	22	3%
Coefficient	25	7%	12	3%
'Other'			12	
Visualization				
Estimated Time of Arrival	25	5%	18	4%
Extended Track	37	8%	24	5%
Lightning/Hail Count	65	14%	76	16%
Warning Polygon	97	20%	139	29%
Geographic Scale				
Street-level	43	12%	33	9%
City/County-level	111	30%	129	35%
State-level	33	9%	9	5%
Place Names				
Cities/Towns	277	54%	56	11%
Highways/Roads	26	5%	23	4%
Landmarks	0	0%	0	0%
Imaginative Power Meteorological Terminology	112	.6%	19	.1%
Protective Action Advice	57	5%	80	4%
Attempts to Educate	98	21%	27	5%

Table 2. Comparison of male and female broadcast meteorologists roles and contributions at WSMV, Nashville, Tennessee.

4.1. Symbolic Power

The results show that there is a difference in the way broadcast meteorologists use symbolic power to place-make depending on gender. These differences in technique change the way each broadcast meteorologist place-makes, impacting how viewers perceive risk and the likelihood of them taking appropriate protective action.

As you can in Table 2, female broadcast meteorologists tend to use more instrumentation overall. However, male broadcast meteorologists tend to use more Correlation Coefficient, Velocity, and instrumentation labeled as 'other', which includes things like 24 hour rainfall totals, whereas female meteorologists used more Doppler Radar/Reflectivity data.

Researchers have found that reflectivity and velocity data are best when it comes to disseminating risk perception to viewers at home (Obermeier et al. 2022; Saunders et al. 2023). The type of data used and the level of technicality an instrumentation product includes may also be connected to how many attempts to educate a broadcast meteorologist uses, for some instrumentation products may be harder for viewers. For example, more explanation may be required to explain what correlation coefficient data means, whereas the same level of explanation may not be required for reflectivity or velocity data due to these two techniques being the most popular instrumentation technique used by broadcast meteorologists (Sherman-Morris and Ali 2024). Thus, areas that receive more coverage using correlation coefficient data may have a better understanding of the situation due to the more in-depth explanation provided due to the nature of the instrumentation used. This increase in knowledge, then, will shape an experience of place for those viewers watching in that area, thus creating a different sense of place depending on the type of instrumentation used, which then impacts the amount of risk perceived.

When looking at the visualization techniques used, we found that female meteorologists used more visualization techniques in general as well as Lightning/Hail Count and Warning Polygon, more specifically. Male meteorologists tend to use more Estimated Time of Arrival (ETA) data and Extended Track data, which can also be found within Table 2.

Ebner (2013) found that the use of ETA data was linked to improved risk perception among viewers, increasing the likelihood that viewers would take shelter. The ETA data, along with the extended track and warning polygon data, displayed communities that may be in danger both graphically and through transcription, providing knowledge to specific communities that were expected to be affected by this storm. The usage of the warning polygon, however, communicates a specific message of risk to the viewer, communicating that the areas within this polygon were in imminent danger, which creates a different experience through knowledge between viewers included in this type of visualization technique

versus other types of visualization techniques, creating a specific place within this area.

The usage of lightning and hail count data tends to communicate knowledge about areas that had already been affected by the storms in conjunction with discussing areas that were being affected by these storms in real time. In short, the use of ETA, extended track, and warning track, whilst driving the coverage into the future, are used to inform different perspectives and experiences of place, whereas lightning and hail count data are used to focus on past and current impacts of the storms covered.

These tools and the differences in their usage between the broadcast meteorologists depending on their gender impact the places created, which then informs the risk perception of the viewers.

This also applies to the way geographic scale is used, for in our results we can see that the code 'geographic scale' coincides more frequently with the code 'female', which makes sense with our findings from comparing gender with instrumentation due to each instrumentation method being inherently geographic. On a more refined scale, male meteorologists use more state level and street level data, whereas females use more city/county level data.

In previous studies, it has been found that the more specific the place name discussed in times of severe weather, the better at disseminating risk to viewers (Ebner 2016). Viewers have stated that they want to know the specifics of the situation, and the more specific, the better. When covering areas, the knowledge of certain areas conveyed by broadcast meteorologists works to create a certain perception of place depending on the level of place that is being discussed, which is thus impacted by the gender of the broadcast meteorologist.

Table 2 also confirms that males use more place names, not only overall but in each instance of the child codes as well. Note that there were no instances of landmarks being discussed within my data set.

Like the discussion above covering geographic scale and gender mentioned, the more specific the meteorologist gets in the coverage,

the better (Ebner 2013). Whereas geographic scale codes were about the use of different graphics and the scale of the graphics being used, these codes relate to the actual place names being spoken by broadcast meteorologists. It is clear, then, that female meteorologists use less of the verbal aspect of the geographic scale than males, which then impacts the places that are created. It is interesting to note, then, that there were no instances of using landmark names as a point of reference when discussing place names, for this is the smallest scale possible, which would then suggest that using landmark names would provide a better perception of risk than the other place names available.

4.2. Imaginative Power

We have also found that there is a difference in the way broadcast meteorologists use imaginative power to engage in the place-making process depending on gender.

Also within Table 2, we see that male meteorologists used vastly more meteorological terminology than females, and this is true for each child code with the exception of the code 'echo'.

The more specific the terminology, the better (Sherman-Morris 2024). This ties to what was discussed earlier, that when terminology is used and explained, it creates a knowledge base that can be interpreted by the audience, helping create a sense of place through this knowledge and perceived experience.

Oppositely, we can see that female meteorologists use more protective action advice than males. Protective action advice is important because including specific action advice is key for risk perception (Sherman-Morris 2024). When protective action advice is used, a level of danger and immediacy is conveyed to the audience, making them take the situation more seriously. This makes them perceive a sense of place based on the knowledge conveyed by the action advice being communicated by the broadcast meteorologists, and by our measures, will most likely be a female broadcast meteorologist.

We can see in Table 2 that male meteorologists use more attempts to educate than females do. Much like we mentioned within

discussions above, communicating knowledge to the public will generate a knowledge base and a perceived experience within their minds, which then creates a sense of place that affects how likely they are to accurately perceive risk.

This can be done using other methods as well. In Table 2, male meteorologists used more perspective in all cases, including giving local knowledge and personal experiences (e.g., making note of an area that had been hit by a past). It is important to note that the authors coded 'meteorologist's perspective' whenever the meteorologists gave their perspective on storm motion, damage, path, future predictions, etc. When a broadcast meteorologist gives their perspective on a storm, they are giving clarification as to what they think regarding the storm.

5.   CONCLUSION

Our study was limited to one television station's coverage of a single tornado outbreak, and we only analyzed half of the station's coverage. Future studies can build upon our findings by analyzing the remaining coverage from this station as well as incorporating additional television stations to examine how different stations within the same viewing area covered the event. Further studies could also benefit from employing qualitative GIS methodologies to explore geographic disparities in broadcast coverage of the event, particularly honing in on differences in tornado risk communication for urban and rural communities. Our investigation of the types of information communicated at varying geographic scales illuminates the potential for gendered differences in communicating risk for specific communities.

Through our examination of the 2-3 March 2020 tornado outbreak in Nashville, Tennessee, we discovered significant differences in the ways male and female broadcast meteorologists engage in journalistic place-making. We document that the use of radar products, visualization tools, and the naming of specific geographic locations exemplifies broadcast meteorologist's symbolic power in tornado risk communication. These practices not only convey technical data but also

reinforce the meteorologist's authority, while strategic place naming shapes the perceived urgency and relevance of weather threats for different audiences.

Our findings indicate that female meteorologists predominantly use reflectivity, while male meteorologists employ a range of more complex tools, such as correlation coefficient and velocity, which are more technically advanced ways to present atmospheric conditions. Additionally, female meteorologists frequently use lightning and hail counts to visualize weather threats, whereas their male counterparts provide estimated times of arrival (ETA) and extended tracks to indicate a storm's trajectory. We also found that men tended to provide more detailed, street-level information, whereas females offered broad, city and county-level information. These findings suggest that men are more likely to use specific, granular information with technical sources to bolster their credibility with viewers.

Broadcast meteorologists use their creative expression and journalistic methods to construct narratives about places impacted by severe weather, which aid in the solidification of their symbolic power. Our analysis reveals that male meteorologists often use complex meteorological terminology, such as terms like "echo" and "hook," to describe atmospheric conditions, reflecting their creative engagement with the data to establish credibility and authority of their expertise. This use of specialized language aligns with their tendency to employ more complex radar products and visualization tools, reinforcing their credibility through technical sophistication. It also aligns with more extensive educational efforts by males, wherein they attempt to explain what's happening within the storm, which reinforces their role as expert communicators.

In contrast, female meteorologists provide more detailed safety advice, which may imply that women exhibit more risk-averse behaviors than men when confronted with decisions involving risk. This emphasis can be seen as an imaginative strategy to address audience concerns directly. Overall, these practices illustrate how imaginative power is employed to craft narratives that shape

public perception of severe weather and places associated with risks.

Altogether, the results presented in this work underscore the persistence of gendered stereotypes within the industry, highlighting how male meteorologists are positioned as more authoritative and credible sources for information, while female meteorologists presume supplementary roles oriented towards providing generalized commentary. Such reinforcement of gender roles presents a need for further exploration of how these dynamics impact the effectiveness of tornado risk communication by broadcast meteorologists. As such, we believe our attempt to connect Gutsche and Hess' (2018) theory of journalistic place-making to severe weather reporting can serve as a springboard for future research on the ways places are depicted in the weather reports.

ACKNOWLEDGEMENTS

Data availability statement
The video broadcast used during this study is available online: WSMV Part I and WSMV Part II.

REFERENCES

Adams, P.C., 2010: A Taxonomy for Communication Geography. *Progress in Human Geography, 35*, 37-57.

Cario, A., 2016: Risk communication in local television news. University of Delaware, 99 pp. https://www.proquest.com/docview/1877629892/abstract/7971D522A31842EEPQ/1 (Accessed June 21, 2024).

Cascio, M.A., E. Lee, N. Vaudrin, and D.A. Freedman, 2019: A Team-Based Approach to Open Coding: Considerations for Creating Intercoder Consensus. *Field Methods, 31*(2), 116-130, https://doi.org/10.1177/1525822X19838237.

Cranford, A., 2018: Women Weathercasters: Their Positions, Education, and Presence in Local TV. *Bulletin of the American Meteorological Society*, **99**, 281–288, https://doi.org/10.1175/BAMS-D-16-0317.1.

Eachus, J.D., and B.D. Keim, 2020: Content Driving Exposure and Attention to Tweets During Local, High-Impact Weather Events. *Natural Hazards,* **103**, 2207-2229, https://doi.org/10.1007/ s11069-020-04078-6.

Ebner, D. M., 2013: A study of the connection between TV meteorologists and their viewers during severe weather broadcasts. University of Missouri--Columbia, .

Elo, S., and H. Kyngäs, 2008: The Qualitative Content Analysis Process. *Journal of Advanced Nursing,* **62***, 107-115,* https://doi.org/10.1111/j.1365-2648.2007.04569.x.

Fields, E.E., 1988: Qualitative Content Analysis of Television News: Systematic Techniques. *Qualitative Sociology,* **11**(3)*, 183-193.*

Green, T.A., C.J. Schreck, N.S. Johnson, and S.S. Heath, 2019: Education Backgrounds of TV Weathercasters. *Bulletin of American Meteorological Society,* **100**, 581-588.

Gutsche, Jr., R. E., and K. Hess, 2020: Placeification: The Transformation of Digital News Spaces into "Places" of Meaning. *Digital Journalism*, **8**, 586–595, https://doi.org/10.1080/21670811.2020.173755.

Gutsche, R. E., and A. Rafikova, 2018: 17. Journalism and Geography. *Journalism*, T.P. Vos, Ed., De Gruyter, 335–352.

Gutsche, R. E., 2014: News place-making: applying 'mental mapping' to explore the journalistic interpretive community. *Visual Communication*, **13**, 487–510, https://doi.org/10.1177/1470357214541754.

Hallows, D. W., The Full Forecast: A Gender and Racial Analysis of Broadcast TV Weathercasters.

Johnson, V.A., 2020: Designated Market Areas (DMAs) and Severe Weather Coverage: Oklahoma-based Broadcast Meteorologists and their Decisions for Providing Live, On-Air Coverage of Tornado Warned Storms. M.S. thesis, Dept. of Geography and Environmental Sustainability, The University of Oklahoma, 137pp.

Lindell, M.K., and R.W. Perry, 2012: The Protective Action Decision Model: Theoretical Modifications and Additional Evidence. *Risk Analysis,* **32**, 616-632, https://doi.org/10.1111/j.1539-6924. 2011.01647.x.

Loroño-Leturiondo, M., and S. Illingworth, 2023: Gender and placemaking: talking to women about clean air and sustainable urban environments in changing cities. *JPMD*, **16**, 91–104, https://doi.org/10.1108/JPMD-04-2021-0035.

Mayring, P., 2014: *Qualitative Content Analysis: Theoretical Foundation, Basic Procedures and Software Solution*. Klagenfurt, https://nbn-resolving.org/urn:nbn:de:0168-ssoar-395173.

Montz, B. E., 2012: Assessing responses to National Weather Service warnings: the case of a tornado. *Studies in Applied Geography and Spatial Analysis*, R. Stimson and K.E. Haynes, Eds., Edward Elgar Publishing.

NWS, 2020: March 2-3, 2020 Tornadoes and Severe Weather. NOAA, accessed 30 July 2024, https://www.weather.gov/ohx/20200303.

NSSL, 2020: Warn-on-Forecast Case Studies: Nocturnal Tornado Outbreak in Tennessee, March 2-3, 2020. NOAA, accessed 30 July 2024, https://www.nssl.noaa.gov/projects/wof/casestudies/nashville-2mar2020/.

Nunley, C., and K. Sherman-Morris, 2020: What People Know about the Weather. *Bulletin of the American Meteorological Society*, **101**, E1225–E1240, https://doi.org/10.1175/BAMS-D-19-0081.1.

Obermeier, H. B., K. L. Berry, and J. E. Trujillo-Falcón, 2023: Understanding Broadcast Meteorologists' Current and Future Use of Severe Weather Watches, Warnings, and Probabilistic Hazard Information. *Weather, Climate, and Society*, **15**, 893–907, https://doi.org/10.1175/WCAS-D-23-0013.1.

Paul, J.W., R.B. Rodrigues, and J.S. Cicek, 2021: Pair-Coding as a Method to Support Intercoder Agreement in Qualitative Research. *2021 IEEE Frontiers in Education Conference (FIE),* 1-5, https://doi.org/10.1109/FIE49875.2021.9637248.

Rainear, A. M., and K. A. Lachlan, 2022: The station scientist: Examining the impact of race and sex of broadcast meteorologists on credibility, trust, and information retention. *Front. Commun.*, **7**, 1052277, https://doi.org/10.3389/fcomm.2022.1052277.

Rayne, N. P., 2020: Do (Weather) Girls Just "Wanna Have Fun"?: A Survey of Broadcast Meteorologist Stereotypes and Experiences. 191.

Relph, E., 2001: *Space and Place: The Perspective of Experience.* University of Minnesota Press, 496pp.

Saldana, Johnny: *Elemental Coding Methods,* 130-133.

Saunders, M. E., K. D. Ash, J. M. Collins, and R. E. Morss, 2023: Construal of Situational Risk and Outcomes—Exploring the Use of Weather Radar Displays with Residents of the Tampa Bay Region. Weather, Climate, and Society, 15, 211–226, https://doi.org/10.1175/WCAS-D-22-0069.1.

Sherman-Morris, K., and S. M. A. Ali, 2024: An Exploratory Content Analysis of Two Local Television Stations' Tornado Warning Broadcasts. *Weather, Climate, and Society*, **16**,

155–170,
https://doi.org/10.1175/WCAS-D-23-0011.1.

Sherman-Morris, K., 2005: Tornadoes, television and trust—A closer look at the influence of the local weathercaster during severe weather. *Environmental Hazards*, **6**, 201–210, https://doi.org/10.1016/j.hazards.2006.10.002.

Stedman R.C., 2003: Is it Really Just a Social Construction?: The Contribution of the Physical Environment to Sense of Place. *Society & Natural Resources,* **16**, 671-685, https://doi.org/10.1080/08941920309189.

Tuan, Y.-F., 1975: Place: An Experiential Perspective. *Geographical Review*, **65**, 151, https://doi.org/10.2307/213970.

Usher, N., 2019: Putting "Place" in the Center of Journalism Research: A Way Forward to Understand Challenges to Trust and Knowledge in News. *Journalism & Communication Monographs,* **21**(2), 84-146, https://doi.org/10.1177/1522637919848362.

Walters, J. E., L. R. Mason, and K. N. Ellis, 2019: Examining patterns of intended response to tornado warnings among residents of Tennessee, United States, through a latent class analysis approach. *International Journal of Disaster Risk Reduction*, **34**, 375–386, https://doi.org/10.1016/j.ijdrr.2018.12.007.

Weibel, D., B. Wissmath, and R. Groner, 2008: How Gender and Age Affect Newscasters' Credibility—An Investigation in Switzerland. *Journal of Broadcasting & Electronic Media*, **52**, 466–484, https://doi.org/10.1080/08838150802205801.

Zavattaro, S. M., and K. A. Stevens, 2022: Broadcast Meteorologists and Personal Branding: An Exploratory Study after a Hurricane Crisis. *Weather, Climate, and Society*, **14**, 609–618, https://doi.org/10.1175/WCAS-D-21-0139.1.