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Article

Evaluations of Landscape Locations along Trails Based on Walking Experiences and Distances Traveled in the Akasawa Forest Therapy Base, Central Japan

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Abstract: Forest planners are interested not only in forest spaces that visitors prefer but also in the preferred spatial arrangements of landscape features. In this study, we aimed to clarify walkers' evaluations of four landscape locations composed of various scenic features in various spatial arrangements along forest walking routes. We also analyzed the trends, differences, and common features associated with different walking distances and experiences. The results are summarized as follows: (1) The walkers' evaluations changed depending on the elements of the scene they observed and the spatial arrangements of those elements. The visitors preferred silent environments in forest spaces to the sounds of a stream. Meanwhile, they appreciated a good view in an open area. (2) The length of a walk prior to visiting a location on a route affected walkers' evaluations of that location. For example, a special landscape feature was more positively rated by the respondents who visited the location late in their walks than those in the early and middle walking stages. However, the early-passage walkers were more pleased by touching natural objects such as rocks and large trees than those later in their walks. (3) Analysis revealed that the ratings of certain parameters differed according to the route taken to a location, whereas other ratings remain unchanged. Consequently, we must consider the effects of spatial properties of scenic factors on

people's perceptions in forest planning. (4) Walkers provided similar ratings on three parameters within forest landscapes—"Open feeling", "Regular landscape" and "Natural" feel—even in the middle and near the end of their walks. Conversely, locations with water elements led to variations in parameter ratings that were maintained until the end of a person's walk. Based on these results, we suggest that positive walking experiences can be maintained by considering the open feeling, regularity, and natural landscape in all three passage stages in planning walking routes.

Keywords: forest recreation; walkers' perceptions; forest bathing; walking preference

1. Introduction

During the previous several decades, the leisure value of forests, e.g., the value of forests for landscape enjoyment and relaxation, has become increasingly significant [1–4] in that increasing numbers of people are enjoying forest tourism in their spare time [5–9]. Previous studies have shown that the activity of walking in a forest can relieve stress caused by an individual's work or life [10–12]. In addition, forests contributed to patients' recovery [13]. For example, the convalescent period of patients who could see trees was shorter than that of patients who could not [14]. According to the results of an investigation performed by the Japanese Cabinet Office in 2007 [15], the top three reasons that people planned to visit a forest included "mental diversion by forest bathing" (62.1%), "to experience contact with nature" (42.4%), and "to enjoy an attractive scene" (43.2%). These results suggest that outdoor activities, such as forest bathing and walks through forests, meet a crucial social need. Therefore, provisions for walking paths and spaces where people can enjoy the forest experience are important [16–21].

Before planning for forest management, it is essential to understand the landscape conditions of forests, which may be performed by landscape evaluation. In earlier research, the expert-based estimation approach, which examines defined visual properties and biophysical features of a landscape using quantitative methods, has been widely applied to assess forest landscape quality [22,23]. However, this approach yields poor reliability due to its strong reliance on the knowledge and experiences of a few professional experts or foresters [24]. With increasing attention being paid to forest recreation, people have become the key users of forest landscapes. Consequently, there are now several perception-based estimation approaches in which visitors are the subjects of assessment [25–28]. Daniel (2001) concluded that perception-based assessments yield greater reliability than expert-based approaches [24].

Based on perception-based approaches, several studies applied a photograph projective technique to understand people's perceptions of nature [2,3,29–31]. These researchers typically invited students and local residents to be the evaluators. However, other authors have found that color photographs are not the ideal surrogates for real landscapes in the study of forest walking because the photographs failed to capture the entire scene. With this method, it is also difficult to evaluate changes in visitors' perceptions along their walks. Shirafuji *et al*. clarified the differences between how people evaluated images of a forest landscape and the actual location in their study [32]. Consequently, several students were

invited to visit the forests for walking evaluations [20,21,33–36]. Although Daniel and Boster (1976) reported that students and Catholic Church group adults were most representative of the general public [25], several authors thought the backgrounds of the people resulted in differences in preferences [16,37]. To control the representativeness of assessors, several researchers began to investigate perceptions of visitors with various attributes [7,9,33,38–40].

However, most previous studies focused only on the evaluation of forest environments by location [1,7,32–36,38,39]. Visitors generally walk freely throughout forests rather than stay in one place. Thus, there have been several studies of dynamic changes in walkers' behavior during their walks. These studies looked at how people perceive the sequence of experiences within a forest environment and how those perceptions affect walking behavior [7,17–19,41–43]. For example, Oku *et al*. suggested that a person's experience of a landscape is accompanied by a series of sequential changes along the trail through the woods; they define these changes using five indices including walkers' satisfaction, desirable landscape patterns, behavioral change as identified through photography and label sampling [18,19]. Moreover, a few researchers reported that a "good combination of the landscape factors on the walking flow" is important (in forest space) [17–19]. Additionally, Zhang *et al*. noted walkers' behaviors in forests and clarified, through an accompanying investigation, objects evaluated by walkers along the path and features of places where the objects were perceived [42]. A linear sequence of experience was noted in our previous study, and there are ongoing, additional studies of favorable spaces where walkers' behaviors are extracted from the axial distribution of time and behavior, changes in how walkers evaluate their surroundings, objects evaluated and settings where objects are likely to be observed. Based on the above results, we found that determining whether there is a difference between how people evaluate forest space from a linear perspective with space as a continuum at the beginning of a walk to a single location *versus* how they evaluate their experiences after having walked a long distance has surfaced as an issue. This study sought to fill this need.

In addition, clarifying how the assessments of objects are affected by changes in perception throughout a person's walk will help planners develop walking routes that promote positive experiences. Forest managers usually want to know not only which forest spaces visitors prefer but also what spatial arrangements of landscape components are attractive. However, there have been few studies of the preferences of people who walked different distances and experienced various elements as they approached a landscape space. Accordingly, the aim of this study was to explore the following issues: (1) how people evaluate specific landscape scenes with varying components and spatial compositions after having walked different distances; (2) which types of forest environments are appreciated by visitors with different experiences; (3) which objects are easily affected by walking distances and experiences *versus* parameters that elicit a similar evaluation regardless of when they appear in a person's walk; and (4) how to construct preferable walking spaces for people's outdoor activities based on the investigation.

2. Materials and Methods

2.1. Study Area

The study was conducted in Akasawa National Recreational Forest, located in western Agematsu, Kiso District, Nagano Prefecture, Japan. The forest ranges in elevation from 1080 to 1557 meters (m) and contains 728 hectares (ha) of land. It is considered one of Japan's three most beautiful forests and is composed of 300- to 350-year-old Kiso cypresses (*Chamaecyparis obtusa*). The park is known as the "birthplace of forest bathing"; it has been named one of the "100 Best Heritage Sites in Japan to Pass on to the 21st Century" by the Forest Culture Association and one of the "100 Best Aromatic Landscapes" by the Ministry of Environment. The park was certified as the "No. 1 Base for Forest Therapy" by the Forest Therapy Society in 2006. The park has a forest railway running along the canyon and has 8 hiking trails—the Fureainomichi, Komadori, Mukaiyama, Tsumetazawa, Nakatachi, Kamiakasawa, Keiryu, and Himemiya Trails (Figure 1)—running through it. The park also provides trails for wheelchairs and is visited by 140,000 tourists each year [44].

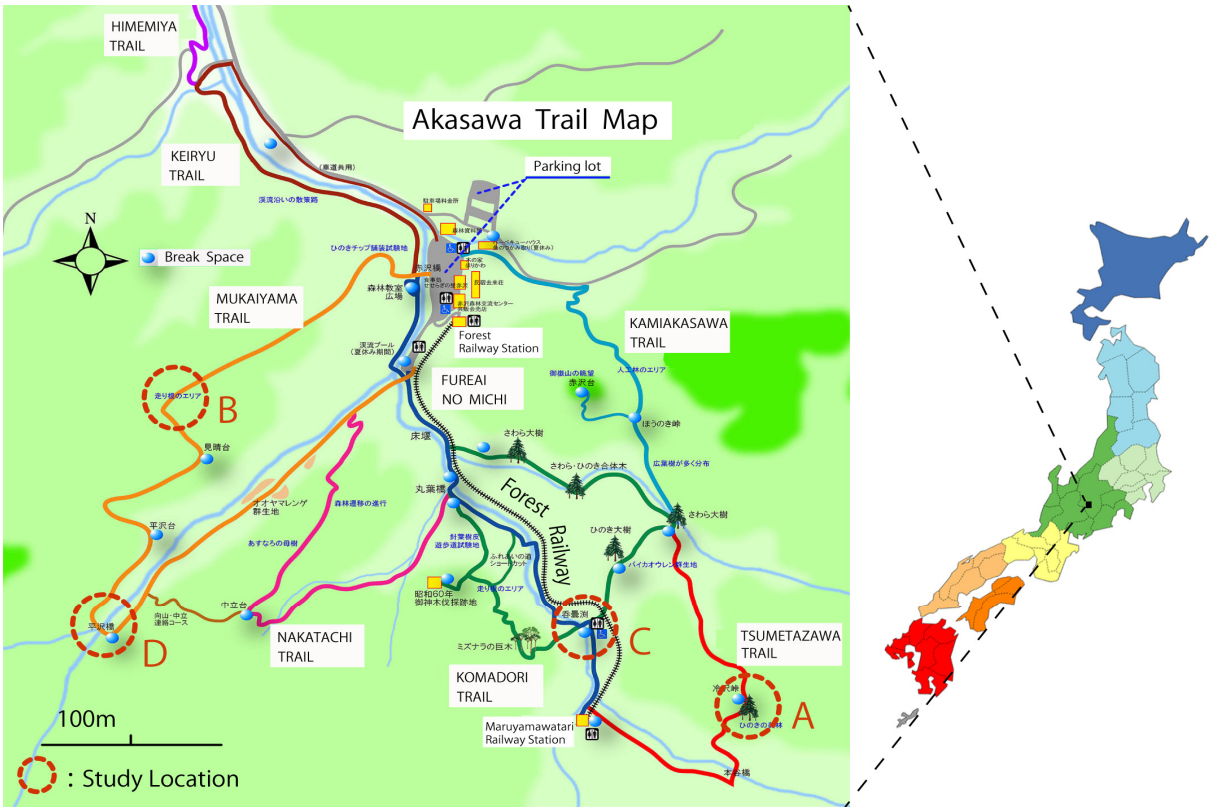


Figure 1. Akasawa Forest Therapy Base: (**A**) Tsumetazawatouge; (**B**) Hashirine area; (**C**) Dondonbuchi; and (**D**) Hirasawahashi.

2.2. Selection of Study Sites and Evaluation Parameters

We first selected the locations where walkers' evaluation behaviors had been observed frequently during our previous study [42]. For example, Hirasawahashi had been most frequently assessed because of the view of the far mountain landscape and stream. Dondonbuchi was another frequently evaluated location due to its three elements: stone, water and the forest railway. The Hashirine area

was appreciated by most walkers due to its unique views of mesh-like roots and giant cypress trees. Additionally, to better select the study sites, a pretest with the question "which is the most satisfying location in your walk and why", was administered in 2012 to more than 100 visitors who had completed their walks. The above three places were frequently selected by the respondents. Most of the walkers also experienced good feelings while walking on the soft road filled by bits of wood and seeing the large cypress trees more than 300 years old in Tsumetazawatouge. In addition, based on the study purpose, the spatial locations of the candidate sites were considered in the selection. For example, locations through which walkers could pass both early and after following a roundabout route helped to account for the effect of walking distances and experiences on perception. As a result, the following four places were finally selected as the study sites: the Hashirine and Hirasawahashi sites on the Mukaiyama Trail, the intersection of two trails at Dondonbuchi and the Tsumetazawatouge site on the Tsumetazawa Trail (Figures 1 and 2). The landscape features at the four sites are listed in Table 1.

Scenic evaluation is a respondent-specific preference for a landscape [31]. Differences in the biophysical and environmental features of forests are the essential reasons for variations in landscape evaluation [16,19,20,30,32–34,38,45]. Based on several previous studies [1,8,9,12,18–20,38,46] and our previous research [42], 16 parameters related to landscape attributes and respondents' perceptions were assigned to three categories—impressions, behavior, and overall evaluation (Table 2)—were investigated to describe the landscape quality of the four locations and to analyze the effects of walking distance and experience on evaluation. The first group of questions addressed respondents' impressions of the forest landscape based on their senses, including vision, hearing, and touch. The second group of questions addressed respondents' behaviors, including their contact with nature and how long they chose to stay at rest areas. The final group of questions included an overall assessment of the respondents' familiarity with and sense of specialness of the site.

Table 1. Space compositions and landscape features at the four sites.

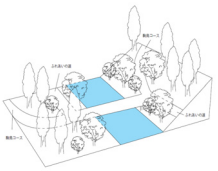
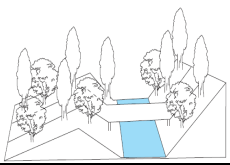
Place Name	Elevation	Composition of Landscape	Landscape	Main Features
Tsumetazawatouge	1180 m		Near view	Wood chip path, large cypress tree (approximately 300 years old)
Hashirine area	1150 m		Near view	Mesh-like cypress roots and raised cypress roots, large cypress tree
Dondonbuchi	1130 m		Near view + Middle distance constrained view	Running stream, bridge, rock, forest railway and rest area, arbor
Hirasawahashi	1140 m		Constrained view + Distant view	Flowing mountain stream, bridge, distant mountain view

Figure 2. Conditions at the four study sites: (**A**) Tsumetazawatouge; (**B**) Hashirine area; (**C**) Dondonbuchi; and (**D**) Hirasawahashi.

Table 2. Spatial evaluation parameters.

Evaluation Categories	**Evaluation Parameters**			
Impression	Good view, Open feeling	Silent, Regular landscape	Natural feeling, Refreshing	Airy
Behavior	Ability to touch plant, water, rock, large tree	Would like to watch leisurely	Ability to rest leisurely	
Overall evaluation	Special landscape, Comfortable	Familiar, Enjoyable	Favorable	
Other	Overall satisfaction			

2.3. Investigation Methods

In this study, we presented an 18-question survey to walkers who passed through one of the four selected locations. The respondents were asked to evaluate their locations by assigning a rating to the 16 parameters listed in Table 2 and to record their purpose for visiting, the walking route they took that day, and how they perceived the selected site. The ratings were assigned values on a seven-point modified Likert scale (with two extremes, one of which was 1, meaning "Hardly think" or "Hardly like", and the other being 7, meaning "Think very much" or "Like very much") [1,9,18–20,32–34,46,47]. The surveys were administered from August to November 2013 on days of good weather.

2.4. Definition of Passage Types

The respondents were asked to record their walking routes on the map printed on the questionnaire. We then calculated the distances walked and classified the participants according to the following three passage stages:

(1) Early passage: Walkers who traveled a distance of less than 1000 m from a starting point to the study site and passed through the study site early in their walk. These participants experienced relatively few types of landscape variations and walked along the only route containing the study site as they approached the site.

(2) Middle passage: Walkers who traveled a distance of 1000–2000 m from a starting point to the study site and passed through the site in the middle of their walk. These participants encountered several landscapes as they approached the study site.

(3) Late passage: Walkers who traveled a distance of 2000 m or more from a starting point to the study site. These respondents approached the study sites after encountering numerous varied elements by walking several routes.

In this investigation, the walking distance excluded the railway length if the participants took the forest railway at the entrance station and Maruyamawataru station (Figure 1).

2.5. Significance Test

We used "SPSS for Windows" and "R version 3.1.1" to analyze the differences among participants' site evaluations. Specifically, we conducted the following tests: (1) The normality of the data for each site was tested using SPSS to identify suitable analysis and test methods. (2) The results from the above step indicated that some datasets investigated by this study were normally distributed data. Consequently, referring to the previous studies [48,49], a Steel–Dwass test, one of approaches to *post hoc* test that is suitable for both of non- and normally distributed datasets [50–52], was conducted to explore the differences in the evaluations of each place. (3) A Steel–Dwass test was also conducted to explore differences in perceptions based on the lengths and routes of participants' walks.

3. Results

3.1. Attributes of Respondents

The study team surveyed walkers who passed each study site from August to November 2013 during days of good weather. Replies were obtained from 679 walkers, including 170 walkers in Tsumetazawatouge, 177 walkers in Hirasawahashi, 165 walkers in Dondonbuchi, and 167 walkers in Hashirine (Table 3). Overall, the number of female visitors slightly exceeded the number of males. Most of the walkers (73%) were in their forties, fifties or sixties. The walkers in their sixties tended to select the Early passage, and the respondents in their fifties selected the Middle and Late passages more than did those of the other two age groups. Additionally, couples were the type of group most commonly seen and composed more than 60% of the visitors of each passage stage. Walkers with a group of friends made up the second largest of the five visiting forms. From the attributes of the visitors passing through each study site, the results yielded the same trends as the average statistic. For example, the respondents at each location were middle-aged and old people; most of them visited with their spouses, friends or family members (Table 3). In addition, of the walkers who passed through Tsumetazawatouge, females dominated the Middle and Late passage categories, making up approximately 60% and 54% of the respondents, respectively. In the Hashirine area, families were the second-largest group type.

Table 3. Demographics of respondents passing through the four study sites. Integers are the number of walkers; decimal values in parentheses are the percentage.

		Tsumetazawatouge (*n* = 170)			**Hashirine Area (*n* = 167)**			**Dondonbuchi (*n* = 165)**			**Hirasawahashi (*n* = 177)**		
		Early Passage (*n* = 57)	**Middle Passage (*n* = 65)**	**Late Passage (*n* = 48)**	**Early Passage (*n* = 61)**	**Middle Passage (*n* = 48)**	**Late Passage (*n* = 58)**	**Early Passage (*n* = 54)**	**Middle Passage (*n* = 58)**	**Late Passage (*n* = 53)**	**Early Passage (*n* = 55)**	**Middle Passage (*n* = 57)**	**Late Passage (*n* = 65)**
Sex	Male	30 (52.6)	26 (40.0)	22 (45.8)	28 (45.9)	23 (47.9)	28 (48.3)	25 (46.3)	25 (43.1)	24 (45.3)	28 (50.9)	27 (47.4)	31 (47.7)
	Female	27 (47.4)	39 (60.0)	26 (54.2)	33 (54.1)	25 (52.1)	30 (51.7)	29 (53.7)	33 (56.9)	29 (54.7)	27 (49.1)	30 (52.6)	34 (52.3)
Age	Teens	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.6)	1 (2.1)	1 (1.7)	1 (1.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.5)
	Twenties	3 (5.3)	3 (4.6)	5 (10.4)	3 (4.9)	1 (2.1)	3 (5.2)	5 (9.3)	1 (1.7)	1 (1.9)	4 (7.3)	0 (0.0)	2 (3.1)
	Thirties	6 (10.5)	7 (10.8)	7 (14.6)	9 (14.8)	3 (6.3)	8 (13.8)	6 (11.1)	10 (17.2)	8 (15.1)	8 (14.6)	10 (17.5)	10 (15.4)
	Forties	8 (14.0)	13 (20.0)	9 (18.8)	14 (23.0)	11 (22.9)	17 (29.3)	8 (14.8)	11 (19.0)	6 (11.3)	8 (14.6)	13 (22.8)	16 (23.6)
	Fifties	16 (28.1)	21 (32.3)	12 (25.0)	16 (26.2)	14 (29.2)	14 (24.1)	11 (20.4)	16 (27.6)	15 (28.3)	11 (20.0)	12 (21.1)	19 (29.2)
	Sixties	18 (31.6)	14 (21.5)	11 (22.9)	15 (24.6)	13 (27.1)	11 (19.0)	20 (37.0)	16 (27.6)	17 (32.1)	18 (32.7)	15 (26.3)	16 (24.6)
	Seventies	6 (10.5)	7 (10.8)	4 (8.3)	3 (4.9)	5 (10.4)	4 (6.9)	3 (5.6)	4 (6.9)	6 (11.3)	6 (10.9)	7 (12.3)	1 (1.5)
Visit form	Couple	37 (64.9)	40 (61.5)	29 (60.4)	30 (49.2)	30 (62.5)	27 (46.6)	36 (66.7)	33 (56.9)	38 (71.7)	34 (61.8)	30 (52.6)	42 (64.6)
	Family	6 (10.5)	9 (13.9)	2 (4.2)	12 (19.7)	8 (16.7)	20 (34.5)	11 (20.4)	6 (10.3)	0 (0.0)	3 (5.5)	6 (10.5)	10 (15.4)
	Bus tour	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (5.5)	0 (0.0)	4 (6.2)
	Group of friends	11 (19.3)	15 (23.1)	15 (31.3)	18 (29.5)	8 (16.7)	10 (17.2)	3 (5.6)	16 (27.6)	14 (25.4)	12 (21.8)	20 (35.1)	6 (9.2)
	Others	3 (5.3)	2 (1.5)	2 (4.2)	1 (1.6)	2 (4.2)	1 (1.7)	4 (7.4)	3 (5.2)	1 (1.9)	3 (5.5)	1 (1.8)	3 (4.6)

3.2. Respondents' Evaluations by Location

We plotted walkers' evaluations of place as the mean of all of the respondents' answers for each site. The results are shown in Figure 3. "R version 3.1.1" was used to conduct a Steel–Dwass analysis test and explore the differences among walkers' perceptions of place (Table 4). It is clear based on these data that Tsumetazawatouge was rated highly in terms of "Silence" and "Special scenery" and received moderate ratings in most categories compared with other sites. However, Hashirine received the lowest ratings on the parameters of "Refreshing feeling", "Airy" quality, "Comfortable" nature, and "Would like to stop to leisurely watch". Although Dondonbuchi received the lowest rating on the parameter "Regular landscape", it received most of the highest ratings with regard to the 16 landscape parameters and the desire to "Stop to leisurely watch" there instead of elsewhere. Conversely, Hirasawahashi received several lowest ratings, such as on the parameter of "Silence", "Familiar", "Could touch plant, water, rock, large tree", and "Could rest leisurely". In addition, although there were significant differences in respondents' evaluations of the sites, the overall pattern of the evaluations of a given site was similar among many walkers. When the study sites were divided into two groups, those in the woods (Hashirine and Tsumetazawatouge) and those with a water element (Hirasawahashi and Dondonbuchi), an interesting pattern emerged: the two wooded spaces were similar in their evaluations, whereas the two water spaces received significantly different ratings on most of the parameters.

By comparing two sites to each other, the analysis revealed significant differences among many of the evaluation parameters (Table 4). For example, ratings on as many as 13 parameters at Hashirine evidently differed from those at Dondonbuchi. There was also clear divergence between the evaluations of Hashirine and Hirasawahashi. However, in terms of a place's "Natural" quality, people's perception of the components and the composition of different landscape views did not vary by location. In other words, the naturalness of all the sites was rated similarly by the majority of walkers.

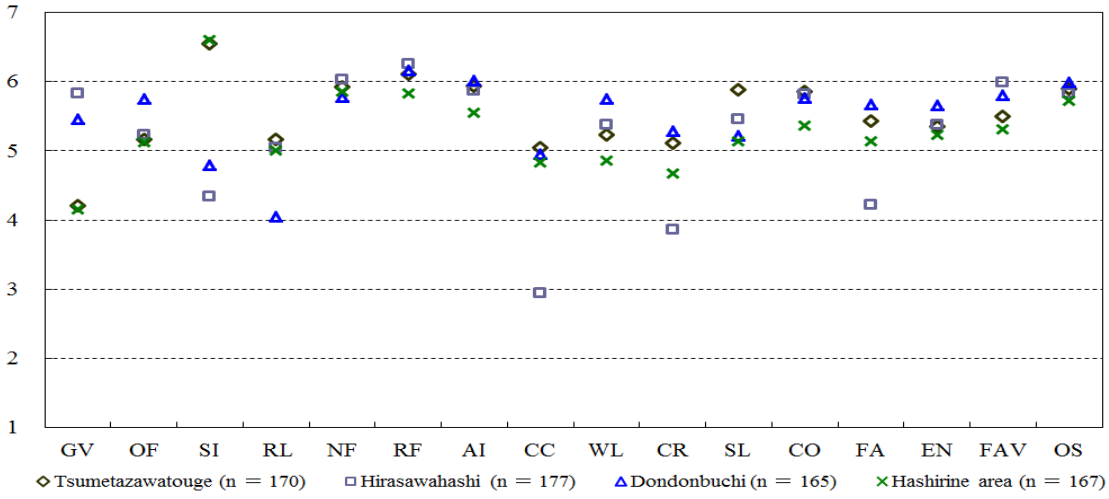


Figure 3. The mean ratings on the 16 parameters at the four study sites. Hardly think = 1; Think very much = 7. Numbers in parentheses are the number of respondents. GV: Good view; OF: Open feeling; SI: Silence; RL: Regular landscape; NF: Natural feeling; RF: Refreshing feeling; AI: Airy; CC: Could contact with pant, water, rock, giant tree; WL: Would like to stop to watch leisurely; CR: Could rest leisurely; SL: Special landscape; CO: Comfortable; FA: Familiar; EN: Enjoyable; FAV: Favorable; OS: Overall satisfaction.

Table 4. Test results of differences in the evaluations at the four locations using the Steel–Dwass test.

Evaluation Parameter	Tsmetazawatouge *versus* Hirasawahashi		Tsumetazawatouge *versus* Dondonbuchi		Tsumetazawatouge *versus* Hashirine Area		Hirasawahashi *versus* Dondonbuchi		Hirasawahashi *versus* Hashirine Area		Dondonbuchi *versus* Hashirine Area	
	Evaluation Score Difference	Sig.	Evaluation Score Difference	Sig.	Evaluation Score Difference	Sig.	Evaluation Score Difference	Sig.	Evaluation Score Difference	Sig.	Evaluation Score Difference	Sig.
Good view	−1.619	**0.000** **	−1.249	**0.000** **	0.056	0.931 ns	0.370	**0.000** **	1.675	**0.000** **	1.305	**0.000** **
Open feeling	−0.061	1.000 ns	−0.575	**0.000** **	0.051	0.893 ns	−0.514	**0.000** **	0.112	0.866 ns	0.626	**0.000** **
Silence	2.208	**0.000** **	1.759	**0.000** **	−0.046	0.966 ns	−0.449	**0.012** *	−2.254	**0.000** **	−1.805	**0.000** **
Regular landscape	0.114	0.983 ns	1.116	**0.000** **	0.153	0.270 ns	1.002	**0.000** **	0.039	0.408 ns	−0.963	**0.000** **
Natural feeling	−0.110	0.468 ns	0.148	0.551 ns	0.067	0.977 ns	0.258	0.051 ns	0.178	0.305 ns	−0.081	0.840 ns
Refreshing feeling	−0.148	0.446 ns	−0.058	0.997 ns	0.285	**0.003** **	0.090	0.455 ns	0.434	**0.000** **	0.343	**0.000** **
Airy	0.065	0.934 ns	−0.077	0.917 ns	0.384	**0.000** **	−0.142	0.531 ns	0.319	**0.000** **	0.461	**0.000** **
Could touch plant, water, rock, large tree	2.104	**0.000** **	0.096	0.765 ns	0.221	0.156 ns	−2.008	**0.000** **	−1.883	**0.000** **	0.125	0.590 ns
Would like to stop to leisurely watch	−0.149	0.568 ns	−0.510	**0.000** **	0.373	**0.001** **	−0.361	**0.000** **	0.522	**0.000** **	0.883	**0.000** **
Could rest leisurely	1.247	**0.000** **	−0.179	0.191 ns	0.435	**0.000** **	−1.426	**0.000** **	−0.812	**0.000** **	0.614	**0.000** **
Special landscape	0.266	0.054 ns	0.499	**0.000** **	0.574	**0.000** **	0.234	0.073 ns	0.308	**0.020** *	0.074	0.814 ns
Comfortable	0.034	0.999 ns	0.095	0.855 ns	0.482	**0.000** **	0.062	0.874 ns	0.448	**0.000** **	0.386	**0.000** **
Familiar	1.221	**0.000** **	−0.231	**0.037** *	0.292	**0.010** **	−1.452	**0.000** **	−0.929	**0.000** **	0.523	**0.000** **
Enjoyable	−0.031	0.988 ns	−0.314	**0.015** *	0.120	0.399 ns	−0.282	**0.017** *	0.151	0.142 ns	0.433	**0.000** **
Favorable	−0.489	**0.000** **	−0.300	**0.019** *	0.189	0.227 ns	0.189	**0.016** *	0.677	**0.000** **	0.489	**0.000** **
Overall satisfaction	0.064	0.630 ns	−0.094	0.965 ns	0.176	0.131 ns	−0.157	0.250 ns	0.112	0.655 ns	0.269	**0.021** *

* significant difference with $p < 0.05$, ** significant difference with $p < 0.01$, ns: no significant difference.

3.3. Evaluation Trends and Differences by Passage Stage at Each Location

In this study, the sites were selected based on their unique features. Consequently, it is essential to explore the variations in the assessments by passage stage at each location. The mean ratings by passage stage of the four locations were compared based on the overall mean values at each site. Furthermore, the Steel–Dwass test was applied to paired site combinations to explore variations in item responses among the passage stages.

3.3.1. Evaluation Trends and Differences by Passage Stage in Tsumetazawatouge

Walkers' perceptions of the Tsumetazawatouge landscape are shown by passage stage in Figure 4. Table 5 shows the variations in responses by passage stage for this site. Early passage walkers encountering Tsumetazawatouge gave the highest ratings on several parameters. For example, "Ability to touch plant, water, rock, large tree" or the person's behavior in relation to nature; and "Favorable", or the respondent's overall evaluation of the space, received significantly higher ratings from the Early passage walkers than from those who walked longer routes. Those walkers who passed through Tsumetazawatouge in the middle of their walks displayed little variation in their overall mean ratings. Those who visited Tsumetazawatouge late in their walks gave high ratings only on the "Special landscape" parameter or the perceived uniqueness of the place. However, these respondents gave the site the lowest ratings on most of the parameters.

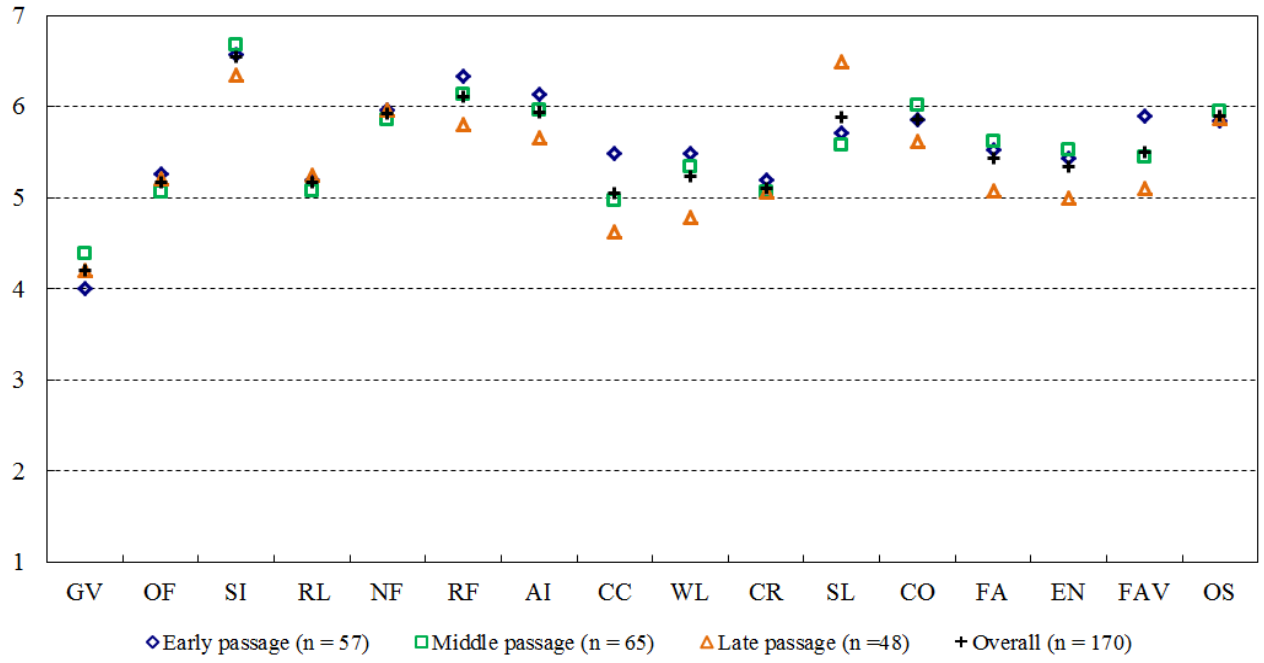


Figure 4. The mean ratings on the 16 parameters by passage stage in Tsumetazawatouge. Hardly think = 1; Think very much = 7. Numbers in parentheses are the number of respondents. GV: Good view; OF: Open feeling; SI: Silence; RL: Regular landscape; NF: Natural feeling; RF: Refreshing feeling; AI: Airy; CC: Could contact with pant, water, rock, giant tree; WL: Would like to stop to watch leisurely; CR: Could rest leisurely; SL: Special landscape; CO: Comfortable; FA: Familiar; EN: Enjoyable; FAV: Favorable; OS: Overall satisfaction.

Table 5. Response variations by passage stage in Tsumetazawatouge using the Steel–Dwass test.

Evaluation Parameter	Early Passage *versus* Middle Passage		Early Passage *versus* Late Passage		Middle Passage *versus* Late Passage	
	Evaluation Score Difference	Sig.	Evaluation Score Difference	Sig.	Evaluation Score Difference	Sig.
Good view	−0.385	0.163 ns	−0.208	0.731 ns	0.176	0.742 ns
Open feeling	0.202	0.974 ns	0.055	0.841 ns	−0.147	0.980 ns
Silence	−0.098	0.395 ns	0.225	0.391 ns	0.323	**0.037** *
Regular landscape	0.116	0.877 ns	−0.057	0.999 ns	−0.173	0.962 ns
Natural feeling	0.103	0.681 ns	0.007	0.981 ns	−0.097	0.809 ns
Refreshing feeling	0.195	0.615 ns	0.521	**0.001** **	0.326	**0.033** *
Airy	0.171	0.359 ns	0.474	**0.003** **	0.303	0.145 ns
Could touch plant, water, rock, large tree	0.522	**0.004** **	0.866	**0.000** **	0.344	0.106 ns
Would like to stop to leisurely watch	0.153	0.584 ns	0.700	**0.001** **	0.547	**0.040** *
Could rest leisurely	0.131	0.825 ns	0.130	0.864 ns	−0.001	0.999 ns
Special landscape	0.135	0.939 ns	−0.781	**0.000** **	−0.915	**0.000** **
Comfortable	−0.156	0.465 ns	0.235	0.125 ns	0.390	**0.023** *
Familiar	−0.089	0.826 ns	0.443	**0.032** *	0.532	**0.007** **
Enjoyable	−0.084	0.765 ns	0.439	**0.038** *	0.523	**0.006** **
Favorable	0.449	**0.008** **	0.791	**0.000** **	0.342	0.256 ns
Overall satisfaction	−0.112	0.958 ns	−0.033	0.908 ns	0.079	0.800 ns

* significant difference with $p < 0.05$, ** significant difference with $p < 0.01$, ns: no significant difference.

Overall, those respondents who disembarked from the forest railway at Tsumetazawatouge and began to walk from the Maruyamawataru station, or Early passage walkers, rated contact with natural objects and the "Favorable" quality of the space slightly higher than did respondents who passed through the site later in their walks. In contrast, Late passage walkers who spent a long time in the forest rated the uniqueness of the scenery ("Special landscape") in Tsumetazawatouge highly but rated sense-related parameters such as "Refreshing feeling" and "Airy", overall spatial qualities such as "Favorable" and "Enjoyable" and touching natural objects lower than the overall mean ratings among the passage stages.

3.3.2. Evaluation Trends and Differences by Passage Stage in the Hashirine Area

Evaluation trends in the Hashirine area by passage stage are shown in Figure 5. Difference tests of the evaluation parameters for the three passage stages in this location are listed in Table 6. Early-stage walkers rated contact with the natural environment higher than the overall mean rating on that parameter and the ratings from the other passage stages. Respondents in the middle of their walk rated the site's "Favorable" parameter slightly higher than the mean but assigned the lowest ratings to several parameters such as "Good view", "Airy", "Special landscape", "Comfortable", and "Could touch plant, water, rock, large tree". However, late passage respondents rated five parameters related to overall spatial qualities and possible behaviors to be performed at the site higher than the combined mean and

the ratings given by respondents of other passage stages. These parameters included "Special landscape", "Familiar", "Enjoyable", "Favorable" and "Could rest leisurely".

Overall, walkers who began to walk the Mukaiyama route through the forest beginning at the Hashirine area rated contact with natural object elements higher than respondents who entered the Hashirine area via longer routes and at a later stage in their walks. Conversely, walkers of the Late passage stage, who had walked longer routes, rated overall spatial qualities slightly higher than the overall mean rating and ratings by walkers of other passage stages. Respondents in the middle of their walk—those who disembarked the railway at the Maruyamawataru station and walked primarily the road alongside a mountain stream—tended to evaluate the overall spatial qualities and the desire to interact with natural objects lower than those of other stages.

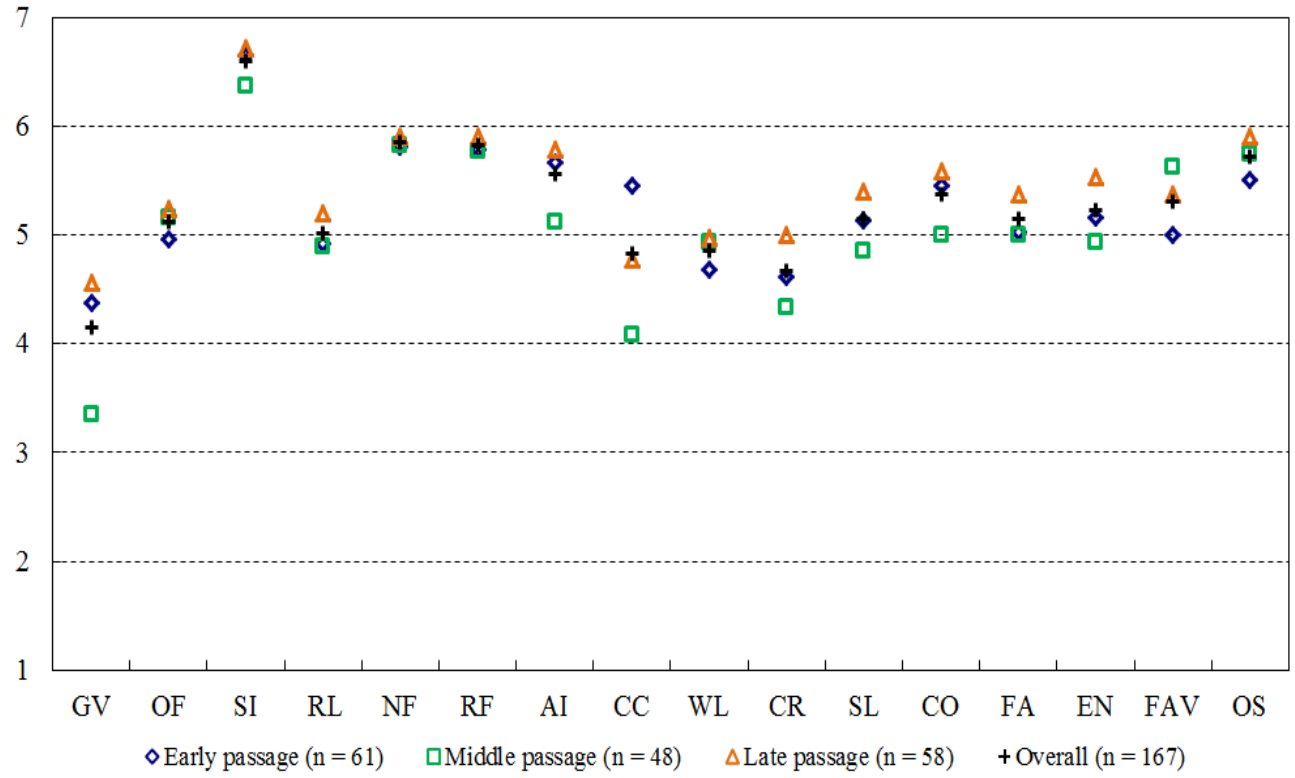


Figure 5. The mean ratings on the 16 parameters by passage stage for the Hashirine area. Hardly think = 1; Think very much = 7. Numbers in parentheses are the number of respondents. GV: Good view; OF: Open feeling; SI: Silence; RL: Regular landscape; NF: Natural feeling; RF: Refreshing feeling; AI: Airy; CC: Could contact with pant, water, rock, giant tree; WL: Would like to stop to watch leisurely; CR: Could rest leisurely; SL: Special landscape; CO: Comfortable; FA: Familiar; EN: Enjoyable; FAV: Favorable; OS: Overall satisfaction.

Table 6. Response variations by passage stage in the Hashirine area using the Steel–Dwass test.

Evaluation Parameter	Early Passage *versus* Middle Passage		Early Passage *versus* Late Passage		Middle Passage *versus* Late Passage	
	Evaluation Score Difference	Sig.	Evaluation Score Difference	Sig.	Evaluation Score Difference	Sig.
Good view	1.023	**0.000 ****	−0.192	0.683 ns	−1.215	**0.000 ****
Open feeling	−0.199	0.322 ns	−0.274	0.079 ns	−0.075	0.632 ns
Silence	0.281	**0.043 ***	−0.068	0.856 ns	−0.349	**0.010 ****
Regular landscape	0.022	0.875 ns	−0.289	0.470 ns	−0.311	0.334 ns
Natural feeling	−0.014	0.905 ns	−0.094	0.585 ns	−0.080	0.738 ns
Refreshing feeling	0.016	0.915 ns	−0.127	0.505 ns	−0.143	0.680 ns
Airy	0.547	**0.002 ****	−0.121	0.566 ns	−0.668	**0.000 ****
Could touch plant, water, rock, large tree	1.376	**0.000 ****	0.683	**0.000 ****	−0.693	**0.000 ****
Would like to stop to leisurely watch	−0.249	0.153 ns	−0.294	0.311 ns	−0.045	0.981 ns
Could rest leisurely	0.290	0.146 ns	−0.377	0.086 ns	−0.667	**0.001 ****
Special landscape	0.277	0.211 ns	−0.265	0.225 ns	−0.542	**0.032 ***
Comfortable	0.459	**0.002 ****	−0.127	0.545 ns	−0.586	**0.001 ****
Familiar	0.033	0.990 ns	−0.347	0.146 ns	−0.379	0.127 ns
Enjoyable	0.226	0.482 ns	−0.371	0.079 ns	−0.597	**0.004 ****
Favorable	−0.625	**0.000 ****	−0.379	0.056 ns	0.246	0.606 ns
Overall satisfaction	−0.242	0.386 ns	−0.406	**0.034 ***	−0.164	0.268 ns

***** significant difference with $p < 0.05$, ****** significant difference with $p < 0.01$, ns: no significant difference.

3.3.3. Evaluation Trends and Differences by Passage Stage in Dondonbuchi

Average evaluations by passage stage in Dondonbuchi are shown in Figure 6. Significance tests of the parameters and the three passage stages associated with this site are shown in Table 7. Respondents at the beginning of their walks rated seven parameters, including spatial qualities perceived with the senses (*i.e.*, "Silence" and "Regular landscape"), overall spatial features such as "Comfortable", "Favorable", and "Enjoyable", and behavior-related parameters such as "Could touch a plant, water, rock, large tree" and "Would like to stop to leisurely watch" higher than the overall mean rating and the mean ratings given by walkers of other passage stages. Perceptions of walkers who were in the middle of their walks varied little from the combined mean rating on all the parameters. The Late passage walkers assigned lower ratings on most of the parameters than the mean for all stages and the means of the other stages.

Overall, walkers who began their walk on the road alongside the mountain stream in Dondonbuchi generally gave high rating on many parameters. Conversely, respondents who walked this stretch of path late in their course or who had walked many routes prior to this one tended to rate most parameters lower than did walkers of the Early and Middle passages.

Table 7. Response variations by passage stage in Dondonbuchi using the Steel–Dwass test.

Evaluation Parameter	Early Passage *versus* Middle Passage		Early Passage *versus* Late Passage		Middle Passage *versus* Late Passage	
	Evaluation Score Difference	Sig.	Evaluation Score Difference	Sig.	Evaluation Score Difference	Sig.
Good view	0.040	0.699 ns	0.329	0.169 ns	0.289	0.355 ns
Open feeling	−0.087	0.878 ns	0.080	0.951 ns	0.167	0.697 ns
Silence	0.763	**0.000** **	0.787	**0.000** **	0.023	0.973 ns
Regular landscape	1.304	**0.000** **	2.804	**0.000** **	1.500	**0.000** **
Natural feeling	0.070	0.859 ns	0.679	**0.000** **	0.609	**0.001** **
Refreshing feeling	0.177	0.177 ns	0.258	**0.035** *	0.081	0.707 ns
Airy	0.061	0.426 ns	0.281	**0.044** *	0.220	0.195 ns
Could touch plant, water, rock, large tree	0.238	0.290 ns	0.524	0.091 ns	0.286	0.783 ns
Would like to stop to leisurely watch	0.273	0.053 ns	0.378	**0.020** *	0.105	0.851 ns
Could rest leisurely	0.169	0.508 ns	0.312	0.146 ns	0.144	0.784 ns
Special landscape	−0.195	0.632 ns	0.053	0.994 ns	0.249	0.558 ns
Comfortable	0.293	0.087 ns	0.434	**0.010** **	0.141	0.806 ns
Familiar	0.374	**0.040** *	0.398	**0.025** *	0.023	0.968 ns
Enjoyable	0.300	0.069 ns	0.267	0.144 ns	−0.033	0.840 ns
Favorable	0.155	0.425 ns	0.453	**0.002** **	0.298	0.078 ns
Overall satisfaction	0.270	0.072 ns	0.261	0.196 ns	−0.009	0.890 ns

* significant difference with $p < 0.05$, ** significant difference with $p < 0.01$, ns: no significant difference.

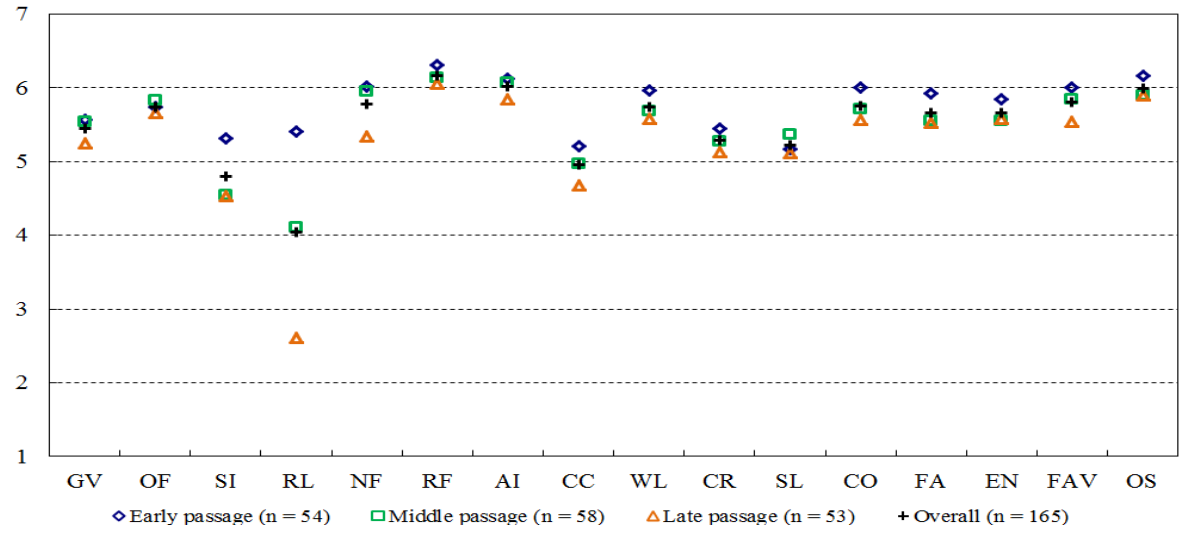


Figure 6. The mean ratings on the 16 parameters by passage stage in Dondonbuchi. Hardly think = 1; Think very much = 7. Numbers in parentheses are the number of respondents. GV: Good view; OF: Open feeling; SI: Silence; RL: Regular landscape; NF: Natural feeling; RF: Refreshing feeling; AI: Airy; CC: Could contact with pant, water, rock, giant tree; WL: Would like to stop to watch leisurely; CR: Could rest leisurely; SL: Special landscape; CO: Comfortable; FA: Familiar; EN: Enjoyable; FAV: Favorable; OS: Overall satisfaction.

3.3.4. Evaluation Trends and Differences by Passage Stage in Hirasawahashi

Evaluation trends by passage stage in Hirasawahashi are shown in Figure 7. Table 8 shows the variations in responses by passage stage for this site. Respondents at the beginning of their walks tended to rate hearing-based parameters such as "Silence" higher than the overall mean and the means associated with the other passage stages. Conversely, vision-based parameters such as "Good view" and overall spatial parameters such as the uniqueness of the landscape tended to receive lower ratings than the overall mean and the means associated with the other passage stages. Walkers who were in the middle of their walks rated only three parameters highly, including sense-based parameters such as "Good view" and "Regular landscape" and overall spatial parameters such as "Special landscape". However, they rated most behavior-based parameters such as "Could touch plant, water, rock, large tree" and "Could rest leisurely" lower than the overall mean and the means associated with the other passage stages. In addition, respondents who were near the end of their walks rated two parameters, including the vision-based quality "Good view" and the perceived value of "Special landscape" higher than the mean, whereas "Silence" was rated lower than the overall mean and the means associated with the other passage stages.

Overall, respondents who began their walk from the woods at Hirasawahashi on the Mukaiyama Trail rated the "Good view" and "Special landscape" qualities lower than the overall mean rating and passage stage means, and they placed a higher value on the silence of the place. Mid-walk respondents—those who disembarked the forest railway at the station in Maruyamawataru and walked the road alongside the mountain stream—and late-stage walkers who had walked a greater number of routes prior to reaching the site, tended to assign higher ratings with respect to "Good view", "Special landscape" and "Silence", than did the Early passage walkers.

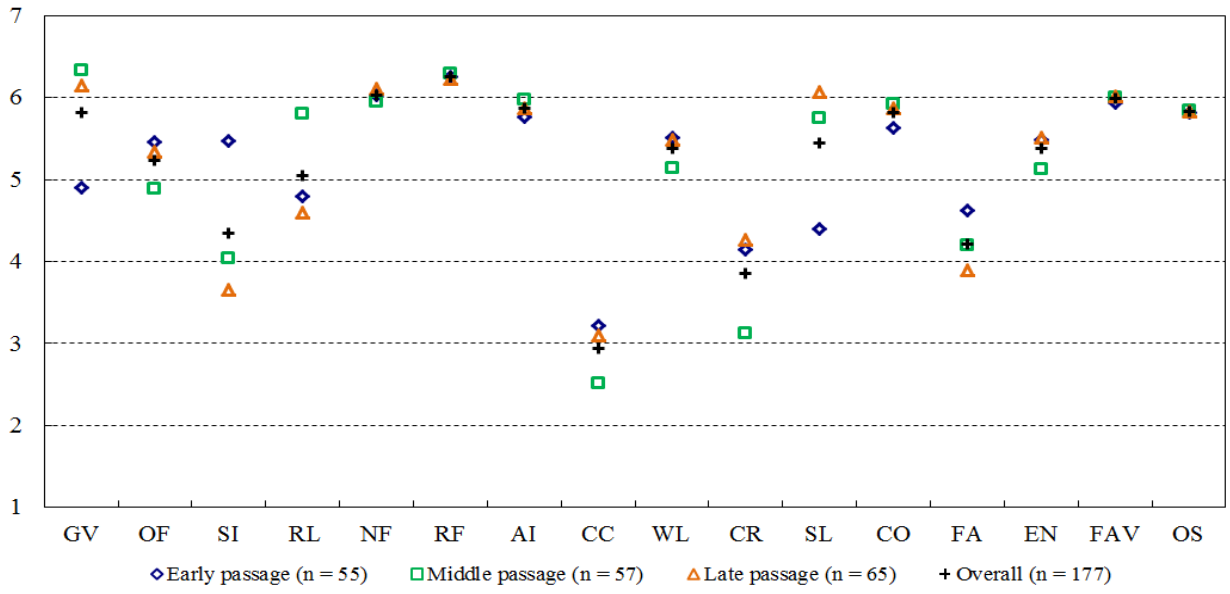


Figure 7. The mean ratings on the 16 parameters by passage stage in Hirasawahashi. Hardly think = 1; Think very much = 7. Numbers in parentheses are the number of respondents. GV: Good view; OF: Open feeling; SI: Silence; RL: Regular landscape; NF: Natural feeling; RF: Refreshing feeling; AI: Airy; CC: Could contact with pant, water, rock, giant tree; WL: Would like to stop to watch leisurely; CR: Could rest leisurely; SL: Special landscape; CO: Comfortable; FA: Familiar; EN: Enjoyable; FAV: Favorable; OS: Overall satisfaction.

Table 8. Response variations passage stage in Hirasawahashi using the Steel–Dwass test.

Evaluation Parameter	Early Passage *versus* Middle Passage		Early Passage *versus* Late Passage		Middle Passage *versus* Late Passage	
	Evaluation Score Difference	Sig.	Evaluation Score Difference	Sig.	Evaluation Score Difference	Sig.
Good view	−1.424	**0.000** **	−1.245	**0.000** **	0.179	0.395 ns
Open feeling	0.560	**0.000** **	0.116	0.814 ns	−0.444	**0.001** **
Silence	1.438	**0.000** **	1.811	**0.000** **	0.374	0.324 ns
Regular landscape	−1.007	**0.000** **	0.200	0.649 ns	1.207	**0.000** **
Natural feeling	0.089	0.504 ns	−0.071	0.863 ns	−0.160	0.113 ns
Refreshing feeling	−0.044	0.969 ns	0.024	0.932 ns	0.067	0.970 ns
Airy	−0.219	0.672 ns	−0.113	0.850 ns	0.106	0.992 ns
Could touch plant, water, rock, large tree	0.709	**0.002** **	0.126	0.772 ns	−0.584	0.075 ns
Would like to stop to leisurely watch	0.369	**0.005** **	0.017	0.956 ns	−0.352	**0.001** **
Could rest leisurely	1.023	**0.000** **	−0.116	0.962 ns	−1.139	**0.000** **
Special landscape	−1.354	**0.000** **	−1.677	**0.000** **	−0.323	**0.004** **
Comfortable	−0.293	0.214 ns	−0.241	0.433 ns	0.053	0.930ns
Familiar	0.425	**0.023** *	0.726	**0.024** *	0.301	0.300 ns
Enjoyable	0.368	**0.008** **	−0.017	0.998 ns	−0.385	**0.000** **
Favorable	−0.056	0.940 ns	−0.071	0.994 ns	−0.015	0.866 ns
Overall satisfaction	−0.024	0.996 ns	−0.013	0.985 ns	0.011	0.983 ns

* significant difference with $p < 0.05$, ** significant difference with $p < 0.01$, ns: no significant difference.

3.4. Presence or Absence of Differences in Evaluations at Each Site by Passage Stage

Patterns in response differences by passage stage are summarized in Table 9. The study sites were divided into two groups, those in the woods (Hashirinearea and Tsumetazawatouge) and those with a water element (Hirasawahashi and Dondonbuchi). In the two wooded spaces, ratings on seven parameters—"Silence", "Airy", "Comfortable", "Enjoyable", "Change from previous landscape", "Could touch plant, water, rock, large tree" and "Favorable"—differed according to passage stage. Ratings on three parameters—"Open feeling", "Regular landscape" and "Natural"—did not vary according to passage stage.

For the sites possessing a water element, respondents' perceptions of four parameters—"Silence", "Regular landscape", "Familiar" and "Would like to stop to leisurely see"—typically varied based on passage stage. All items produced at least some variation in perception based on the passage stage. This pattern may be because differences in the spatial elements and compositions of these two types of places are sufficiently distinct to allow the different perceptions to remain constant to the end.

Table 9. Presence or absence of response differences associated with walking distance.

Evaluation Parameter	Forested Sites		Water Sites	
	Tsumetazawatouge (*n* = 170)	**Hashirine Area (*n* = 167)**	**Dondonbuchi (*n* = 165)**	**Hirasawahashi (*n* = 177)**
Good view	Δ	○	Δ	○
Open feeling	Δ	Δ	Δ	○
Silence	○	○	○	○
Regular landscape	Δ	Δ	○	○
Natural feeling	Δ	Δ	○	Δ
Refreshing feeling	○	Δ	○	Δ
Airy	○	○	○	Δ
Could touch plant, water, rock, large tree	○	○	Δ	○
Would like to stop to leisurely watch	○	Δ	○	○
Could rest leisurely	Δ	○	Δ	○
Special landscape	○	○	Δ	○
Comfortable	○	○	○	Δ
Familiar	○	Δ	○	○
Enjoyable	○	○	Δ	○
Favorable	○	○	○	Δ
Overall satisfaction	Δ	○	Δ	Δ

○: There was a difference in experience based on walking distance; Δ: There was no difference in experience based on walking distance.

4. Discussion

To improve the representativeness of the evaluators, we assessed walkers rather than use students and local residents in this research. We found that female visitors outnumbered males, which reflects the family culture of Japan. For example, most Japanese women will devote all of their attention to the home after they marry. However, they are eager to vary their monotonous lives with hiking, mountain climbing and other activities, particularly after their children have grown up. Additionally, research has suggested that females are more interested in outdoor relaxation than males in Japan [42]. In terms of the age composition, most of the respondents were in their forties, fifties or sixties. Notably, the fraction of people older than 60 was as much as 35.3%, whereas younger people (less than 40 years old) made up only 10.9% of the participants. These results can be partly explained by the fact that Japan is an aging country. Moreover, younger Japanese need to spend most of their time working and are unwilling to venture outdoors, whereas retirees are free every day and very interested in nature. However, as previous studies indicated, forest walking can help people relieve stress [7–12]. Accordingly, encouraging young people to enjoy outdoor recreation has become a topic of discussion recently.

There are differences in walkers' perceptions depending on the composition of the space observed [7,8,12,20,39]. Figure 3 shows that the visitors enjoyed different elements at different points in the landscape. For example, it seems that the walkers preferred silent environments in the forests to

the sounds of a stream. Meanwhile, they appreciated a good view in open areas and the naturalness of all of the sites. Although the respondents did not have strong feelings regarding contact with natural objects, they were unsatisfied with locations where no objects could be touched. Furthermore, the walkers liked to stop to enjoy the views of distant mountains when they approached the Hirasawahashi site, but they were unable to leisurely rest there due to the lack of seating. Consequently, planners should consider installing resting facilities near the bridge. In addition, the "Favorable" indicator, which measures the degree to which an entire landscape is appreciated, was assessed differently. When the ratings assigned to the "Favorable" category were compared, the sites with a water element were rated more "Favorable" than were the wooded sites. This result was similar to those of other researchers [18], who described how "the view of the waterside was significantly highly evaluated compared with the view of the trail". In other words, it is likely that trails containing a water element are preferred over walking spaces that only pass through a forest [18,39,42,53].

Evidently, there was no clear trend in the evaluations of the four locations. However, when the study sites were divided into two groups, those in the woods (Hashirine area and Tsumetazawatouge) and those with a water element (Hirasawahashi and Dondonbuchi), the two wooded spaces received similar evaluations, whereas the two water spaces received significantly different ratings on most of the parameters. These results may be interpreted in terms of the unique spatial features. For example, the two wooded locations offer near-view scenes. Both of them are enclosed and silent and have regular landscapes consisting of large trees with an organized arrangement. Certainly, the different forest structures produced by the species compositions and stem densities led to the differences in the assessments of several parameters [3,54–57]. Conversely, the two water views have different objects appreciated by people. The visitors had a good view, enjoyed the view of a distant mountain, and listened to the stream in Hirasawahashi. Compared with the far-view landscapes, however, numerous people prefer the Dondonbuchi site, where they can make contact with water and rest by sitting on the rocks and observing the fish in the stream [4,17,18,39,42]. The walkers thought that Dondonbuchi was an enjoyable place and would like to stop to play leisurely. As a result, most of the parameters in the categories of behavior and overall evaluation received higher ratings at this site than those at other sites. Consequently, planners should consider providing special spaces for visitors to touch natural features in a forest [17–19,41,42].

The analysis of trends in respondents' perceptions at each location and the differences in these trends (Figures 4–7) are as follows: (1) The perceptions of respondents who had walked different distances varied. (2) According to the Steel–Dwass test results, opinions with regard to the parameters varied among walkers of each passage stage, whereas opinions regarding certain parameters did not vary among Late passage walkers. It was presumed that the evaluated items, which were typically recognized by walkers of any walking stage in a given walking space, were present. Based on the similar perceptions of walkers according to walking distance and the experience of landscape, it is likely that maintaining forest features such as their "Open feeling", "Regular landscape", and "Natural" feel can yield high ratings not only early in a walk but also in the middle and later stages (Table 9). However, locations with a water element differ from the forest locations studied. There were no parameters whose ratings remained constant between these two location types. However, when places were analyzed individually, commonalities were found. Six parameters—"Good view", "Open feeling", "Special landscape", "Enjoyable", "Could touch plant, water, rock, large tree" and "Could rest

leisurely" were commonly evaluated even at the end of walking in Dondonbuchi. In Hirasawahashi, five parameters—"Natural", "Refreshing feeling", "Airy", "Comfortable" and "Favorable"—were typically rated highly regardless of the visitor's walking stage. The space compositions of Dondonbuchi (where walkers can descend from a bridge and touch water and rocks with forest on both sides) and Hirasawahashi (which features a mountain stream and a distant mountain view) support these findings.

As mentioned above, the following two points are derived from the composited results of the perceptions at the four locations. First, it was presumed from the presence of common items for evaluation along two wooded trails that although the forest landscape varied, people's perceptions of the spaces were partially stable at each walking stage; Second, because no parameters received similar ratings from walkers who observed spaces with a water element, the perception of these spaces may have changed with the characteristics of the elements present, including whether walkers could touch natural objects.

In addition, the mean ratings on the 16 parameters associated with each passage stage at each site suggested that including a few special landscapes late in a walk can help visitors maintain their favorable impressions of a forest space [1,7,12,18,39,42]. Moreover, in the forest landscapes, it may be particularly beneficial to create a few special spaces where walkers can touch natural objects such as specific plants and stones at the beginning of a walk rather than at the end or middle (Figures 4 and 5). In the spaces with a water element, however, the Late and Middle passage walkers perceived a noisier environment than the early passage walkers even though both groups were in the same location (Figures 6 and 7). In other words, if a landscape includes a rushing stream, the stream should be located in the first half rather than the latter part of a walking route. Additionally, the regular landscape feature in a water space was more difficult to recognize by those respondents who encountered the location near the end of their walk than by those who did so earlier in their walk.

Unlike previous research [1,7,20,21,33–36,38,39], this study did not involve subjects who were brought into a forest space and asked their perceptions. For this study, we visited locations to administer a questionnaire to walkers who were visiting the locations by their own choice. For this reason, it was impossible to control the demographics or the routes of the walkers. In the future, researchers should survey not only walkers with other attributes (such as those in a young age group) but also those who visit with different types of groups and compare the resulting data to the information presented here. Moreover, although walkers' perceptions of the study sites were analyzed here, we did not address how the long-term experience of a walking space impacted those perceptions. This should be the subject of further research in a series of sequential spatial evaluations and forest walkers' behavior.

5. Conclusions

This study clarified changes in walkers' evaluations of place based on when they experience a particular location in their hike, the features evaluated and the presence or absence of differences in those perceptions of forest routes based on walking distance and views of experiences matching the behaviors of walkers. Our results are summarized as follows:

(1) Walkers' perceptions at a given location and after having walked a given distance were not constant across the parameters under evaluation, and our results indicate that walkers' perceptions of a place may change with the distance traveled to that location.

(2) A statistical analysis revealed that certain parameter ratings varied significantly among different passage stages at a single location, whereas other parameter ratings remained stable regardless of when a person visited in their walk. Accordingly, we must consider the effects of spatial arrangements of various landscape factors on people's perceptions in forest planning. For example, certain items such as special landscapes should be located late on a walking route to receive a high rating, whereas greater enjoyment stems for placement of a silent space where one can touch natural objects early in a walk rather than later on a route.

(3) When similar ratings that matched the behaviors of walkers were identified at each passage stage in wooded areas, it was noted that parameters such as "Open feeling", "Regular landscape", and "Natural" feel were perceived similarly not only early but also in the middle and late in a walk. Conversely, it was noted that differences in spatial elements and their composition, particularly in the presence of water, led to changes in perceptions through the late stage of a walk. Based on these results, we suggest that positive walking experiences can be maintained by considering the open feeling, regularity, and natural landscape in planning walking routes. The findings also indicate that taking into account the effect of spatial features of water elements on a walking experience is very important in route planning. Our study has clarified not only which types of walking space are appreciated by visitors but also how the evaluations are affected by walking distances and experiences, which provides very useful recommendations for forest managers in the design and reconstruction of forest parks. However, as mentioned above, some issues, such as effects of walkers' attributes on their evaluations, and how the long-term experience of a walking space impacts visitors' perceptions, should be the subjects of further research.

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Author Contributions

Tong Zhang designed the experiment. Kunihiro Sasaki and Songqiu Deng coordinated the research project and provided technical support and conceptual advice. Tong Zhang and Qianqian Ma collected the data, analyzed the data and wrote the paper. Tong Zhang, Qianqian Ma, Kunihiro Sasaki, and Songqiu Deng helped prepare and revise the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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