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The Tourism Story Project: Developing the Behavioral Foundations for an AI Supporting Destination Story Design

Storytelling enables destination advertising to build emotional connections between tourists and the destination. In this paper, we summarize the results of the Tourism Story Project (TSP) which focused on understanding the underlying persuasive process of destination stories, especially the impacts of various story elements and the raised emotions. The overall goal of TSP was to establish the behavioural foundations for developing a computer-based tool (an AI) which can be used to guide the design, evaluation and implementation of online destination stories.

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Introduction

Tourists are both story creators and story consumers (Chronis, 2012). They create stories through trip experiences, and they communicate these experiences through storytelling using online and offline channels (Gretzel, Fesenmaier, & O'leary, 2006). Thus, storytelling is considered a powerful marketing strategy for communicating with potential consumers (Moscardo, 2017). Indeed, storytelling enables destination advertising campaigns to evoke strong emotional responses by enabling tourists to make their own meanings thereby building emotional connections with a destination (Tussyadiah & Fesenmaier, 2008). Not surprisingly, the key feature of successful destination-focused stories is the sequence of human actions and activities which trigger readers' emotions, involvement, and action (Akgün, Keskin, Ayar, & Erdoğan, 2015). Thus, an essential requirement for successful destination storytelling advertising is to understand how tourists perceive and respond to various elements of destination stories (Tussyadiah, Park, & Fesenmaier, 2011). Importantly, the emergence of artificial-intelligence (AI) systems provides the opportunity to develop innovative tools which can be used for designing, evaluating and delivering tourism-related stories (Reagan, Mitchell, Kiley, Danforth, & Dodds, 2016). In this paper, we summarize the results of a ten year long research program (called the Tourism Story Project) which focused on understanding the underlying persuasive process of destination stories, especially the impacts of various story elements and the raised emotions with the overall goal of establishing the behavioural foundations of a computer-based tool (an AI) which can be used for designing, evaluating and implementing destination related stories.

Literature Review

Stories are a powerful means which help people communicate and learn about the world. A story includes characters, settings, and plots; thus, it is more than just a description

of place or events; additionally, stories often include adventurous elements that raise emotional reactions such as surprise and expectation in readers (Herman, 2013). A good story has the potential to influence reader's experience, which provides the stimuli that evoke reader's sensations, cognitive, and behavioral responses (Brakus, Schmitt, & Zarantonello, 2009). By framing and delivering information in an understandable and memorable manner, storytelling can effectively build emotional attachment with a destination (Moscardo, 2017). Further, studies show that tourists are easily influenced by emotional factors when making travel decisions (Walters, Sparks, & Herington, 2012). Therefore, storytelling has been shown to be a powerful promotion tool as it delivers not only fact-based information but also affective information which, in turn, inspires imagination about the destination (Tussyadiah & Fesenmaier, 2008).

Research indicates that the touristic experience is shaped by emotion (Kim & Fesenmaier, 2015). Emotion is considered the outcome of interactions in tourism settings and is seen as an important factor affecting traveler's engagement and long-lasting memory (Hosany, 2012). Izard (2009) argues that emotion is a stage instead of a consequence of the neurobiological activity which suggests that emotional experience is a process containing a series of basic elements. Further, Davidson and Milligan (2004) argue that the basic components of emotion generate low-level experiences which evoke emotion arousal and valence and therefore continuously shape individual's tourism experience. Indeed, studies show that the emotions tourists experience during their journey are critical in forming long-term memories, which in turn, impacts tourist's perception toward the destination and influences future decision-making behaviors (Volo, 2017). Therefore, emotion can be considered both an antecedent and a consequence of tourism experiences and therefore are essential to successful destination advertising (Hosany & Gilbert, 2010).

The Tourism Story Project

With this background, the Tourism Story Project involved several researchers and included over 25 studies from 2008 to 2018 where the overall goal was to develop the behavioral foundation for an AI system that can be used to guide the design, evaluation and implementation of online destination stories. The objectives of these studies were: 1) Testing (and designing) procedures for measuring emotional response to tourism stories; 2) Developing a comprehensive behavioral model to measure the persuasiveness of online destination stories; and, 3) Linking the behavioral model of persuasion to aggregate sentiment-based indexes and the website performance measures. The studies followed a three-stage process (see Figure 1): first, various methods were tested to identify the best tools for measuring story persuasiveness; second, the relationships between story layout, format, narrative structure, and embedded emotions with the story persuasiveness were examined; third, a series of analyses were conducted to test the links the basic behavioral foundations of persuasion established in Stage 2 to sentiment analysis which used the story corpus and measures of the overall success of the destination website. It is argued that if links the text contained within the story can be established, a tool for evaluating online destination stories based on emotional structures of the stories can be developed to provide guidance for designing, evaluating and implementing destination stories.

Stage 1 Procedures for Testing Emotional Response

The first stage of TSP focused on testing new procedures to identify the most appropriate approaches to measuring story performance, including the emotions elicited by the respective destination-related stories. The traditional approaches to measuring emotions employ experimental or quasi-experimental methods that emotions are self-reported by the participant (Mauss & Robinson, 2009). Although self-report method is internally reliable and valid and is relatively easy to implement (Bagozzi, Gopinath, & Nyer, 1999), significant

limitations exist such as biased responses due to participant's ability to recognize and describe emotions, time lag, social pressure, and the cost (e.g., time and money) of conducting the study.
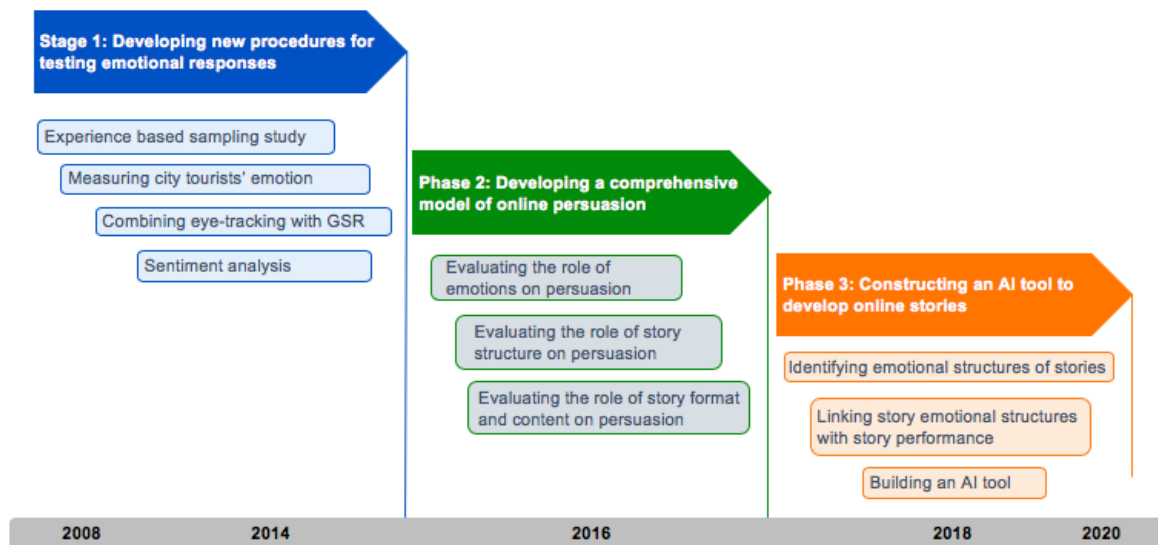

Figure 1. Studies conducted within the Tourism Stories Project

These studies focused on describing the nature of tourists' experiences. In particular, one study developed a proprietary system to conduct 'experience-based' sampling wherein Philadelphia visitors were asked to report their hourly activities, overall feelings toward the city, emotions raised, and the perceptions in terms of noise, smell, etc.; additionally, a GPS tool was used to track their spatial and temporal movements throughout the day (Tussyadiah, Fesenmaier, & Yoo, 2008). A series of small sample studies (i.e., less than ten informants) were also conducted to gain experience in the use of new technologies for measuring visitor experiences (Kim & Fesenmaier, 2015). These studies confirmed the viability of these new approaches to documenting visitor emotions. Based on the results, several new technologies including eye-tracking, Galvanic Skin Response (GSR) sensors and sentiment analysis showed the potential to measure people's emotional responses to online destination stories more accurately and efficiently.

A relatively large sample experimental laboratory-based study was then conducted which combined eye-tracking technique, emotional mapping tools, and follow-up interviews

to fully evaluate how people read online stories and their perceptions of the stories including emotional responses and the role/impact of story elements on these responses. Specifically, 68 participants (39% male, 41% female) participated in the study where they were first asked to read a "warm-up" story and then were asked to evaluate two stories randomly selected from a list of 39 stories about US destinations. The stories differed in several design elements including point of view (first person vs. third person), length, topic, destination, and emotional appeal; participants' attitudes towards the story and destination and visit intention were obtained in follow-up interviews. Mobile eye-tracking glasses were used to track how the participant read the story in terms of the sequence and timing of viewing the story; further, GSR sensors were used to measure real-time emotional arousal levels. These tools enabled us to obtain substantial insight into the moment-by-moment involvement level of the readers. In particular, the results of the eye tracking (Figure 2) demonstrated that there are few 'hot spots' (i.e., interest areas) which consume much of their reading time; the results also indicate that most subjects skipped much of the story while focusing on specific words and photographs included within the story. Further, the results of GSR sensors document the subject's moment-by-moment arousal level (Figure 3), which reflects the engagement and involvement level evoked throughout the story.

Stage 2 Modelling Online Persuasion

The goal of the second stage of TSP was to develop a comprehensive model of destination story persuasion. Based on the literature, core components of the persuasion model included in the study were image fluency, argument strength, the information content of the story, story believability, narrative transportation, personal identification with the story, and emotions raised (Escalas, 2007; Lein & Chen, 2013; Machleit & Eroglu, 2000). Last, several measures of persuasion were included in the study, such as attitude toward the ad and the destination, inspiration toward the destination, and visit intention (Wong, Lee, & Lee, 2015).
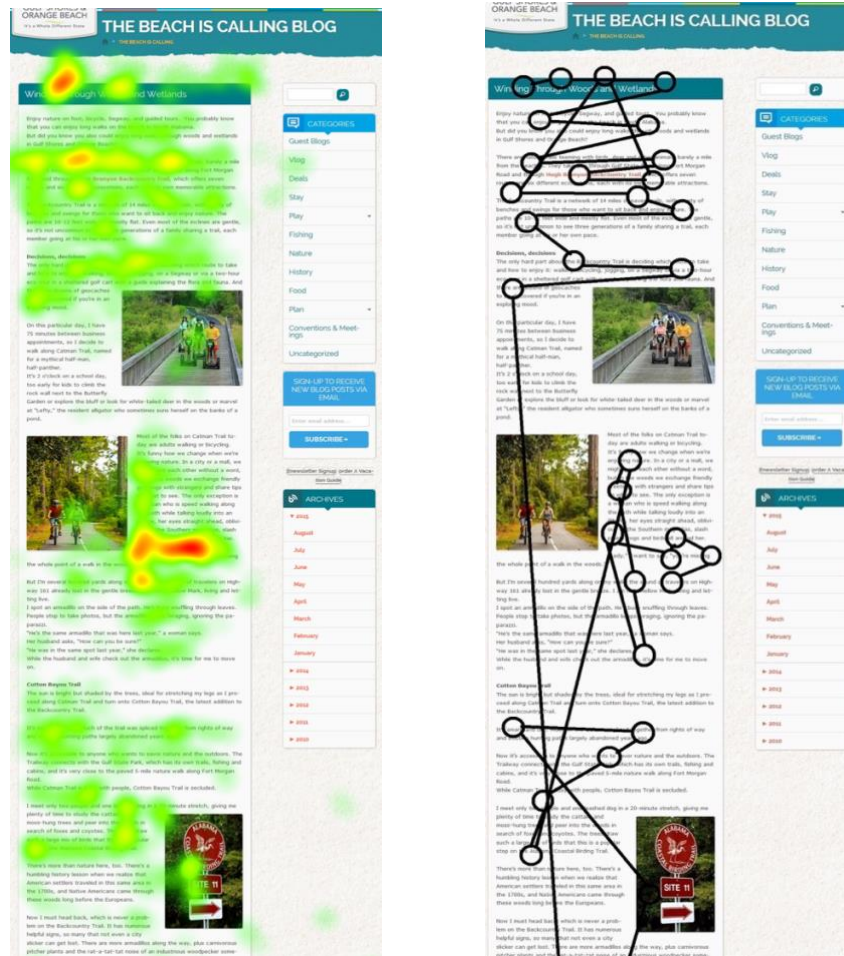
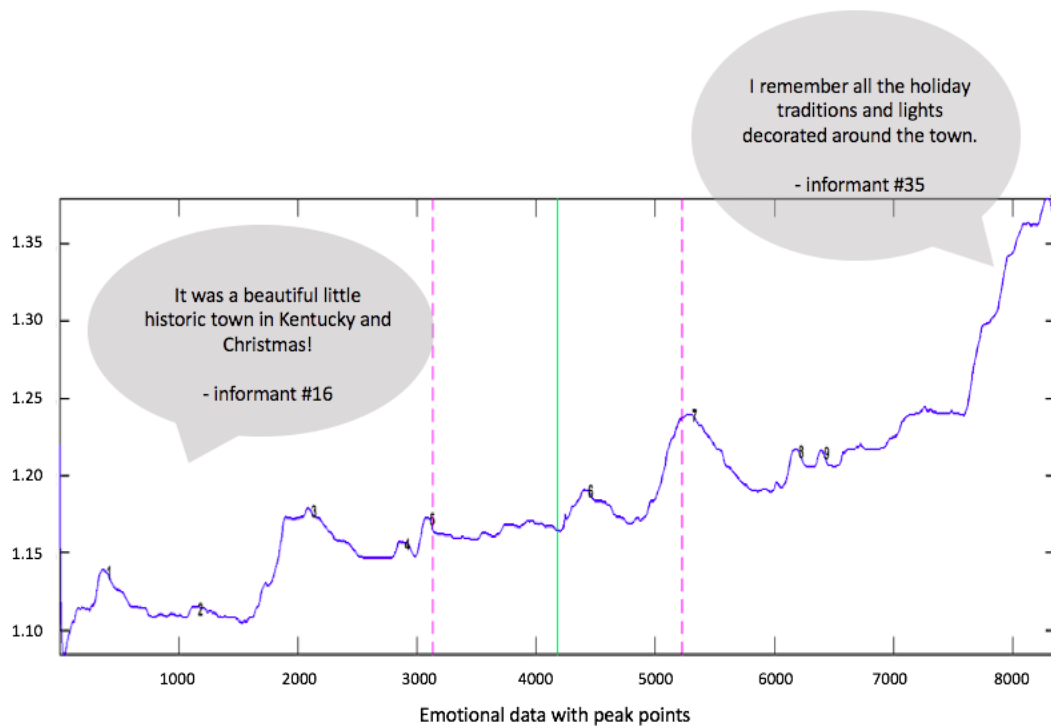**Figure 2. Heat map and gaze plot of participant #3**

Figure 3. An example of subject response to reading destination story

An online survey of 200,000 American travelers was conducted wherein the 39 online destination stories from Stage 1 were randomly assigned to the respondents. The travelers were invited via email to read one story and then answer questions relating to affective and cognitive responses toward the respective story and the story persuasion. The potential travelers were contacted up to three different times during a week and generated 1,721 complete responses. The results show that stories can evoke reasonably strong emotions, mostly positive emotions, and a reasonable degree of inspiration, which further translates into a positive attitude toward the destination. The results also confirm a strong linkage exists between raised emotions and most aspects of story persuasion (Figure 4 and 5). When evaluating the influence of emotions at specific stage of the story, the results show that the timing of emotional appeal is important in story persuasion. However, the relationships are quite complicated as story design needs to balance off the positive aspects of emotions when raised at an early stage with the negative relationships between emotions raised later in the story.

Components of the Persuasion Model

	Image Fluency	Argument Strength	Information in Story	Believability	Affective Appeal	Involvement in Story	Narrative Transportation	Cognitive Appeal
Anger	NEG	NS	NS	NEG	NS	NS	NS	NS
Joy	POS	POS	POS	POS	POS	POS	POS	POS
Sadness	NS	NEG	NEG	NS	NEG	NS	NS	NEG
Acceptance	POS	POS	POS	POS	POS	POS	POS	POS
Expectancy	NS	POS	POS	POS	POS	POS	POS	POS
Disgust	NEG	NEG	NEG	NEG	NS	NEG	NEG	NS
Surprise	POS	POS	POS	POS	POS	POS	POS	POS
Fear	NS	NS	NEG	NS	NS	NS	NS	NS
	R=.546	R=.691	R=.587	R=.546	R=.560	R=.715	R=.612	R=.565

Note: POS indicates that the feature of the story has a consistently positive and significant impact on the particular component of the persuasion model; NEG indicates that the feature of the story has a consistently negative and significant impact on the particular component of the persuasion model; NS indicates that the relationship between the feature of the story and the particular component of the persuasion model is consistently non-significant.

Figure 4. Correlations between emotions raised and aspects of persuasion

This study also evaluated the impact of story design, layout, and content on the story persuasiveness. As shown, there is little systematic correlation between images and how people perceive the story persuasiveness; however, the use of color and human/animal subjects appear to significantly impact the various aspects of story persuasion (Figure 6). In terms of the story contents (Figure 7), discussion of "outsides life" tends to generate positive perception of story persuasion, while discussion of another destination tends to negatively affect the story persuasiveness, especially the degree of information contained in the story, emotional and cognitive appeals. Furthermore, personal comments at the beginning and end of the story tend to positively influence story persuasiveness.

	Image Fluency	Argument Strength	Information in Story	Believability	Affective Appeal	Involvement in Story	Narrative Transportation	Cognitive Appeal
Anger	NEG	NS	NS	NEG	NS	NS	NS	NS
Joy	POS	POS	POS	POS	POS	POS	POS	POS
Sadness	NS	NS	NEG	NS	NEG	NS	NS	NEG
Acceptance	POS	POS	POS	POS	POS	POS	POS	POS
Expectancy	NS	POS	POS	POS	POS	POS	POS	POS
Disgust	NEG	NEG	NEG	NEG	NS	NEG	NEG	NS
Surprise	POS	POS	POS	POS	POS	POS	POS	POS
Fear	NEG	NS	NS	NS	NS	NS	NS	NS
Emotion 1 - Exposition	NS	NS	NS	NS	POS	NS	NS	NS
Emotion 2 – Rising action	POS	NS	NS	NS	NS	POS	NS	NS
Emotion 3 - Climax	NS	NS	NEG	NS	NS	NS	NS	NS
Emotion 4 – Falling action	NEG	NEG	NEG	NS	NEG	NS	NS	NEG
Emotion 5 – Resolution	NEG	NEG	POS	NEG	NS	NEG	NEG	NS
	R=.572	R=.701	R=.610	R=.553	R=.584	R=.519	R=.620	R=.586

Figure 5. Correlations between emotions raised, story structure and aspects of persuasion

	Image Fluency	Argument Strength	Information in Story	Believability	Affective Appeal	Involvement in Story	Narrative Transportation	Cognitive Appeal
# of Images	NEG	NS	NS	NS	NS	NS	NS	NS
Dominant Closing Image	NS	NS	NS	NS	NS	NS	NS	NS
# of Supporting Images	POS	NS	NS	NS	NS	NS	NS	NS
# of Videos	NS	NS	POS	NS	NS	NS	NS	NS
Animation	NEG	NS	POS	NS	NS	NS	NS	NS
Video Dominance	NS	NS	NEG	NS	NEG	NS	NS	NEG
# of Colors	POS	POS	POS	POS	POS	POS	POS	POS
Human Subjects	POS	POS	NS	POS	POS	POS	POS	POS
Animal Subjects	NEG	NEG	NEG	NEG	NEG	NEG	NEG	NEG
Natural Subjects	NS	NS	NS	NS	POS	NS	NS	POS
Pictures (Middle)	NS	NS	NS	NS	NS	NS	NS	NS
Pictures (End)	NS	NS	NS	NS	NS	NS	NS	NS

Figure 6. Correlations between story format and aspects of persuasion

	Image Fluency	Argument Strength	Information in Story	Believability	Affective Appeal	Involvement in Story	Narrative Transportation	Cognitive Appeal
Discussion of Outside Life	NS	POS	POS	POS	POS	POS	POS	POS
Discussion of Other Destination	NS	NS	NEG	NS	NEG	NS	NS	NEG
Destination Facts	NS	NS	NEG	NS	NEG	NS	NS	NEG
Narrator Advice	NS	NS	NS	POS	NS	NS	NS	NS
Event/Seasonality	NS	NS	NS	NEG	NS	NS	NS	NS
Use of 3rd Person	NS	NEG	NS	NS	NS	NS	NS	NS
# of Episodes	NEG	NEG	NEG	NEG	NEG	NS	NEG	NS
Narrator Gender	NEG	NS	POS	NEG	POS	NS	NS	NEG
Total # of Characters	POS	POS	POS	POS	NS	NS	NS	POS
Personal Comments (Beginning)	POS	NEG	POS	NS	POS	NS	NS	NS
Personal Comments (End)	POS	POS	POS	NS	POS	NS	NS	POS

Figure 7. Correlations between story content and aspects of persuasion

A structural model of the persuasion process is shown in Figure 8. The six-stage model fits very well, wherein all goodness-of-fit statistics exceed basic standards. Specifically, emotion has a significant relationship with image fluency, argument strength, information

content, and believability; these aspects of story design, in turn, directly correlate with narrative transportation and personal identification. These elements correlate significantly with the extent to which people like the story and destination, and inspiration toward the destination. Finally, inspiration, attitude toward the destination and attitude toward the story significantly correlate with intention-to-visit the destination. Thus, these findings confirm that story design has a significant impact on how readers understand and perceive the stories.
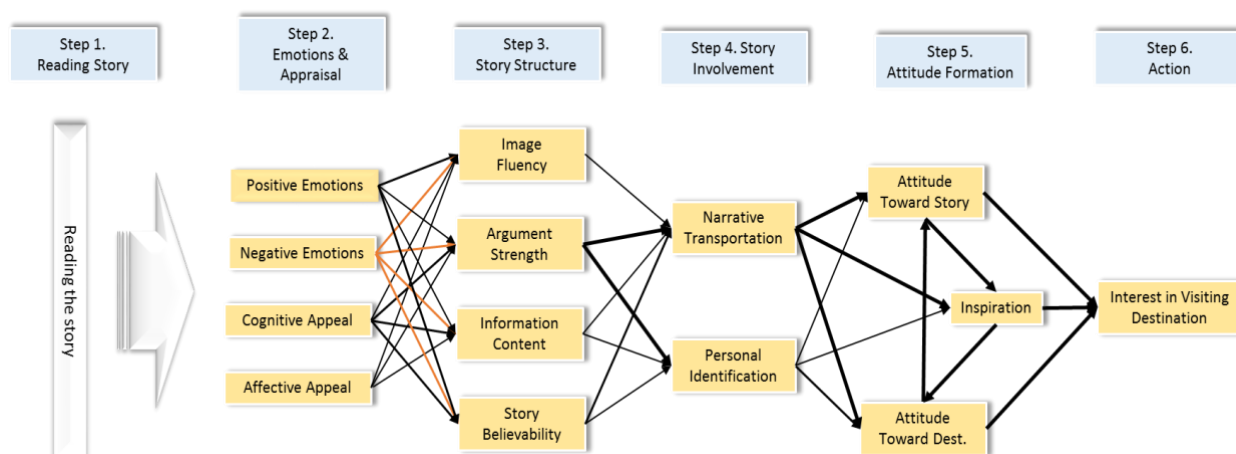

Figure 8. Proposed six-stage model of story persuasion

Stage 3 Assessing Story Structure and Website Performance

The third stage of TSP focused on linking the persuasion model with overall website performance. In order to achieve this goal, the first set of analyses evaluated the efficacy of sentiment analysis in describing the emotional structure of online destination stories where it was posited that sentiment analysis of online stories is very efficient in providing a base level description of online stories. The second series of analyses were conducted to investigate the relationships between emotional structure and story performance, where emotional structure is measured using sentiment analysis and story performance is based upon website performance measures from Google Analytics.

Study 1: Emotional structure of the stories using sentiment analysis

Two sets of analyses were compared to evaluate the efficacy using sentiment analysis for describing the emotional structure of online destination stories. First, sentiment analysis

was conducted at the sentence level. Analyses of the words contained in each sentence was evaluated using sentiment analysis tools in R. The dictionary used in this study is EmoLex developed by the National Research Council Canada which assessed the sentiment conveyed by English words based on their associations with the eight fundamental emotions (anger, sadness, fear, disgust, joy, surprise, anticipation and trust) and the positive and negative sentiments (Mohammad & Turney, 2013). An example of the results of the sentiment analysis is illustrated in Figure 9 showing a destination-related story which contained 56 sentences that conveyed a range of emotions where Anticipation and Trust were the dominant themes.
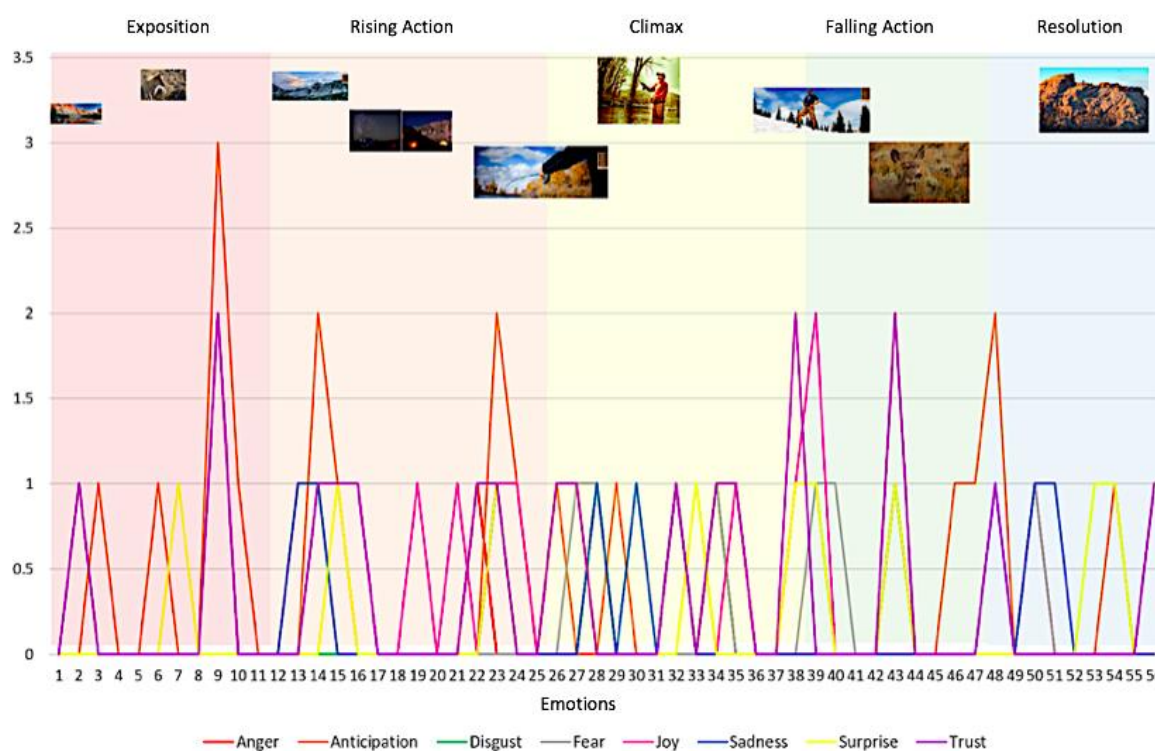

Figure 9. Semantic analysis for a Laramie, Wyoming story

Multiple regression analyses were then conducted to test the relationships between the text-based semantic analysis (including emotions and the overall positive/negative aspect of the story) of the overall online story and the various components of the persuasion model. These analyses also examined the correlation between the text-based sentiment analysis at the story plot level and the various persuasion components, arguing that certain emotions should be more effective at certain stages of the story. Last, multiple regression analyses were

conducted to investigate the role of emotions and the emphasis of each of the five stages of the story bases upon the focus/goal of the story writers.

The results of these analyses indicate that the emotions identified in sentiment analysis significantly correlated with most components of the story persuasion model (Figure 10). The MR values ranged from 0.17 to 0.33, showing that they can be a useful tool to assess the potential emotional impact of the story on the traveler's responses. Anticipation and Fear were consistently statistically significant and positive in terms of 'explaining' traveler response to the stories. Joy was positive in terms of argument strength, involvement in the story and the extent of narrative transportation. Interestingly, Anticipation has a negative impact on the degree to which travelers evaluate the informational content of the story. Disgust, Surprise, and Trust have consistently negative (and significant) relationships with many components of the persuasion model. Overall sentiment is correlated negatively with argument strength and involvement in the story. Importantly, the results of the text-based analyses are consistent with the traveler-based analyses, confirming that Joy, Acceptance, Expectancy, and Surprise have significant and positive impact on story persuasiveness; further, Anger, Sadness and Disgust have significant negative effects on the various persuasion components.

	Image Fluency	Argument Strength	Information in Story	Believability	Affective Appeal	Involvement in Story	Narrative Transportation	Cognitive Appeal
Anger	NS	NS	NS	NS	NS	NS	NS	NS
Anticipation	POS	POS	NEG	POS	NS	POS	POS	NS
Disgust	NS	NEG	NEG	NS	NEG	NEG	NS	NEG
Fear	POS	POS	POS	POS	POS	POS	POS	POS
Joy	NS	POS	NS	NS	NS	POS	POS	NS
Sadness	NS	NS	NS	NS	NS	NS	NEG	NS
Surprise	NS	NEG	NS	NEG	NS	NEG	NEG	NS
Trust	NEG	NEG	NS	NEG	NEG	NEG	NEG	NEG
Overall Sentiment	NS	NEG	NS	NS	NS	NEG	NS	NS
	R=.265	R=.250	R=.274	R=.176	R=.313	R=.202	R=.172	R=.328

Figure 10. Correlations between text-based emotions and elements of the persuasion process

Analyses were also conducted to examine the relative role of the timing of raised emotions within the story. Results show that the impact of story design is extremely complicated wherein design components have positive impact on certain elements while at the same time, have negative impact or non-significant impact on other aspects of the persuasion process (see Figure 5). Anger is most often non-significant but has a significant impact when emphasized during Falling Action or Resolution stages of the story. This contrasts with Sadness, which has a significant negative impact throughout most stages of the story. Further, Joy has a positive impact during Rising Action and Falling Action but a negative impact during the Climax. Thus, the effects of each emotion need to be considered in all stages of the story.

Study 2: Sentiment-based and self-report based emotional profiles

A second study was conducted to compare the emotion structure of online stories when using self-report method and sentiment analysis, where it is argued that this relationship is essential if one wanted to use sentiment analysis for modeling emotional response to online stories. The results from the study reported in Stage 2, wherein the 39 American destination stories were compared to the results of a sentiment analysis following the methods described above. The results show (Figure 11) significant and positive correlations between the emotional ratings of the two approaches with a Pearson's r of 0.90 ($\alpha=0.01$) and a Spearman's r of 0.81 ($\alpha=0.05$). The results indicate that sentiment analysis can be used as an effective alternative approach to measuring emotions in large-volume text (Zhang & Fesenmaier, 2018).

Study 3: Story emotional structure and story performance

This last set of analyses (using logistic regression analysis) examined the relationships between the key emotional features of online stories and measures of story performance, including the average time spent on reading the story. This analysis used 60 online stories that were published on the websites of several popular U. S. travel destinations. The results (see Table 1) confirm that the emotional levels of the beginning, peak, and end of the online story

are significantly correlated with to the extent which readers actually read the story. Specifically, the stories with high overall emotional scores at the key points (start, end, and peak) tend to be read more thoroughly. However, duration showed a non-significant relationship with reading time, which is consistent with the duration neglect theory proposed by previous studies.
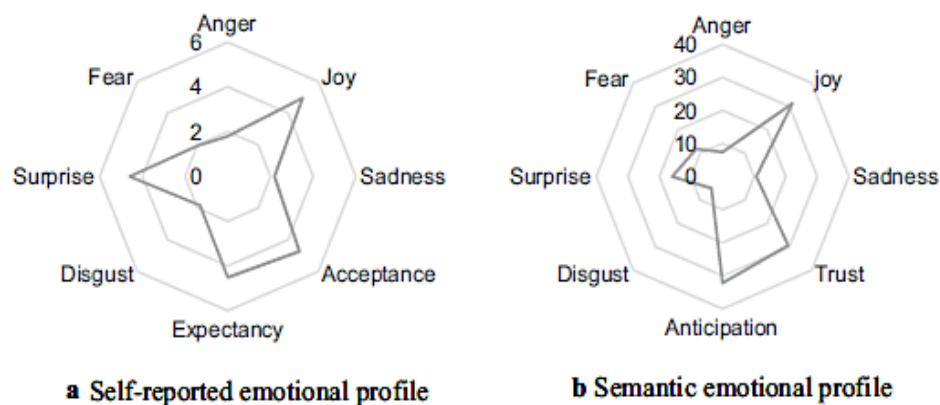

Figure 11. Self-reported and semantic emotional profiles

Conclusions

The results of the many studies within the Tourism Stories Project document the complex relationships between story design, perceptions, and persuasion. Importantly, several basic principles were found which provide a foundation for writing successful destination stories. In particular, the studies show that sentiment analysis can be an efficient tool to detect text-based cues that elicit specific emotions in stories used to promote a destination. This is especially true when applied to analyze large volumes of text. Thus, these analyses provide an excellent foundation in terms of tools and theory for developing an AI system that can be used to design, evaluate and implement extremely effective destination related stories.

Certain limitations of this research should be addressed in the future. Most importantly, studies included in this research considered only the emotions conveyed by text; however, most online stories contain photos, videos, and other forms of graphic materials. In addition, the genre and topic of the story and the popularity of the topic were not extensively evaluated in

the studies. Last, the level of interactivity of the destination website and story was not explored in this research. Future research should consider these story elements when developing an AI for writing destination stories.

Table 1. Results of Multiple Regression Analyses Between Sentiment Structure and Overall Story Performance

Variable	Min.	Max.	Mean	SD	Estimate	Std. Error	t value	p value
Total Sentence	19	140	64.47	20.13	0.00	0.01	0.40	0.69
Sentiment 10%	-4	16	4.25	3.85	-0.02	0.07	-0.27	0.79
Sentiment 20%	0	13	5.98	3.06	0.10	0.05	2.08	0.04 *
Sentiment 30%	-3	15	5.23	3.97	0.09	0.04	2.33	0.02 *
Sentiment 40%	-4	14	4.90	4.13	0.01	0.04	0.28	0.78
Sentiment 50%	-2	18	5.47	4.16	0.03	0.04	0.78	0.44
Sentiment 60%	-2	16	4.80	4.10	0.01	0.04	0.21	0.83
Sentiment 70%	-1	16	5.90	3.86	0.07	0.05	1.26	0.21
Sentiment 80%	-2	17	5.25	4.57	0.09	0.04	2.22	0.03 *
Sentiment 90%	-4	16	4.77	3.62	0.01	0.05	0.18	0.86
Sentiment 100%	-2	19	6.18	4.42	0.01	0.05	0.30	0.77
Max. intensity	2.76	15.29	6.07	2.63	0.26	0.08	3.24	0.00 **
Max. location	.04	1.00	.38	.28	-0.12	0.63	-0.20	0.85
Min. intensity	-13.46	0.00	-2.55	2.43	-0.06	0.09	-0.74	0.47
Min. location	.02	1.00	.349	.26	0.82	0.56	1.46	0.15
SD of sentiment	.84	6.42	3.39	1.09	0.14	0.16	0.86	0.39

Note: DV: ln (average time spent) – Mean: 212.75, SD: 158.70, Min.: 28, Max.: 735
R^2=.9701, Adjusted R^2=.9592, df=11, f=89.22, p=.000; *p < 0.05, **p < 0.01

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