"I feel like I am in that place and I would like to see more": Aesthetic and embodiment components of tourist destination image.

Abstract

Photographs of places are cognitive sources that provide the observer with a first, essential impression of a potential tourist destination, before the observer visits that place. Recent evidence suggests that aesthetic qualities of a tourist destination may affect tourists' experience and satisfaction, contributing to their loyalty towards a destination and intention to return. Drawing upon the literature on sensorimotor processes of aesthetic experience of arts, here, we investigated whether embodiment and aesthetic qualities of landscape photos might play a role in people' aesthetic preference and willingness to visit a tourist destination. One-hundred twenty-one participants (Mage = 22.17, SD = 6.25) completed an online survey, which asked to evaluate a series of landscapes according to subjective ratings of presence, exploration and completion, that is the intention to explore beyond the represented place (embodiment dimensions), as well as of symmetry. Furthermore, participants rated how much they liked each destination (Liking) and how much they would like to visit that place (Tourist judgement). Convolutional neural networks (CNN) of image features (Symmetry, Variance and Self-similarity) were also analysed to rule out the effects of these features on the two types of judgement. Results showed that embodiment components predicted both Liking and Tourist judgements. In contrast, neither subjective Symmetry nor CNN measures predicted any of the two Liking and Tourist judgements. Overall, our findings support a novel theoretical framework of tourist aesthetic judgement, whereby sensorimotor mechanisms might play a role in tourist destination choices.

Key words: embodiment, CNN features, liking, symmetry, destination image.

‘I Feel Like I Am In That Place and I Would Like To See More’: Aesthetic and Embodiment Components of Tourist Destination Image

The choice of a tourist destination is a decision-making process that starts with an individual’s subjective interpretation of a tourist place (Andrades-Caldito, et al., 2013; Tuan, 1975). This subjective idea is called Tourist Destination Image (TDI) and it is defined as an attitude-like construct consisting of cognitive and affective evaluations that are reflected in the beliefs about and feelings toward a tourist destination (Baloglu & McCleary, 1999; Lin et al., 2007). TDI is also characterized by a conative dimension that is the likelihood of visiting the touristic place (Pyke & Ryan, 2004). A favourable TDI will lead to positive on-site experience, higher tourist satisfaction, and therefore higher loyalty, which in turn will lead to intention to revisit, recommendation to others and favourable word of mouth (Sun et al., 2013). Given the pivotal role of TDI in tourists’ satisfaction (Bigné et al., 2001; Fakeye & Crompton, 1991), TDI has been considered a hot subject in tourism destination management (Holbrook, 1978), particularly with destination managers eager to survive and to be sustainable in extremely competitive tourism environments.

Destination image not only guides the initial stage of destination selection but also impact upon consumer subsequent loyalty behaviour (Chi & Qu, 2008). Accordingly, the media technologies used for the destination images’ promotion must be considered in the components that qualify destination images. With these regards, photos are important sources that provide the potential tourist with a subjective destination image before the visit, priming a first, essential impression and mental representation of the potential tourist destination (Beerli & Martín, 2004). As such, photos are a powerful and plentiful medium for research and destination promotion because their effects on people’s memory are superior to those of texts (Hunter 2008; Singh & Formica, 2007). Photos might also provide information about the aesthetic qualities of a destination, which in turn will impact upon a tourist experience

profoundly (Todd, 2009). Given the significant role of the aesthetic appreciation of a destination for the purpose of tourism loyalty development (Zhang & Xu, 2020), several studies investigated the impact of the aesthetics on destination images (Kirillova et al., 2014; Kirillova & Lehto, 2015). The results of these studies converge on the idea that aesthetic qualities affect tourists' experience and satisfaction, contributing to their loyalty towards a destination (Lee et al., 2011) and therefore to the intention to return (Baloglu et al., 2008). With these regards, destinations' aesthetic qualities have been an integral element of many subjective measures used in tourism research, including satisfaction and perceived image' self-report scales (e.g., Alegre & Garau, 2010; O'Leary & Deegan, 2003). However, other studies employing sophisticated brain imaging techniques have attempted to use more objective measures of aesthetic qualities by investigating the brain areas related to the appreciation of beautiful and ugly stimuli, including photographs of landscapes, artifacts, urban scenes, and interior spaces (Cela-Conde et al., 2004; Kawabata & Zeki, 2004; Mickley & Kensinger, 2008; Vartanian et al., 2013). One study has also focused on the brain areas underlying tourists' behavioural intention to select attractive (vs non-attractive) hotel destinations for their next vacation prior to tourists visit (Al-Kwifi, 2015).

It should be noted that in most of the studies above, aesthetic qualities have been reduced to a single dimension of beauty (or liking) of the stimuli, thus limiting the appraisal of the multifaceted and dynamic process that instead might characterise the tourist's aesthetic experience in tourist destination choice. Notably, tourism aesthetics is characterised by a complex, multisensory, lived experience, which entails interrelations not only between a tourist and the surrounding environment, but also among potential dimensions of this interactive experience (Ittelson, 1978). As such, the aesthetic evaluation of images of tourist destinations might benefit from a condition in which the observer is encouraged to embody the tourist destination 'as if' they would be present in that place, hence triggering

sensorimotor experiences associated to an imaginative exploration of the place. Given the complex nature of this mechanism, preference for tourist destinations may not be entirely understood if it is investigated only by means of aesthetic components, as it is the case of visual arts. A more in-depth consideration for the additional qualities that answer to the question of 'what are the drives for aesthetic and tourist destination choice in a TDI' is needed.

The current study

To the best of our knowledge, no studies so far have investigated whether other dimensions paired with the aesthetic (liking or beauty) quality of a TDI are involved in tourists' destination choice, when looking at photographs of places before visiting those destinations. With this aim, we draw upon the embodied cognition framework which emphasises the importance of bodily experiences and sensorimotor processes in our perception and evaluation of the environment (Körner et al., 2015). The role of embodied mechanisms in aesthetic experience has been already discussed in the domain of empirical aesthetics (see Chatterjee & Vartanian, 2014, 2016; Freedberg & Gallese, 2007). For example, according to the 'embodied simulation account of aesthetics' (Freedberg & Gallese, 2007), the aesthetic experience is grounded in the simulation of actions, emotions, and bodily sensations induced by art which ultimately contribute to its aesthetic appreciation (Kirsch et al., 2015; Ticini et al., 2015).

In the current study, for the first time, we transferred this idea of embodiment into a different context, that is, the evaluation of tourist destination images. We aimed to assess whether an offline re-enactment of behaviours involved in the exploration of tourist sites would play a role in the aesthetic evaluation and the subsequent choice of tourist destination. As such, the crucial questions to ask participants were those that

would enable us to measure the extent to which they felt part of the observed environment, as if (i.e., via offline simulation) they were physically present in that place. In contrast to an automatic (pre-reflective) embodied simulation, given the nature of our study, we asked explicit questions which focused on three different components of the embodiment dimension: (1) presence, (2) exploration and (3) completion. The first component corresponds to the sensation of being in the observed place; the second, in turn, concerns the willingness to explore the surroundings (i.e., action); and the third reflects the desire to view more sites and therefore to extend the exploration further. To this aim, we asked a sample of participants to provide their ratings of a series of landscape's photographs to gather subjective measures of aesthetic (liking) and of embodied components that might lead to the preference of a tourist destination and ultimately to their willingness to visit that place. Besides the embodied components, we addressed the role of visual properties of the images on tourist destination choice by asking participants to rate symmetry (i.e., subjective symmetry). We focused on symmetry because this is a visual feature that is relatively easy to detect (Cattaneo, 2016; Bertamini & Makin, 2014; Wagemans, 1997), it is typically shared across a variety of visual stimuli (Bertamini et al., 2019), including visual arts (see Jacobsen et al., 2006), and it has been associated with positive valence (Bertamini et al., 2013). **Symmetry is an object property that helps the observer to identify a stimulus (Machilsen et al., 2009). Symmetry is also typically detected within brief presentations (Julesz, 1971; Wagemans, 1993); it catches the eye (Locher & Nodine, 1987) and is processed automatically (Wagemans, 1995). Symmetry is aesthetically pleasing (Ramachandran & Hirstein, 1999) cross-culturally (Che et al., 2018) and in a range of stimuli, for example with abstract shapes or patterns (Jacobsen & Höfel, 2003; Höfel & Jacobsen, 2007) flowers (Hůla & Flegr, 2016), and faces (Perrett et al., 1994; Rhodes, 2006). However, the extent to which symmetry is preferred among**

other configurations may depend on the type of objects (Vessel et al., 2018). This makes symmetry an interesting feature to examine also in the context of TDI. It should be noted that Bertamini et al. (2019) investigated the salience of symmetry for images in different categories by comparing the pictures in their original format with those subjected to computationally produced bilateral symmetry. Results within the landscape category reported a preference for the original, less symmetrical pictures. However, a separate analysis of original and modified stimuli revealed a positive correlation of salience of symmetry with preference for the artificial subsample. This result suggests that symmetry did not positively affect an individual's aesthetic appreciation of landscape if it was perceived as artificial (i.e., computationally produced). Compound symmetries (i.e., combinations or different kinds of symmetry) are actually common in natural and urban environments (Mehaffy, 2020), and it has been demonstrated that symmetrical patterns can govern aesthetic preferences (Hagerhall et al., 2004; Jacobsen & Höfel, 2003; Jacobsen et al., 2006; Palmer et al., 2008; Treder, 2010). However, because symmetry is only one of the aesthetic parameters that might play a role in liking, and there are cases where is not the most preferred one (Leder et al., 2019; McManus, 2005), we also took advantage of computational aesthetics by means of deep convolutional neural networks (CNN, Redies, 2019) to extract additional and objective CNN features (i.e., symmetry, self-similarity and variances) that might contribute to liking and choice of a tourist destination (Brachmann et al., 2017).

Moreover, we should consider that tourist practices reflect an individual cross-modal engagement with the destination (Markuksela & Valtonen, 2011), and therefore symmetry and aesthetic features could contribute to tourists' judgements without necessarily being crucial in determining the final choice.

Based on the literature reported above, and acknowledging that aesthetic appreciation is an important component of tourist satisfaction (Berleant, 2005; Kirillova & Letho, 2014; Zhang & Xu, 2020), we hypothesized that (1) there would be a positive correlation between liking and tourist evaluation, (2) the subjective embodiment components of presence, exploration and completion would predict liking and tourist destination choices, and that (3) aesthetic features (i.e., subjective symmetry and CNN features) would predict only the liking (but not tourist) evaluation of a tourist destination image.

Methods

Participants

The data collection took place between August and December 2020, that is, during the lockdown due to the COVID-19 pandemic. A power analysis was conducted a priori to determine the sample size. We used G*Power 3.1.9.4 (Faul et al., 2007) (setting parameters for a multiple regression analysis with four predictors, 85% power to detect a moderate effect size (f^2 = .15), alpha level of .05) which reported a minimum sample size of 95 participants. One-hundred eighty-four participants responded to the survey. However, only 121 (97 women, Mage = 22.17, SD = 6.25, **range 18-61yrs,** 89.26% Caucasian) participants completed the study. Three participants self-declared as art/photography experts (from 1 to 2 years of experience working in the sector) and four as art/photography students; one participant declared to have worked in a travel agency for 5 years. Participants were recruited by advertising the study on social media and they took part on a voluntary basis. **Inclusion criteria required to be aged 18 years old and above, with normal or corrected to normal vision and no neurological/psychiatric disorders.**

Participants provided implied informed consent prior to testing and were debriefed at the end of the experiment. First-year undergraduate students of *** were also invited to take part in the study via the Psychology Experiment participation scheme website (SONA system) in exchange for course credits. All participants were offered to enter a prize draw with a chance to win two £10 shopping vouchers. All procedures were approved by the Research Ethics University Committee (UREC, approval n.: 20/NSP/029) of ***. The study was conducted in accordance with the British Psychological Society (BPS) code of ethics.

Materials

Landscapes photographs set

The visual stimuli consisted of a database of 50 high-quality colour photographs depicting either urban or natural environments (see examples in Figure 1), presented in both landscape and portrait orientation. All images were adjusted to a frame size of 405×540 pixels for landscape orientation and of 540×405 pixels, for portrait orientation, using Adobe Photoshop (Adobe Inc., San Jose, CA). Photographs were taken by one of the authors and by three people known to the author with an iPhone 8. **Photographs depicted a set of Italian, French and American natural and urban-based environments.** The urban photographs included elements such as squares, buildings, and urban parks. The photographs of natural environments included natural elements like lakes, seas, mountains and forests. Importantly, we excluded photographs of notorious touristic places (for e.g., Saint Peter's Square, St. Mark's Square or Louvre Museum) to avoid familiarity bias (Leder et al., 2004). **The high degree of heterogeneity among the pictures was intended to simulate people's online browsing of photos from disparate sources, reflecting the development of Web 2.0 technologies and the resultant increase in communication via social media (Sheungting Lo et al., 2011).**

Photos taken by professional photographers and marketing organizations were not selected; rather, we favoured an approach more representative of the way a significant proportion of modern-day travellers evaluate and search for tourist destinations, that is, by using social media sources. A recent investigation conducted by Marine-Roig (2019) suggests that the use of social media -including browsing Instagram-, influencers' webpages and other travellers' narratives (word of mouth)—might be instrumental in shaping people's first impressions and subsequent choices of tourist destinations. Moreover, the increasing adoption of smartphones—and, with it, ubiquitous access to the mobile Internet—have had a profound impact on the information searches and decision-making of tourists and have thus played an essential role in the overall travel process (Amaro et al., 2016). In most of the cases above, available material is not professionally produced; rather, it is user-generated content, including pictures taken by amateur photographers, as it is the case in our study. Accordingly, it has been recognized that online media sources shared by users are considered to be more reliable than official materials provided by marketing organizations (Agustí, 2018; Fotis et al., 2012; Katsoni, 2014; Xiang & Gretzel, 2010). The stimuli set and the database are publicly available at https://osf.io/dejxs.

Convolutional Neural Networks

We used Convolutional Neural Networks (CNN) algorithm by Redies (2019) to obtain information concerning the aesthetic structure of each image (i.e., objective measures). These algorithms are particularly useful in that they simulate how the human visual system encodes input images (Wurtz & Kandel, 2000), detecting color and spatial frequency information (Brachmann & Redies, 2016). CNN methods can also distinguish between types of visual stimuli (i.e., artworks vs. non-art works) based on their aesthetic structure (Denzler

et al., 2016). In this study, CNN was implemented to extract five objective aesthetic properties of an image: self-similarity (i.e., the fractal structure or scale invariance, see Brachmann & Redies, 2017), variances (i.e., distribution of color and luminance edges, see Brachmann et al., 2017) and left/right (Brachmann & Redies, 2016), up/down and rotational symmetry.

For the analysis of the CNN, we used the guidelines and the script available at https://osf.io/xb983.

General procedure

Participants were invited to complete an online survey hosted on Qualtrics (Provo, UT, qualtrics.com). Before starting the task, they were asked to read the information sheet and provide implied consent if they wished to take part. Then, they were prompted to report their demographic information including age, sex, and ethnicity. Given that expertise can play a role on aesthetic evaluations of a variety of visual stimuli (Dupont et al., 2015; **Gartus et al., 2020**; **Leder et al., 2019**; Mulas et al., 2012; **Weichselbaum et al., 2018**), participants were also asked to report if they were art/photography experts and for low long ('Are you an Art/Photography expert?'; 'If you are an Art/Photography expert, please specify how long you have been doing this job') or students ('Are you an Art/Photography student?') and any current job experience in travel agencies and for low long ('Do you work in a travel agency?'; 'If you work in a travel agency, please specify how long you have been doing this job'). **Before starting the image evaluation, a preliminary screen stated that participants were invited to answer the questions as quick as possible (without overthinking). Also, the software did not allow participants to go back and answer questions or modify previous answers provided.** For each image, participants were then asked to provide embodied ratings for the following dimensions: *Presence*: 'I see a place which I can be

bodily present in'; *Exploration*: 'I feel I am in that place, like if I am exploring it'; *Completion*: 'I see only a part of the place and I would like to see something more'. Furthermore, they were asked to provide judgments of *Symmetry*: 'I think the image is symmetrical'; *Liking*: 'How much do you like this image?'; and of *Tourist* choice: 'How much would you like to visit the place represented in the image?'. All judgements were provided by means of a 10cm visual analogue scale VAS which ranged from *Not at all* (0) to *Very much* (100). **The rating scales were randomly presented for each image. The image remained on screen until participants had recorded all ratings and pressed an arrow to move onto the next question.** At the end of the survey, participants were offered to enter the prize draw. Finally, they were thanked for taking part and debriefed about the aims of the study. **Overall, the study took approximately 35 minutes.**

Data Analytical approach

All statistical analyses were performed using SPSS-26 (SPSS Inc., Chicago, IL). We used two different analytical strategies. In the first analysis (Analysis 1), we computed participants' mean ratings across images of embodiment and Symmetry dimensions to assess the predictive role of these components on participants' Liking and Tourist judgements. In the second analysis (Analysis 2) instead, we first computed mean ratings of Liking, Tourist and Symmetry across participants for each individual image of our dataset. These mean ratings were then correlated between them and with CNN features (Self-similarity, Mean variance, left/right, up/down and rotational Symmetry). Finally, we assessed the predictive role of CNN features on Liking and Tourist judgements of each image.

Concerning Analysis 1, first, an intraclass correlation (ICC) analysis was carried out to investigate the reliability of ratings for all the six variables (i.e., Presence, Exploration, Completion, Symmetry, Liking, Tourist) and assess the degree of

consistency. The average measures ICC was .95 with a 95% confidence interval from .88 to .99 [$F(5,600) = 20.87$, $p < .001$], thus demonstrating a consistency of ratings across all variables.

Pearson's r was computed to study the bivariate correlations between all subjective ratings of embodiment, Symmetry, Liking, and Tourist judgements. Given that this analysis demonstrated substantial correlations amongst the embodiment and Symmetry ratings, we carried out a principal component analysis (PCA) to identify the smallest number of statistically independent dimensions in the subjective judgements, that we could use as predictors in our multiple regression models and to avoid variance inflation due to multicollinearity amongst explanatory variables. A PCA with direct oblimin rotation was then conducted on the embodied and rated Symmetry components, which revealed a three-component solution according to Cattell's (1966) interpretation of the scree plot and with 96.68% of total variance accounted (see Figure 2), with the three components loading 72.27%, 12.75% and 11.66% of the variance, respectively. For each PCA component, we considered variables with component loadings greater than |.50| (see Table 1). The values of the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO = .75) and Bartlett's test of sphericity ($p < .001$) revealed that PCA was suited to our data. The results obtained suggested that Presence and Exploration could be considered as a single principal component. Accordingly, we performed linear multiple regression analyses by considering presence and exploration as a single component (referred to henceforth as Presence_Exploration), which was obtained by averaging the ratings for Presence and Exploration. Finally, two separate multiple regressions were fit to test our hypotheses of the predictive role of the two embodiment (Presence_Exploration, Completion) and Symmetry components on Liking and Tourist judgements (i.e., outcome variables).

Regarding Analysis 2, a series of multiple regression models were fitted to test the predictive role of the CNN features (Self-similarity, Mean Variance, left/right, up/down and rotational Symmetry) on Liking and Tourist judgements, respectively. For all the analyses, the critical value for significance was fixed at $p = .05$ and the confidence interval level in regression models was fixed at 95%.

Results

Analysis 1: predictive role of embodiment and Symmetry components on Liking and Tourist judgements

Table 2 reports descriptive statistics and Pearson's correlations among the embodiment, Symmetry, Liking, and Tourist variables. All variables showed significant positive correlations (all $p < .001$). As expected, the Liking and Tourist judgements were also positively correlated ($r = .95$, $p < .001$), that is the more participants liked the place depicted in the photograph, the more they would like to visit it. Most importantly, embodiment components of Presence, Exploration and Completion were also positively correlated with Liking and Tourist judgements. In other words, the stronger the observer's sense of exploration and presence in a place and the desire to continue to explore beyond the image, the higher the liking and willingness of visiting that place.

With regards to the regression model explaining participants' Liking judgements [$F(3,117) = 156.91$, $p < .001$; $R^2 = .80$], only Presence_Exploration significantly predicted the outcome variable (see Table 3a). Concerning the regression model explaining participants' Tourist judgements [$F(3,117) = 185.03$, $p < .001$; $R^2 = .83$], Presence_Exploration and Completion had a significant role as predictors (see Table 3b). In contrast, Symmetry did not predict neither of the two Liking and Tourist judgements (see Table 3a, 3b). **Finally, we carried out a comparison between urban and natural**

environments by selecting a subset of 10 urban and 10 natural images. The selection followed a strict criterion based on the presence (urban) versus absence (natural) of human artefacts. Results substantially overlap with those obtained from the whole set of images. Accordingly, symmetry did not account for liking and tourist ratings for both types of environments. On the contrary, all embodiment components (with the exclusion of completion for natural environments) predicted liking and tourist judgments for both natural and urban environments (see Supplemental Materials).

Analysis 2: predictive role of CNN features on Symmetry, Liking and Tourist judgements

Pearson's correlations among the images' visual features obtained with the use of CNN and participants' ratings of Symmetry (see Table 4) showed that the latter was correlated with Self-similarity (r = -.39, p < .001), Mean variance (r = .36, p = .01) and left/right Symmetry (r = .55, p < .001) CNN features. There were positive correlations between subjective ratings of Symmetry and both Liking (r = .48, p < .001) and Tourist (r = .44, p = .001) judgements. On the contrary, neither of the two judgements were correlated to any of the objective variables (Self-similarity, Mean Variance and left/right, up/down and rotational Symmetries) obtained with CNN.

A series of multiple regression analyses explaining participants' ratings of Symmetry, Liking and Tourist choice were performed to test the predictive role of CNN measures of Mean variance, Self-similarity and Symmetries. The multiple regression model revealed that none of the CNN features predicted participants' ratings of liking [$F(5,44) = 1.50$, $p = .21$; $R^2 = .15$] and tourist [$F(5,44) = 2.33$, $p = .06$; $R^2 = .21$] judgements. Only left/right symmetry predicted subjective ratings of symmetry [$F(2,47) = 11.43$, $p < .001$; $R^2 = .15$, see Table 5].

Discussion

To the best of our knowledge, only one (brain imaging) study so far explored the influence of destination image, before the tourists visit that destination and experience it (Al-Kwifi, 2015). However, in their investigation the author focused only on judgements of attractiveness of a set of (hotel) destination images, thus neglecting the role of visual properties and embodiment components, which might be at play in tourist destination choice. With this study, we aimed at filling this gap by investigating for the first time, the role of embodied components in evaluating destination images of landscape photographs. Specifically, we addressed the question as to whether liking and tourist judgements might be explained by an observer's sense of bodily presence, sense of exploration of the represented place, as well as their desire to continue with this exploration beyond what has already shown within the photo. The rationale for exploring the contribution of these dimensions was dictated by the fact that embodied mechanisms involving the coupling of perception and action, whereby the observation of an image triggers a sense of active and ongoing exploration in visual arts, might also partially extend to individuals' intention to visit a destination in future. Accordingly, we tested the hypothesis of a predictive role of embodied mechanisms (Presence, Exploration, and Completion) in landscapes aesthetic preference and tourist destination choice (Analysis 1). Furthermore, we took advantage of computational aesthetics, by means of CNN, to assess the contribution of low-level CNN features to aesthetic appreciation and tourist judgements of heterogeneous landscapes (Analysis 2).

Our findings of a positive linear relationship between subjective measures of liking and tourist judgements are not new. Indeed, these results agree with prior evidence that beauty appreciation is pivotal to the touristic experience and destination image formation (Kirillova & Lehto, 2015; O'Leary & Deegan, 2003). For instance, studies suggest that aesthetic qualities like 'beautiful scenery' are one of the most important reasons for

destinations choice (Kamenidou et al., 2009) but also that, destinations with stronger positive images have a higher probability of being selected by tourists when they make their decisions (Alhemoud & Armstrong, 1996; Chi & Qu, 2008). Furthermore, a neuroimaging study by Al-Kwifi (2015) reported that the neural activity of the ventromedial prefrontal cortex (vmPFC), a brain area supposedly involved in tourists' decision making, was greater when participants were asked to assess attractive destination images compared to non-attractive ones. But also, that the positive attitude toward an attractive destination led to higher intention to visit that destination. Accordingly, our findings corroborate the idea that tourist judgements are positively related to aesthetic qualities of an image destination; so that the higher tourists' subjective ratings of liking, the greater their desire to visit that destination.

More interestingly, our results of positive linear correlations amongst all variables of Liking, Tourist judgements and embodiment components provide first evidence that aesthetic appreciation and tourist judgements of destination images might be mediated by the observer's sense of bodily-presence and exploration of that image and even before the potential tourist visits that destination and experiences it. Accordingly, it might be plausible to think that the 'desire' to discover what is shown beyond the picture (i.e., Completion) might trigger a sense of exploration of an unknown scenario. Likewise, the findings of a role of Presence and Exploration in predicting the observer' responses to destination images seem to suggest that embodied mechanisms, like the ones driving the aesthetic experience when observing visual arts, could play a role in tourist judgements of destination images before the tourists visit that destination and experience it. As suggested by Chatterjee and Vartanian's aesthetic triad model (2014), the aesthetic experience is defined as the result of the interaction of three components involving the meaning-knowledge (expertise, context, and culture), sensorimotor (sensation, perception and motor system), and emotion-valuation (reward; emotion; wanting and liking), systems. In keeping with this view, we speculate that the desire

of visiting tourist destinations may entail an association of a sensorimotor approach that could emerge from the engagement of the observer with the different images of destinations. Accordingly, our findings may support the idea of an intentional, ongoing exploration and motor engagement through the tourist experience (Kawabata & Zeki, 2004; Umiltà et al., 2012), thanks to which the observer re-enacts offline past sensorimotor experiences (Gallese & Goldman, 1998; Gallese & Freedberg, 2007).

One additional mutual but not exclusive interpretation of our findings might be related to dissociable reward mechanisms of "liking" and "wanting" (Berridge et al., 2009), which might differently underpin aesthetic and tourist judgements, respectively. According to this view, the observer's mental state and relative experience of pleasurable aesthetic emotions whilst contemplating a destination image, might affect subjective ratings of liking and tourist judgements depending on the 'role' assumed by the observer. In other words, it might be plausible that assuming the role of a tourist might trigger a cognitive state during which the observer engages in an active behaviour, i.e., the 'wanting' to visit the place, which does not necessarily occur when contemplating a photograph in an aesthetic mode, i.e., when making judgements of liking. Further studies are needed to corroborate the hypothesis that dissociable rewarding mechanisms might be involved in the 'liking' and 'wanting' to visit a tourist place.

In partial disagreement with our hypothesis, our findings show also that subjective ratings of Symmetry did not explain liking and tourist judgements of photographs of image destination. This result was also supported by the lack of predictive role of CNN features of Mean variance, Self-similarity and Symmetry, with regards to any of the Liking and Tourist judgements. This result is novel but is not surprising. For instance, although symmetry reflects a perceptual organisation, which contributes to individuals' greater aesthetic appreciation of a variety of visual stimuli (al-Rifaie et al., 2017; Grammer & Thornhill, 1994;

Jennath & Nidhish, 2016; Rhodes, 2006; Tinio, et al., 2013;), it should be noted that in some cases symmetry is not the primary source of beauty (Leder et al., 2019; McManus, 2005). Furthermore, this finding might be supported by neuroimaging evidence that beauty and symmetry judgements (in the case of geometrical shapes) do not share the same neural substrates (Jacobsen et al., 2006). In fact, aesthetic judgements of beauty seem to engage the left temporal pole and the temporo-parietal junction, which generally underlie evaluative judgements. In contrast, symmetry judgements seem to elicit specific activations in several areas concerned with visuospatial analysis, including dorsal premotor cortex, superior parietal lobule and intraparietal sulcus (Schubotz & von Cramon, 2003; Wager & Smith, 2003). Accordingly, one might expect that symmetry structure of complex tourist destination images might not be necessary in triggering the observer's aesthetic emotional experience or their desire to visit a destination.

Nevertheless, the current work suggests that other dimensions than symmetry might exert a stronger influence when making tourist judgements. Indeed, one's evaluation of real-world stimuli, i.e., a tourist destination could be driven by the observer's sensorimotor experience (Leder et al., 2004), as well as their attitude and sense of engagement rather than low-level, perceptual features of a destination image, thus supporting the embodied nature of the tourist's experience (Larsen, 2005; Scarles, 2009). According to this view, our results lend support to the idea of an observer's multisensory apprehension of tourist destination images (Crouch, 2002), according to which the tourist experience might go beyond a pure aesthetic features evaluation to instead incorporate multisensory and motor mechanisms (Cattaneo, 2020; Chatterjee & Vartanian, 2014; Di Dio et al., 2006; Di Dio & Gallese, 2009; Ferretti, 2021; Gallese & Freedberg, 2007).

Despite the contributions, it is important to acknowledge the limitations of this study. First, although comparing the impact of embodied components on liking and tourist

judgements of destination images of natural vs. urban environments was not the main objective of this investigation, yet we cannot exclude that other aesthetic visual properties (i.e., "scenery/viewing") of a natural vs. urban destination might have differently affected participants' subjective ratings of liking and intention to visit a place. For instance, although it is well known that natural environments are consistently preferred to urban environments and judged as more beautiful (Hartig, 1993; Maulan et al., 2006), a recent study by Kirillova and colleagues (2014) suggests that people tend to prefer more nature-based destinations with little human presence, whilst they perceive urban destinations as less beautiful if they are not populous. Accordingly, it might be the case that the tourist experience, which results from the combination of aesthetic visual properties together with the observer's sense of bodily presence and exploration, might not be necessarily the same when comparing nature-based to urban destinations. **It should be noted that carrying out a comparison between natural and urban images would involve some requirements which were beyond the main objectives of the present study. Firstly, the visual stimuli should be more strictly categorized into natural and, even more importantly, urban environments: also, the urban environment could be of different types (e.g., a street, a cityscape, a green space), thus requiring more accurate categorisation (Aspinall et al., 2013). For this reason, the sample of participants should also be more controlled, since different tourists embrace different environments such as destinations (Plog, 2001) in response to a subjective novelty effect (Kirillova et al., 2014). Nevertheless, by carrying a comparison between urban and natural environments by selecting a subset of 10 urban and 10 natural images, which followed a strict selection criterion based on the presence (urban) versus absence (natural) of human artefacts, we show that results obtained substantially overlap with those obtained from the whole set of images.**

Future research is encouraged to investigate the impact of embodiment components—in conjunction with the aesthetic visual properties of natural and urban landscapes—on tourists' likings and judgements, controlling for both the visual stimuli and personality variability among participants. Second, it should be noted that low-level CNN features that could affect Liking and Tourist judgements examined in this study were predominantly grounded on visual regularity (Symmetry, Self-similarity and Mean variance). Therefore, the current study failed to account for the role of other aesthetic image qualities, for e.g., colours pattern and harmony, sharpness, saturation, contrast, and anisotropy (Amirshahi et al., 2016; Lu et al., 2014; Redies et al., 2012; Yu et al., 2020), all of which might have affected people' appreciation and willingness to visit a destination. Therefore, future studies should examine the contribution of additional low-level properties on aesthetic and preference for tourist destination images. Besides, individual differences in socio-demographic characteristics, for e.g., age and ethnicity might also have significantly influenced perceptual/cognitive and affective evaluations of TDI (Baloglu & McCleary, 1999), as well as the aesthetic experience of a visited place (Kirillova & Letho, 2014). Further outlooks into perceptual and embodied mechanisms underpinning aesthetic preference and tourist destination choice may extend to a wider age sample and/or to other personal and socio-demographic characteristics.

Finally, since the study was conducted during the lockdown due to the COVID-19 pandemic, we cannot exclude that while in isolation, participants' browsing of tourist destination websites may have increased, as they dreamt of being elsewhere instead of being confined to their own premises. In turn, this could have had an impact on participants' aesthetic and tourist intention responses. Alternatively, it might be the case that negative influence of the COVID-19 on potential tourist's perceived risk might have decreased their intention to travel during the pandemic (see for e.g., the studies of

Xie et al., 2021 and Jin et al., 2021 on Chinese travellers; Pappas (2021) and Pappas and Glyptou (2021) on adult residents of Athens; and Perić et al., 2021 on Serbian travellers). Further research is suggested to expand the scope of our investigation by examining the moderating effect of participants' experience linked to COVID-19 in aesthetic and tourist judgements in the formation of tourist destination images.

Nonetheless, this study represents a pioneering effort to empirically address the role of embodiment dimensions in aesthetic and tourist experience. Accordingly, we suggest that a deep understanding of the tourist's experience must not disregard the role of the 'Embodied Tourist' according to which the tourist's multisensory body is an active element of the process, which starts even before the tourist visits that destination and experience it. In other words, embodied tourism might allow a unique 'appreciator-object' coupling whereby the potential tourist is fully immersed, with all their senses, in a destination, in pursuit of a novel interactive experience. As such, it must be considered an exceptional process, which may partially share its attributes with the aesthetic experience of art works.

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Table 1

Results Obtained By a Principal Component Analysis of the Embodiment and Symmetry Variables

Variable	Component Loading		
	C1	C2	C3
Presence	**1.03**	-.02	-.07
Exploration	**.74**	.10	.23
Completion	.00	**1.01**	-.01
Symmetry	.01	.00	**.99**

Note. The extraction method was Direct Oblimin Rotation.

PCA loadings > |.50| are indicated in bold.

Table 2

Descriptive Statistics and Bivariate Correlations between All Subjective Variables of Embodiment, Symmetry, Liking and Tourist Judgements

Variable	M	SD	(1)	(2)	(3)	(4)	(5)	(6)
(1) Presence	60.73	17.19	—					
(2) Exploration	56.93	17.72	.84*	—				
(3) Completion	57.52	16.40	.53*	.62*	—			
(4) Symmetry	53.58	16.13	.55*	.70*	.52*	—		
(5) Liking Judgement	63.11	13.40	.84*	.87*	.56*	.62*	—	
(6) Tourist Judgement	62.48	13.84	.86*	.88*	.61*	.58*	.95*	—

Note. M: Mean. SD: Standard Deviation. *$p < .001$, two-tailed.

Table 3

Multiple Regressions Predicting Liking and Tourist Judgements

Variable	Unstd. ß	*SE*	Std. ß	*t*	*p*
a. Outcome Variable: Liking Judgement					
Constant	19.91	2.31		8.63	.00
Presence_Exploration	.68	.05	.85	14.20	.00
Completion	.01	.04	.02	.32	.75
Symmetry	.05	.05	.05	.98	.33
b. Outcome Variable: Tourist Judgement					
Constant	16.88	2.23		7.58	.00
Presence_Exploration	.71	.05	.86	15.46	.00
Completion	.09	.04	.11	2.16	.03
Symmetry	-.03	.05	-.04	-.67	.50

Note. $N = 121$

Table 4

Bivariate Correlations between the CNN Features and Subjective Symmetry

Variable	(1)	(2)	(3)	(4)	(5)	(6)
(1) Self-Similarity	—					
(2) Mean Variance	-.79**	—				
(3) Symmetry - left/right	-.46*	.39**	—			
(4) Symmetry - up/down	.43**	-.69**	-.02	—		
(5) Symmetry - rotational	.39**	-.66**	.12	.97**	—	
(6) Symmetry - subjective	-.39**	.36*	.55**	-.07	-.02	—

Note. $*p < .05$. $**p < .001$, two-tailed.

Table 5

Multiple Regression predicting Subjective Symmetry

Variable	Unstd. ß	*SE*	Std. ß	*t*	*p*
Outcome Variable: Subjective Symmetry					
Constant	35.96	16.22		2.22	.03
Self-similarity	-16.85	12.88	-.18	-1.31	.20
Symmetry - left/right	58.16	16.76	.47	3.47	.00

Note. N = 50. Mean variance was removed from the model due to multicollinearity problem.

Figure Captions:

Figure 1: *Sample of Images Dataset, in (A) landscape and (B) portrait orientation.*

Figure 2: *Scree Plot of Principal Component Analysis. Note. Graph of the scree test in Principal Component Analysis. In line with Cattell's (1966) criteria, the elbow of the curve is included in determining the number of components selected for the analysis (i.e., C1, C2, C3).*