

Influencing visitors through signs: Analyzing functions and components of signs in the USA for developing evaluation indicators

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INTRODUCTION

Visitor communication plays a vital role in informing and educating visitors about the sites they encounter, enhancing their experiences, and managing or influencing their behaviors to ensure safety and resource protection. Unlike in-person services such as tour guides or interpreters, signs are continuously available at no cost and are widely encountered across tourism and recreational settings (Ballantyne et al., 2007). As such, signs represent one of the most pervasive and accessible communication tools at destinations.

Ballantyne et al. (2007) identify three primary functions of signs: warning/caution, orientation, and interpretation. Through these functions, signs instruct, inform, educate, and guide visitors while contributing to both experience creation and resource protection. In particular, warning and cautionary signs have received considerable scholarly attention due to their role in visitor safety (Kortenkamp et al., 2021; Ruan & Deng, 2024; Zhong et al., 2025). Signs are often positioned as indirect management strategies, contrasting with direct approaches such as physical barriers, infrastructure, or regulatory enforcement. Persuasive signs, for example, can influence visitor reasoning and decision-making processes and thereby shape behavior (Park et al., 2023; Rice et al., 2023).

A substantial body of research has examined how signs affect behavioral change and compliance with regulations at recreational settings (Davis & Thompson, 2011; Foerster et al., 2025; Kortenkamp et al., 2021; Marschall et al., 2017; McDade et al., 2025; Price et al., 2018; Yang, 2024). These studies highlight the importance of message framing and textual design. For instance, emphasizing personal benefits has been shown to increase persuasive effectiveness (Abrams et al., 2020). Graphic design elements, such as color contrast and scale, also play a crucial role in attracting attention and enhancing behavioral influence, particularly when combined with persuasive language (Rice et al., 2023). Furthermore, integrating norms into messaging has been found to significantly increase compliance and behavioral intentions (Chung & Lapinski, 2024; Foerster et al., 2025; Kortenkamp et al., 2021; Niemiec et al., 2020; Schoenleber et al., 2022).

Despite these advances, several gaps remain. First, prior research has primarily focused on warning/caution and orientation functions, while comparatively little attention has been paid to interpretive signs aimed at enriching visitor experiences. Second, although some studies apply communication and social psychology theories - such as the Theory of Planned Behavior, the Elaboration Likelihood Model, and norm-based approaches (Selvaag et al., 2023) - many signs in practice do not appear to be explicitly theory-driven. Evidence suggests that theory-based persuasive messaging can outperform non-theory-based approaches (Abrams et al., 2025; Brown et al., 2010; Schoenleber et al., 2022), raising questions about the theoretical grounding of existing signage. Third, storytelling has been proposed as a potentially powerful yet underexplored element of signage. Narrative formats may enhance persuasion and strengthen visitors' emotional and cognitive connections to places (Hughes & Moscardo, 2024; Moscardo & Hughes, 2023). Additionally, narratives can attract and engage readers at recreational settings (Hall et al., 2010; Schoenleber et al., 2022). However, little empirical research has examined whether storytelling is incorporated into signs and to what extent it contributes to their communicative functions.

In response to calls for broader and more representative examinations of communication strategies in recreational settings (Foerster et al., 2025), this study investigates the patterns, functions, and components of contemporary signs in tourism contexts. Rather than evaluating the effectiveness of individual signs, the study explores the range of types, structural elements, theoretical underpinnings, and communicative strategies currently in use. Specifically, it examines (1) whether signs appear to be theory-informed, (2) what message framing approaches are employed, and (3) whether storytelling elements are incorporated.

By identifying prevailing strategies and structural characteristics, this study aims to develop evaluation indicators for assessing the quality and functions of signs. Understanding the breadth and depth of existing signage practices provides a foundation for future evaluation of both current and newly designed communication strategies in tourism settings.

METHOD

Field observations were conducted in the western and midwestern states in the USA. They involved primarily U.S. national parks, as well as selected state parks, regional parks, nature preserves, and scenic roadways where signs were publicly installed and accessible without additional fees or restricted access. This study began data collection in July 2025 and concluded in March 2026. During site visits, researchers photographed signs encountered in the field. To date, 142 sites across nine U.S. states have been visited, including 16 National Parks, 13 other National Park Service units, 17 other nationally designated sites, 57 state parks, and 39 regional parks and in-town. Among thousands of photographs of publicly accessible signs collected, 790 photos of signs were analyzed. Directional markers and signs indicating only trail routes or warning were excluded from the analysis.

Content analysis was employed to identify patterns, structural components, and functional characteristics of the signs. AI-assisted software (I Weaver) was used to examine: (1) which of the three primary functions—warning/caution, orientation, or interpretation—constituted the dominant focus of each sign; (2) whether the textual content followed a narrative or storytelling format; and (3) structural features, including word count and image coverage.

Several limitations should be acknowledged. A convenience sampling approach was used in selecting study sites and signs, based primarily on researchers' logistical constraints, including geographic accessibility and time availability. Consequently, the study does not encompass all potential locations or all installed signs within each site. Due to these constraints, the findings should be interpreted with caution. Nonetheless, this study offers preliminary insights into the structure and functions of signage in tourism and recreational contexts and contributes to ongoing discussions of experiential quality.

FINDINGS

Because coding is still ongoing, the findings presented here are preliminary. To date, analyses have focused on identifying (1) primary functional categories, (2) the presence of story-format structures, and (3) structural characteristics such as word count and image coverage. Analysis of theoretical grounding and message framing has not yet been completed. Examples of representative sign structures are provided in Figures 1–4. Preliminary content analysis reveals several emerging patterns:

Primary purpose: The majority of signs primarily serve interpretive functions related to natural or cultural resources (81%). Warning/caution and orientation functions appear less frequently as dominant purposes.

Story format usage: Almost a half of signs exhibit strong narrative structures, while fewer than 44% do not contain a story format. Approximately 6% demonstrate partial narrative or conceptual formats.

Thematic unity: A substantial proportion of signs are organized around a single theme (96%), rather than multiple unrelated messages.

Word count: Although this varies depending on the size of the sign, the majority of interpretive signs contain fewer than 250 words (62%), followed by those with 250–350 words (20%).

Image coverage: Images occupy approximately 60–80% of the panel area in the largest proportion of signs (32%), followed by 40–60% coverage (27%).



Figure 1. Example of informational sign with orientation/warning (Source: author)
165 words, 90-95% image coverage



Figure 2. Example of instructional sign (Source: author)
240 words, 45-55% image coverage

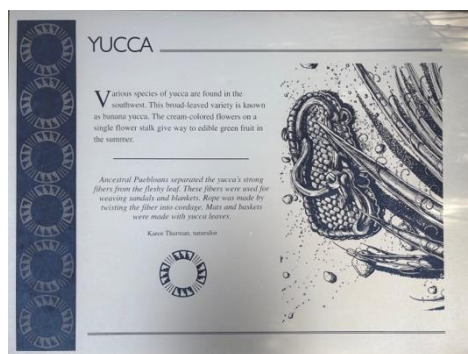


Figure 3. Example of thematic informational sign (Source: author)
72 words, 50% image coverage

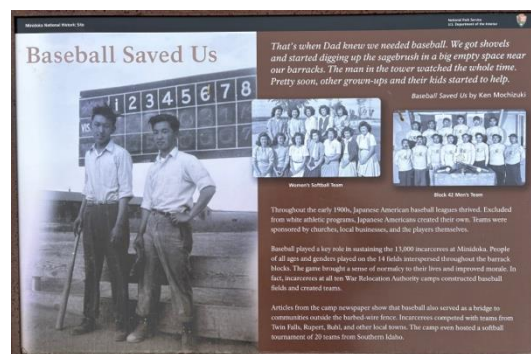


Figure 4. Example of clear narrative sign with a clear theme (Source: author)
184 words, 60-65% image coverage

DISCUSSION AND IMPLICATIONS

Rather than drawing definitive conclusions at this stage, these preliminary findings offer early insights into prevailing design tendencies in visitor signage across U.S. recreational and tourism settings. First, the predominance of interpretive functions suggests that signs are frequently positioned not only as informational tools but also as experiential devices intended to shape visitors' understanding of place. The widespread use of narrative structures further indicates that storytelling may already be embedded - implicitly or explicitly - within interpretive communication. Second, the consistent word length and substantial image coverage observed across interpretive signs point to emerging structural norms in sign design. These patterns may serve as a foundation for developing evaluation indicators related to thematic clarity, narrative integration, and visual-text balance.

As coding continues, subsequent analyses will examine whether signs are grounded in communication or social psychology theories and how specific message framing strategies are applied. Comprehensive quantitative results will be reported and discussed in the presentation.

REFERENCES

- Abrams, K. M., Dietsch, A., & Bice, C. (2025). Shaping Camper Behavior to Protect Wildlife: Effects of a Social Marketing Approach in National Parks. *Environmental Communication*, 19(8), 1467-1487.
- Abrams, K. M., Leong, K., Melena, S., & Teel, T. (2020). Encouraging Safe Wildlife Viewing in National Parks: Effects of a Communication Campaign on Visitors' Behavior. *Environmental Communication*, 14(2), 255-270.
- Ballantyne, R., Hughes, K., & Moscardo, G. (2007). *Designing Interpretive Signs: Principles in Practice*. Fulcrum Publishing.
- Brown, T. J., Ham, S. H., & Hughes, M. (2010). Picking up litter: an application of theory-based communication to influence tourist behaviour in protected areas. *Journal of Sustainable Tourism*, 18(7), 879-900.

- Chung, M., & Lapinski, M. K. (2024). The Effect of Dynamic Norms Messages and Group Identity on Pro-Environmental Behaviors. *Communication Research*, 51(4), 439-462.
- Davis, S. K., & Thompson, J. L. (2011). Investigating the Impact of Interpretive Signs at Neighborhood Natural Areas. *Journal of Interpretation Research*, 16(2), 55-66.
- Foerster, T. A., Chalgren, L., Abrams, K., Bice, C., & Singer, M. (2025). Informing or Influencing? A Content Analysis of Wildlife Feeding Deterrence Messages in U.S. National Park Communications. *Journal of Interpretation Research*, 30(2), 183-203.
- Hall, T. E., Ham, S. H., & Lackey, B. K. (2010). Comparative Evaluation of the Attention Capture and Holding Power of Novel Signs Aimed at Park Visitors. *Journal of Interpretation Research*, 15(1), 15-36.
- Hughes, K., & Moscardo, G. (2024). Once upon a time: the impact of storytelling on connecting people to natural landscapes. *Environmental Education Research*, 30(2), 235-250.
- Kortenkamp, K. V., Moore, C. F., Miller, E. M., & Truell, K. V. (2021). DANGER! NO HIKING! Risky hiking decisions, framing of normative warning messages, and self-exempting beliefs. *Journal of Outdoor Recreation and Tourism*, 35, 100415.
- Marschall, S., Granquist, S. M., & Burns, G. L. (2017). Interpretation in wildlife tourism: Assessing the effectiveness of signage on visitor behaviour at a seal watching site in Iceland. *Journal of Outdoor Recreation and Tourism*, 17(Supplement C), 11-19.
- McDade, C., Fatone, A., Larson, L. R., Leung, Y.-F., Tanner, J. D., & Taff, D. (2025). Leave No Trace in the Frontcountry: Assessing Knowledge and Behaviors Before and After a Targeted Messaging Intervention. *Journal of Interpretation Research*, 30(1), 149-173.
- Moscardo, G., & Hughes, K. (2023). Rethinking Interpretation to Support Sustainable Tourist Experiences in Protected Natural Areas. *Journal of Interpretation Research*, 28(1), 76-94.
- Niemiec, R. M., Champine, V., Vaske, J. J., & Mertens, A. (2020). Does the Impact of Norms Vary by Type of Norm and Type of Conservation Behavior? A Meta-Analysis. *Society & Natural Resources*, 33(8), 1024-1040.
- Park, L. O., Marion, J. L., & Wimpey, J. F. (2023). Efficacy of Combining Education and Site Management in Reducing Off-Trail Travel in a Fragile Biotic Community, Acadia National Park. *Journal of Interpretation Research*, 28(1), 25-49.
- Price, A. M., Monahan, J. C., & Bergren, R. (2018). Can interpretive graphics influence visitor behavior in an exhibit space? *Journal of Interpretation Research*, 23(1), 47-56.
- Rice, W. L., Shellhorn, J., Bloomgren, V., Booth, L., Duncan, S., Elias, J., Flowers, K., Gambini, I., Gans, A., Medina, A., Obadare, D., O'Neill, C., Rooney, Q., Scherck, G., Schmidt, K., Thomas, C., Thomas, E., Walhus, G., Whitney, P., & Winckler, C. (2023). The impact of graphic design on attention capture and behavior among outdoor recreationists: Results from an exploratory persuasive signage experiment. *Journal of Outdoor Recreation and Tourism*, 42, 100606.
- Ruan, W. Q., & Deng, F. (2024). Stop unsafe behaviors: Matching strategies of social norms and anthropomorphized roles in tourism safety communication. *Journal of Hospitality and Tourism Management*, 60, 177-191.
- Schoenleber, C., D'Antonio, A., & Hall, T. E. (2022). Are signs enough? Using normative and narrative messaging to protect the western snowy plover (*Charadrius nivosus*) in coastal Oregon. *Journal for Nature Conservation*, 69, 126251.
- Selvaag, S. K., Keller, R., Aas, Ø., Gundersen, V., & Singsaas, F. T. (2023). On-site communication measures as a tool in outdoor recreation management: a systematic map. *Environmental Evidence*, 12(1), 14.
- Yang, T. H. (2024). The effectiveness of information signs in deterring visitor vandalism. *Journal of Outdoor Recreation and Tourism*, 45, 100731.
- Zhong, H., Zou, Y., Hao, F., Fang, Y., & Ng, W. (2025). Shaping safety: Effective signage for tourist attractions. *Tourism Management*, 110, 105186.

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