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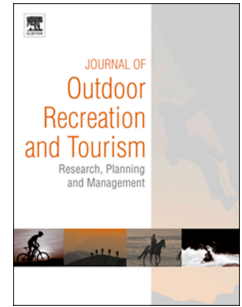
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Doubles, drops and ditches: Deconstructing the art of the mountain bike trail-builder

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Managerial Implications

1. Communication with stakeholders and the wider community is key, along with understanding the 'big picture'.
2. Make the trail 'fit' the landscape and ensure the result looks and feels 'natural'. Trail builds should aim for a more sustainable construction.
3. To enable mountain bikers to have optimal experiences trails need to be designed to 'flow'. This has managerial consequences, as reducing the need to brake helps to cut trail maintenance..
4. Ensure the trails have the right balance between thrill and safety, controlling people's speed - without them realising it – with appropriate sight lines and signposting.

Abstract

Mountain biking's sustained popularity determines a need for greater purpose-built infrastructure as a stage for riders' performance, even if these domesticated spaces may create a rather inauthentic experience compared to the challenges of the 'great outdoors'. While ever more bike parks and trail centres are being constructed, there is little known about how the trail builder forges an unforgettable riding experience. To address this lacuna, the authors interviewed professional trail builders from Scotland and Germany in a qualitative study design that explored key design elements. These ranged from appreciation of the big picture to more directed considerations of a trail build that needs to balance the management of risk with the construction of a trail explicitly created to entertain, challenge and thrill. The findings illustrate how these experience co-creators approach a new trail build through a focused understanding of user needs and developing the affinity for the environment that facilitates the construction of trails that don't fight the terrain, but 'fit' into the landscape and engender a more natural feel to the trail. Also paramount is the need to provide sufficient physical and psychological challenge to avoid ennui and set the stage, through the highly rhythmic riding of flowing trails, for the intrinsic reward of optimal experiences. While there is a certain irony in ensuring safety for recreationalists for whom battle scars can be a badge of honour, the trail builder needs to ensure that ultimately the riders are being subtly orchestrated without it detracting from their trail experience.

Key Words

Mountain biking; trail building; flow; sustainable trails; experience; safety.

Management Implications

1. Communication with stakeholders and the wider community is key, along with understanding the 'big picture'.
2. Make the trail 'fit' the landscape and ensure the result looks and feels 'natural'. Trail builds should aim for a more sustainable construction.
3. To enable mountain bikers to have optimal experiences trails need to be designed to 'flow'. This has managerial consequences, as reducing the need to brake helps to cut trail maintenance.
4. Ensure the trails have the right balance between thrill and safety, controlling people's speed - without them realising it – with appropriate sight lines and signposting.

Introduction

The continuing popularity of mountain biking has created and sustained demand for enclavic spaces, "enabling participants to perform [their] identities" (King and Church, 2015: 289), a move away from more traditional recreational goals of quiet enjoyment and contemplation (Miller *et al.*, 2001). This has prompted a disjuncture of 'experience landscapes' (Gibbs and Holloway, 2018): wilder, more natural settings, and a 'domesticated outdoors', the latter manifest in the development of purpose-built infrastructure for mountain bikers (Brown, 2013).

To meet this demand significant investment has been ploughed into this recreational fabric (Gibbs and Holloway, 2018), predicated upon the realisation that these recreational activities can serve as a stage for personal performance (Clope and Perkins, 1998), encourage active lifestyles (King and Church, 2019) and be an important tool for revitalising rural economies (Costa and Chalip, 2005).

As well as generating significant incomes for local businesses, the development of such facilities can help to divert bikers from other areas where sustainability questions are posed: damage to fragile ecosystems or the creation of conflict with other users (Mosedale, 2003) on public rights of way. These rights of way – generally if erroneously termed ‘natural trails’ – and purpose-built trail centres are both popular with mountain bikers, but their ‘dichotomy of characteristics’ (Taylor, 2010) determines that “in general they are considered to fill different sorts of needs and purposes” (Fitzgerald, 2012: 115). Brown (2014: 25) goes further, suggesting an asymmetric causal relationship as “the proliferation of trail centres is a renewed impetus for riding in ‘wilder’ and more ‘natural’ places”.

As experienced riders may have a preference for rights of way (Fitzgerald, 2012: 115), it is clear that purpose-built facilities may not be universally loved by mountain bikers. Their relative control and predictability suffer accusations of McDisneyization (Ritzer and Liska, 1997), and the provision of cafés and family-friendly facilities at many centres serves to reinforce these charges of experience ‘commodification’ (Taylor, 2010). These arenas are also often confined to often aesthetically unappealing plantation forest settings (Fitzgerald, 2012) and rendered “divorced from more ‘authentic’ outdoor experiences” (Gibbs and Holloway, 2018: 250). Mountain bikers used only to the ‘domesticated outdoors’ may ultimately lack “the capacity to behave ‘responsibly’ in wilder outdoors” (Brown, 2013: 15).

The fact that the UK’s first trail centre opened in 1996 and that by 2018 there were at least 67 such centres (Gibbs and Holloway, 2018) suggests, however, increasing and enduring popularity. For many their accessibility (Taylor, 2017) is key: in our hypermodern lives (Varley and Semple, 2015), trail centres offer convenience, a “quick hit of exercise and adrenalin” (Taylor, 2010; 268) for ‘time-pressured participants’ (Brown, 2014). These centres have been designed with thrilling riding in mind, these commodified playgrounds almost guaranteeing a positive affective experience (Brown, 2013). The terminology of ‘playground’ is apposite, as trail centres are ‘places of play’ (Brown, 2014), enabling participants to forget the mundanity of everyday lives and just act ‘like a kid’ (Taylor, 2010). Their trails are designed with “features not readily found on... ‘natural’ trails” (Gibbs and Holloway, 2018: 250), conducting feelings of challenge and satisfaction, albeit on trails that are generally bereft of ‘nasty surprises’ (Fitzgerald, 2012).

Trails are graded using a systematic rating system adopted from international ski areas, albeit with some regional variance (Jacobs et al. (2014); these serve, on paper at least, to homogenise technical skills (Gibbs and Holloway, 2018). Although trails were initially constructed for more experienced riders (Taylor, 2017), more recently trails have been designed with broader participation in mind (Brown, 2014). Cognisance of the intended technicalities allows bikers to “ride hard and fast, knowing that the trail has been built and maintained to a standard” (Fitzgerald, 2012: 47). Safe in the knowledge that many trails are uni-directional and devoid of competing trail users (Taylor, 2010), riders can ‘let rip’ and embrace terrain and surfaces conducive to optimal experiences (Brown, 2013).

How do trail builders design and construct trails to facilitate and enable these experiences? Dissecting the trail builder’s art has been the subject of little direct scholarly attention, research generally marginalising their role. Yet the development of tracks gifts the trail builder with “a particular geographical imagination that has a feel for how existing landscape features can be built into a new section of trail” (Gibbs and Holloway, 2018: 251). Trail builders therefore play an instrumental role, “carefully crafting the terrain into the shapes and surfaces” (Brown, 2013: 14), and harnessing and manipulating the landscape to create a trail that satisfies a swathe of personal motivations (Taylor, 2010).

Drawing from semi-structured interviews undertaken in Germany and Scotland, the purpose of this paper is to further our understanding of the role of these experience 'co-creators' (Gibbs and Holloway, 2018) through an interrogation of the design and construction of mountain biking tracks at purpose-built trail centres as the stage for this personal performance.

Literature Review

To contextualise the ensuing discussion and enable an understanding of how mountain bike trails are designed and constructed to challenge and entertain riders, a broad range of associated issues are considered. This focussing process commences with comprehension of what motivates people to participate in mountain biking.

Motivations for mountain biking

Recreational mountain biking is an activity that has few extrinsic rewards, and people do not generally enjoy the sport for rational reasons; with the notable exception of exercise, people take part predominantly for personal satisfaction and intrinsic benefits (see: Chiu and Kriwoken, 2003; Skår et al., 2008; Taylor, 2010; Devine, 2012). While mountain biking can foster feelings of subjective eudaemonic well-being through 'contact with nature' (Houge Mackenzie and Hodge, 2020), it can often be a hedonistic experience, one of the principal aims of such adventurous pursuits (Cater, 2006). On purpose-built trails mountain bikers are effectively encouraged to 'play', almost eschewing responsibility (Brown et al, 2008) and divesting themselves of the "mundane duties of adulthood" (Roberts, 1995: 35). Consequently, thrill has been found to be a key motivation for mountain bikers and is actively sought in a ride or trail, unlike the deliberate seeking of risk that has traditionally defined adventure recreation (Ewert, 1989), even it is acknowledged that a degree of risk can be a desirable experiential element (Taylor, 2010).

Undoubtedly, people's motivations to participate in mountain biking do change with increasing levels of experience. As bikers become more engaged in mountain biking mastering the challenges presented by a technical trail, physiological or psychological, takes on greater importance (Cessford, 1995). Similarly, as their skill levels increase, some of their preferences with regards to trail characteristics change (Symmonds et al., 2000), to the more testing topography or technical features that can characterise trails purpose-built for mountain biking.

Preferences for purpose-built or traditional trails

To satisfy motivations for mountain biking participation, riders "search for settings which will allow them to behave in the ways they desire" (Schreyer et al., 1985: 16), an arena for their personal performance. With purpose-built trail centres continuing to be developed for mountain biking, their advantages and weaknesses are keenly debated. Traditional trails, typified by public rights of way, have a number of characteristics of their own that make them desirable settings, including a more organic feel to their naturally evolving trail surfaces and the challenge of self-navigation (Fitzgerald, 2012). Others prefer their more natural settings (Goefft and Alder, 2000), and they "can often feel more adventurous, with a destination as a focus and an element of the unknown" (Taylor, 2017: 9). It has been suggested that mountain biking on traditional trails might be defined in terms of more cerebral motivations (Taylor, 2010) such as exploration, immersion in nature and opportunities for mental catharsis.

Trail centres, conversely, can satisfy different motivations, most notably in terms of a rider experience enhanced by having a variety of waymarked trails purpose-built for mountain biking, with "features not readily found on so-called 'natural' trails" (Gibbs and Holloway, 2017: 250). Their

accessibility is underpinned by their ‘all-weatheriness’, granted by their generally better drainage and trail maintenance and settings less prone to the vagaries of the weather (Fitzgerald, 2012). Segregation from other users enables bikers to satisfy their dynamic motivations without concerns of conflict. It is clear that tension does still exist between mountain bikers and other user groups (Taylor and Brendehaug, 2015), even if they share similar motivations for being in the outdoors (Brown *et al.*, 2008). The motivations for using these domesticated spaces have broadened considerably as consumers today often demand sophisticated facilities, such as cafés and shops; many riders considered such facilities desirable (Taylor, 2017), albeit subsidiary to the characteristics and features of the trails and the riding experience (Gajda, 2008).

Desired trail characteristics

As “the most sought-after experience among mountain bik[ers]” (Gajda, 2008: 37), ‘singletrack’, defined as “a trail or pathway that is only wide enough to accommodate users travelling in single file” (Koepke, 2005: 3), is arguably the most desired attribute of a trail (Goefl and Alder, 2000; Bowker and English, 2002). Devine (2012) also found that favoured tracks are technical singletrack trails with a variety of obstacles, which add to the experience (Symmonds *et al.*, 2000). The desired attributes of trails unsurprisingly change with the rising skill level of riders, experienced riders in particular seeking the challenging nature of singletrack trails (Cessford, 1995; Fitzgerald, 2012). Table One unpicks some of the more popular trail argot.

Berm	A bermed corner is where the corner is built up higher on the outside of the corner than it is on the inside
Boardwalk	Refers to a trail that has been raised up above the ground, generally using wood, to avoid a boggy section
Ditch	These are designed to allow water to drain off the trail efficiently, so it doesn’t turn into a river
Double	Effectively a jump, with a take-off and a landing, where the middle ground in between has been dug out - so there is no safe rolling option, you must jump
Drop	A drop is where the trail falls away sharply, and you have to carry enough speed to allow both wheels to hit the landing at the same time
Rock garden	A section with lots of head-sized rocks in, or on, the track
Switchback	Where the trail turns 180 degrees on a tight corner

Table One: Popular Trail Jargon (H+I Adventures (no date))

Goefl and Alder (2001) concluded in their literature review that there are two highly desired trail attributes: a natural setting and a variety of trail attributes, such as slopes and curves. These correlate to findings in later studies (Gajda, 2008; Rowsell, 2012), that also highlighted the importance of having a variety of different tracks within a single destination (Gajda, 2008; Taylor, 2010). Purpose-built trails that are well mapped and signposted help to create an accessible riding experience, devoid of the need for the knowledge or skill for backcountry riding, and maintain an uninterrupted trail flow (Rowsell, 2012).

The flow of a trail

This term ‘flow’ is one that is often used by mountain bikers themselves, generally used to describe what would be for many riders an idealised trail: smooth, fast and flowing singletrack (Taylor, 2010; Rowsell, 2012). Conversely, scholars in the outdoor recreation field are more likely to understand ‘flow’ in terms of Csikszentmihalyi’s (1975: 36) theory, that “holistic sensation that people feel when they act with total involvement”, and which can reward participants in outdoor recreational activities, that may have few extrinsic dividends (Csikszentmihalyi and Csikszentmihalyi, 1990). Flow continues to be empirically examined in a broad range of recent recreational applications (for example, Tsaur et al. (2015); Cheng and Lu (2015); Cater et al. (2020)). More directly relevant, Taylor and Carr (forthcoming) suggest that bikers can experience feelings akin to flow, without actively seeking it, although the authors acknowledge that many bikers might not be able to fully elucidate what it is they are actually experiencing. Other authors in this field have also recognised the inherent difficulty in such articulation (Dodson, 1996; Brown *et al.*, 2008).

There is, however, a relationship between ‘flow’ and ‘flowy or flowing singletrack’ (Taylor and Carr, forthcoming), explained in terms of flowing trails being characterised by relatively smooth surfaces (Rowsell, 2012) that create the desirable rhythm that might facilitate some of the characteristics of flow (Taylor, 2010). It is this rhythm that is argued to be more likely to induce the core elements of flow, as the uninterrupted nature of smooth trails enables the necessary unconscious sense of control over actions (Taylor and Carr, forthcoming), and participant skill level matched to the challenge ahead. The narrowness of these trails can demand direct handling skills and create a heightened sense of interaction with both the immediacy of the scenery and the nature of the trail (Taylor, 2010). It is this combination of trail characteristics, settings and features that create a great mountain bike experience (Symmonds et al., 2000; Rowsell, 2012), and which the trail builder seeks to incorporate in new trail design.

The trail builder’s relationship with nature

Moving beyond the dichotomous Cartesian constraints of the nature-culture dualism (Jelinski, 2005), a more recent dialectic suggests ‘hybridisation’, where what was “natural... undergoes transformations and becomes something that is not natural anymore but, at the same time, not completely artificial either” (Possamai, 2013: 840). The trail builder must successfully negotiate with nature as they “tune themselves to the landscape” (Cherrington and Black, 2020: 83), dissecting an area’s history to enable an understanding of how the terrain can be embraced, or even celebrated, in the trail design and construction process (Black and Cherrington, forthcoming).

Understanding and making sense of the landscape (Brown, 2013) are at the core of this process, and the trail builder’s relationship with nature determines how the qualities of the landscape will be utilised or enhanced, or even subsumed. This connection will shape how such human agency will affect the environment, and how the environment in turn impacts upon the results of the trail builder’s labour. It is not just the visual aesthetics that pertain here, but the more somatic elements of the mountain bike experience – how riders bodily engage with the terrain (Brown, 2014) – and the trail builder’s facilitating role.

This connection to the environment works in a multitude of layers, encompassing not only how the trail fits the landscape and harnesses or ‘enhances’ natural features (IMBA/BLM, 2017), but also how the trail impacts natural processes – erosive forces for example – that can work for or against the trail builder. Natural processes, such as the movement of water or nature’s ability to rebalance itself after disturbance from the shovel, means the trail builder has to understand these processes to take

advantage of their efficiencies (Cherrington and Black, 2020) and mitigate their impacts. Yet nature's 'contingency' (Black and Cherrington, 2020) is something that can never be fully predicted, and the creator is therefore never completely in control of their creation (Cherrington and Black, 2020). *The art of trail-building*

Trail builders have a key role to play in co-creating and imagineering the mountain bike experience (Gibbs and Holloway, 2017). Intending a knowledge base for trail design, it is the emotional components of mountain biking that form the primary focus of Hagen and Boyes (2016) research in New Zealand, interrogating riders' affective responses in the context of their trail preferences. Commensurate with a wealth of research, albeit often conflicting in conclusion, on mountain bikers' effect on the environment (see Taylor and Brendehaug's (2015) synopsis), the authors develop a series of recommendations for trail builders that will also help in "mitigating the negative impacts on mountain biking landscapes and environments" (Hagen and Boyes, 2016: 97).

From an industry perspective, the International Mountain Bicycling Association and Bureau of Land Management (2017) present arguably the most comprehensive guide to improving the design and construction of mountain bike trails, recognising the impact these have on the rider's experience. This is practically realised through the application of 'outcomes-focussed recreation management', which recognises that obtaining "specific recreational outcomes is highly dependent on the presence of the physical, social, and operational setting characteristics that support those outcomes" (IMBA/BLM, 2017: 26). The result is a framework for structuring trail design; it is consideration of these setting characteristics that form the basis for much of the discursive component of this paper.

While the work of Brown (2014) and Gibbs and Holloway (2018), for example, examines purpose-built trail centres as experience landscapes, and the various works of Cherrington and Black unpack the trail builder's nature relations, we argue that little or no scholarly attention has been devoted to the how the various elements of the trail build are deconstructed, from initial landscape appraisal to the implementation of trails as these performative arenas.

Research Method

The mountain biking scene in Scotland and Germany

In Scotland, mountain biking arguably started to capture wider imagination with the development of the 7Stanes mountain biking centres. Co-financed by the European Union, the purpose-built trail centres were developed in 2001 as a recovery response to the foot and mouth outbreak. Around £3.6 million was spent between 2001 and 2008 on the development on the 7Stanes (EKOS and Tourism Resources Company, 2007). The result has been nearly 400,000 visitors per year, making them one of the most popular tourist attractions in Scotland (ibid.), and prompting Taylor (2017: 10) to opine that "few would argue that the 7Stanes weren't the single greatest driver for the popularisation of mountain biking in Scotland at the start of this century". Consequently, a range of private organisations and public agencies, most notably Forestry and Land Scotland, started to develop centres across Scotland, in line with their development strategies. Initially trail centres were generally sited in more rural areas, "co-existing with productivist forestry landscapes" (Gibbs and Holloway, 2018: 251), but increasingly have been developed closer to urban centres.

While mountain biking is very popular in Germany, there are very few trail centres (Sobek et al., 2018). There are several bike parks and trails in the alpine regions that were constructed on private land, but there are legal and land owner issues that prevent the building of trail networks (Gebhard, 2018). While hiking and biking are allowed for recreational purposes in German forests, land owners can be held responsible for accidents and injuries of mountain bikers on their grounds. They have to

guarantee a safe passage on the trails for all trespassers; building trails is therefore seen as critical (Gebhard, 2018). With no mountain bike trails in place many bikers ride on established hiking trails or build illegal trails in the forests. This leads to conflicts on the trails and to environmental issues, which have given rise to a negative image and reputation of mountain biking in society. The last few years have seen a few smaller trail networks on common grounds where individuals have taken responsibility for the trails and their maintenance (Rieger and Sand, 2018). This study gives useful insights into the key elements of mountain bike trails that need to be taken into consideration when building trail networks in Germany going forward.

Study design

Qualitative research was undertaken, in order to learn important characteristics of mountain bike trail design and how to overcome challenges during the building process. Structured interviews were held with trail builders from Germany and Scotland to gain insights into the art of trail building and relevant parameters of mountain bike trails. The interviews were held with three professional trail builders from each of the two countries. The aim was to interview experts from a country that had developed a purpose-built, linked network of trail centres (Scotland) and a country that, while having some small trail centres, is in the early stages of building a trail network (Germany). There is only a limited number of professional trail builders in both Scotland and Germany, and the number of interviews undertaken is therefore considered to be a representative sample. The study focussed on mountain bike trails where riders need to climb the uphill for the reward of the descent, positioned at the nexus of the overlapping typologies of trail riding and cross-country riding (Cycleguard, 2017), rather than gravity-fed downhill riding which dictates, in part, different design parameters. The trail builders were purposively selected by the researchers from their existing contacts, and by snowball recommendations through this network. Several years of experience in trail building and a good knowledge of the current trends in mountain biking, and of the trail building sector in the respective country, were the selection criteria. All the trail builders that were approached agreed to take part in the study. The interviews were held between November 2015 and March 2016, either in person or via Skype; the duration of the interviews ranged between 25 and 55 minutes.

Structuring the interview questions

To determine the scope of the interview questions discussions were held between the authors, and selected experts not included in the study were invited to give input and feedback; as a result, a few questions were added, others eliminated. The final interview guide included 17 questions with sub-questions and probes. As an icebreaker the trail builders were asked about their favourite trail and what, in their opinion, makes a great trail. The following questions focused on the trail building itself. The experts were invited to explain how they approach a new trail build, how the landscape influences the process of building, and how the disparate needs of the average experienced cross-country/trail rider and less experienced riders are accommodated. An important question, given its importance to riders (Taylor and Carr, forthcoming) was about 'flow', eliciting the trail builder's understanding of the term, its importance for the mountain biking experience and how they can generate flow by shaping the trail. The trail builders were also asked how they balance the often-conflicting needs of providing a thrilling ride versus a reasonably safe experience, and when planning tracks how do they make sure that mountain bikers don't conflict with hikers on the trail for example.

Other questions focused on subjects such as the disadvantages of purpose-built trails and how these can be overcome, designing uphill sections, the importance of trailhead facilities, and how purpose-

built trail centres are funded and can make themselves financially sustainable. This broad scope, and the quantity of findings, determined that for the purposes of this paper the authors needed to distil the focus, and centre their attention on questions that related to the nature of trail building process itself, and not be distracted by what were considered to be ancillary, if interesting, issues.

Content analysis

Having transcribed the interviews a conventional content analysis, derived from Hsieh and Shannon (2005), was undertaken. First, each author made repeated, close readings of their transcriptions, to identify and highlight key-themes and sub-themes for each response. Most of the core themes fitted the correlative question; some responses, however, were deemed to be more appropriate to another question, and transferred accordingly. The responses from all interviewees were then combined into a single document and discussed between the authors, to ensure that these themes accurately represented the responses. Critical reflection by the authors sought to confirm that the chosen themes correctly reflected the research questions. Essential quotes from the trail builders, using pseudonyms, were highlighted to give depth, flavour and meaning to the ensuing discussion of results, presented according to the main themes of the content analysis.

Discussion of Findings

The narrative flow in the discussion of findings echoes the trail builder's method, from the initial approach and assimilation of the landscape's form and influence to the implementation of a trail design ethos that balances the risk management engineered into the 'domesticated' outdoors with the creation of a trail explicitly created to thrill. This broadly logical sequence naturally commences with how trail builders initiate design and implementation.

Initiating a trail build

When approaching a new commission, in order to ascertain and comprehend the range of generic and setting-specific issues, from landscape to community involvement, most of the interviewees stated that communication was the most important first step, to understand "what people want, like and wish to experience and then how to construct the landscape so that these desires are met" (Gibbs and Holloway, 2018: 251). This allows wider recreational objectives and specific trail user objectives to be identified (IMBA/BLM, 2017). As Mark explained:

The important factors for me are planning and communication. I come across so many [trail builds] that haven't really been thought through or haven't really been communicated to other stakeholders... You create a problem for yourself.

Terry verified the importance of liaising with the players involved:

First of all I try to get to know the people behind it, the community behind it and the communities surrounding the project, to get a good understanding of what they want, but not just what they want but what is going to work best for them.

He sounded a note of caution though, believing that as the people who want to develop the project are often competent bikers themselves, "often then what people want and what they need are different things", as these riders "are at the slightly pointy end of the performance pyramid if you want to call it that". Earlier trail centres were aimed at the more experienced rider (Taylor, 2017) and this 'needs analysis' highlights the importance of building trails for a wider market. Therefore, possibilities and ideas need to be discussed with the customer to meet the needs of both parties. Hans raises a point that is particularly important in Germany at the moment (Gebhard, 2018): "other

aspects are important, too, such as land owners, public authorities; they have to allow the trail to be built.”

Trail builders in both Germany and Scotland agreed that it is important to take a good look at the area and its topography before starting a trail build, to develop an affinity for the landscape (Cherrington and Black, 2020). Martin explains: “I try to make myself familiar with the topography for a few days and I look how the hills are arranged, how the altitude differences are distributed, how do I get from A to B.” While Henry conceded that “if I’m following a document that been designed by somebody else that’s what you have to do”, generally the next stage is to assess the “big picture... thinking about the size, access, not just for riders but also construction, gradient, water and drainage, conservation issues” (Terry). Having dealt with this ‘big picture stuff’, thoughts turn to how that it will all coalesce. As well as construction of the trail, this entails thinking about secondary factors, such as the associated infrastructure: “where are people going to park or wash their bikes” (Terry). While more sophisticated amenities such as a bike shop or café may to some represent the nadir of these “overtly commodified spaces” (Gibbs and Holloway, 2018: 250), it is clear, in the UK at least, that many mountain bikers are demanding consumers, and facilities such as a café can “help to reinforce mountain biking as both a ‘community’ and a sociable recreational activity” (Taylor, 2017: 11).

Harmony with the landscape

Many of the participants expressed the opinion that while trails can in theory be built anywhere, “the landscape influences the trail building process strongly” (Klaus), and trails should be appropriate to the terrain and soils (IMBA/BLM, 2017). The importance of making the trail integrate into the landscape resonated with Henry: “the key issue is... making it appropriate to the landscape it’s being built in”. Across the board trail builders do not like to “fight the terrain” (Mark), as verified by Terry:

In a lot of cases [the landscape] influences it massively, so if you’re looking at forest situations, you’re working with the landscape to have as light a touch as possible, and really augmenting the landscape as much as possible.

Both Terry and Mark repeatedly used the word ‘natural’ to explain how they wanted both the result to look and how the actual build process itself should ideally be: “if it doesn’t fit into the topography you don’t want to be superimposing it” (Mark). This suggests “using natural features and adding bits in here and there to add something to the experience” (Terry).

Commensurate with the nature-culture hybridisation (Possamai, 2013), in terms of construction Mark feels: “it’s making that naturally fit into the topography, and the construction should match the existing geology as well, so at Dalby [UK], for example, we’ve made it with local material”. While acknowledging that local materials might not be the best possible material, they can make the trails more natural looking, as well as more making construction more ‘sustainable’ (IMBA/BLM, 2017). The importance of an ethical, sustainable build is echoed by Terry:

Ideally I don’t want to be coming in with bulldozers and making a mess and changing it because ultimately mountain biking is a sport where you are out and about in the landscape, and feeling part of the landscape is part of it.

Other techniques can be employed to impart a more natural feel to the trail, ‘vegging up’ (Cherrington and Black, 2020) for example, to encourage regrowth of plant around the trails.

Utilizing the terrain to your advantage and to showcase the area, however, are what can help make a great trail. Hans believes: “basically good trails can be built even if the landscape is not perfect.” And Martin adds: “I can’t imagine anything that you couldn’t build, but it is simply disproportionately expensive and doesn’t make sense with respect to the scenery”. Participants always look for the area where they can build the best trail possible without changing the landscape too much.

The significance of scenery saw divergent responses however. While scenery has been found to be an important element of the mountain bike experience (Gajda, 2008), in other studies (Taylor, 2010; Fitzgerald, 2012) respondents have bemoaned the often-monotonous nature of the ‘plantation’ settings of many purpose-built trails. While Mark felt that “I’d like to think it’s a big part of the experience”, Henry stated that “it should be but it’s not”. For Martin the trails are the most important element: “the bike park itself should make sense and if you can make use of the views and add a view point, then that’s what you should do, if it’s not possible then that’s no big deal”. Scenery, however *is* considered an added bonus, helping to make trails feel more ‘authentic’. Klaus is convinced that if two trails are comparable, the one with great views will be favoured by bikers. While scenery is only considered a key element by some of the trail builders from both countries, they all agreed that trails should fit the landscape and make the most of the existing terrain without changing it completely.

Catering for both experienced and less adventurous riders

Reflecting recent efforts to broaden the appeal of trail centres (Taylor, 2017), Mark has observed the changing nature of the sport, feeling that the “majority of trail riders will ride around drops, bumps and rollers, so we tend to design a lot of those features out now, depending on the grade of the trail”. Interestingly, Terry felt that “what riders ask for is not what they want to ride”, admitting that this discrepancy “creates a challenge for me as a trail builder”.

The competence of many riders to cope with or enjoy the more advanced features was also questioned by Terry: “people often don’t like doubles with a perceived or real gap, it puts them off”. This feeling also pertains to ‘Marmite’ features, which people either love or loathe: “there is a real mixture of people – some really like ‘skinny’ features – log skinnies, that kind of thing – some people absolutely hate them... and just don’t get any satisfaction from it”. While riders in Scotland often don’t use the existing technical features, there are hardly any trails in Germany with purpose-built features. Martin disapproves of these purpose-built technical installations: “I do not see any reason to add purpose-built installations to publicly accessible trail areas, neither because of accountability nor pragmatic nor functional aspects”. Correlative to a common desire to ride in more natural settings (Rowell, 2012), a move towards wanting more ‘natural’ trails appears to be a trend among UK bikers, as Terry explained:

I think that there is a demand for more natural-feeling trails. Over the last five years or less there has been a movement away [from purpose-built trails] and mountain biking was starting to feel very manicured, and they were starting to look for more natural and exposed routes and want to feel they are riding on bedrock rather than ‘kitty litter’.

He felt that to cater for that group he would “build armoured trails rather than surfaced trails. Keep them narrow, natural-feeling but very definitely armoured so they are that bit more sustainable”, even if a truly sustainable trail is impossible (Black and Cherrington, 2020). Reflecting the very personal nature of motivation for riding (Hollenhorst *et al.*, 1995), Klaus felt that “the type of trail still depends on the individual, on the type of biker, some people like difficult trails, I personally like difficult but flowy trails”.

To cater for less-experienced riders it was suggested that “shorter loops with escape routes” (Mark) aid the feeling of security, while having “skills areas, with three or four loops, with features that increase in severity as you go from loop to loop”(Mark) will aid the progression of rider ability. A consensus of opinion from the interviewees confirmed that, while less-experienced riders may be after the same kinds of feelings and psychological rewards as red-trail bikers, with the same opportunities for ‘identity performance’ (King and Church, 2015), the means differ for facilitating those feelings. Terry therefore believes that: “less-experienced riders want to feel like they’re doing all that stuff but they aren’t going to enjoy it if they are actually doing it”.

To enable this perception of achievement and mastery, on relatively non-technical trails and features, Mark feels it’s about them “not getting out of their depth”. Henry agreed that these riders still enjoy berms and rollers, but they “need a bit more width and bit less gradient”. This will enable them, without scaring themselves too much, to “keep the rhythm, easy to keep the momentum going and the flow going” (Terry).

What makes a great trail?

Although previous studies have highlighted the importance of variables such as natural settings and variety of trail features (Goefit and Alder, 2001), three key characteristics of a great trail emerged from the respondents: flow, challenge and a feeling of naturalness. The latter element was explained lucidly by Henry:

I like narrow, natural-feeling trails. If you ride down a natural trail the surface is variable – it goes from hard packed to loose, open material... I don’t like a trail to be all one surface. I like it to change and morph.

A great trail should offer “a good mix between technical challenge, physical challenge and flow” (Klaus), the application of skill to master a challenge being a canon of the flow experience (Taylor and Carr, forthcoming). According to Hans you should be able to ride a trail at speed without taking big risks, and these trails should be “as close to nature as possible and as long as possible and it should be more on the challenging side” (Martin). These sentiments were echoed by Mark, opining that “a great trail for me is one where the designer has used the topography of the landscape, more of a natural feeling trail and that fits into the landscape”. This apparent paradox of creating a ‘natural’ trail (Black and Cherrington, 2020) will diminish over time as the trail ‘beds in’ and nature reclaims the margins.

It was suggested that there is a move these days away from the ‘manicured’ trails more prevalent in the trail builds of the previous decade, to give the rider an experience that is maybe a compromise between purpose-built and ‘natural’ trails, and creates a feeling of being immersed in and attuned to the micro-topographies of the landscape (Brown, 2014). This was qualified by Henry, however: “a great trail is one that feels natural, looks and feels natural, so as long as they have flow...”.

All trail builders emphasised the importance of flow, even if it only occurs in ‘localised moments’ (Hagen and Boyes, 2016). As Henry stated, “flow is king”, adding: “as a rider, flow is that massive fun thing, you ride and everything just slots together. Flow is the key fun thing for riding”. In elucidating his thoughts on flow Terry unknowingly referenced further tenets of Csikszentmihalyi’s (1975) flow theory:

It’s quite a subjective thing. I’m no musician but if I can hark back to that... having a certain rhythm is quite like music, a fast section that keep going, and one section into the next and the next... There are synergies with other action sports, surfing as well. It’s... a certain sweet spot

where it's easy and fast but now and again you have to wake up. That's what I suppose we are hunting for, and you don't mind putting a few pedal strokes in.

Matching skill level to the challenges presented by the trail (Martin and Priest, 1986) plays a large role in experiencing flow, and difficult trails will only allow riders of a higher skill level to experience these kinds of peak experiences. As the 'flow experience is so individual' (Martin) this can perhaps only be achieved by building trails of different levels, so that each rider can choose a suitable one. "We are often in the situation that we are supposed to do magic and conjure up the all-in-one solution that fits every purpose on the mountain" (Martin). While he considers this impossible without compromises, Klaus thinks it is possible to some extent: "this can be done by chicken lines to keep the flow for beginners and the experienced rider can take the difficult line." Hans and Klaus also mentioned the importance of uninterrupted biking, enabling the unconscious control over actions that encapsulates flow experiences (Taylor and Carr, forthcoming); this can be achieved by preventing crossings where possible (Klaus) and "by building trails where you do not have to brake a lot, which means you use compression so that riders are slowed down by uphill passages before bends" (Hans). Creating the opportunities for a flow experience is important to both Scottish and German trail builders, although the desires and preferences of mountain bikers are very different and there is no one perfect trail.

Constructing a flowing trail also has sustainability consequences, "as it saves your trail and reduces your maintenance. You have to design a trail so people can flow around it without excessive braking... Flow stops the trail getting broken up by braking bumps". Clearly, the development of trails with the right ingredients for flow can have more prosaic managerial implications as well as enabling the affective highs that can reward mountain bikers (Taylor, 2010).

Avoiding conflicts with other users of the outdoors

In Scotland in particular, with its liberal outdoor access rights, avoiding conflict between different user groups is an important consideration. Terry and Mark concurred that it is a potential issue that needs to be acknowledged and addressed early in the design process. As Mark stated:

The crucial point is that at the very beginning, when you are planning a trail we have a process whereby anyone who has an interest in that trail, be that a forester, a conservation manager, the engineers, archaeologists, the interest groups, they all have the chance to have some input.

Terry believes that "it comes back to the bigger picture – getting to know the community, getting to know what they want". His rationalisation was a pragmatic one: "the aim of bigger projects is generally to bring more visitors to the area and very, very often the hikers and dog walkers way outnumber mountain bikers... You have to include them". Henry was equally realistic: "you can't keep hikers off purpose-built trails. Mountain bikers who ride there have got to be aware that there may be people walking on there".

One key element that is designed into many trail centres is to create an element of 'social sustainability' (IMBA/BLM, 2017) and, through the development of biking-only trails, obviate at source potential conflict with other users of the outdoors (Taylor and Brendehaug, 2015). Mark admits: "we don't tend to design our mountain bike trails to be multi-use. Once you get to red grade trails they don't make particularly decent walking". Where he has found issues he has "redesigned the trails there to be mountain bike 'looking'. We don't tend to put 'no walking' signs up, but rather 'this is a mountain bike trail' sign, being less negative".

Trail segregation is not always desirable, possible or permitted, however; where trails are co-used by mountain bikers to avoid conflict with hikers “it’s about controlling speed and visibility... You wouldn’t put a trail in at 25%, straight down the fall line, as you know that mountain bikers wouldn’t be able to control their speed if they came across a hiker” (Henry). Martin adds:

The first thing that is essential is clear signposting where everybody knows what the deal is, everybody must get the information to be careful because there is oncoming traffic. Secondly they should be able to see each other. Thirdly the trails should be as wide as possible and if that is not possible then you should have overtaking lanes.

This latter point clearly hints at the compromised nature of shared-use trails, as narrow singletrack has consistently found to be the experienced mountain bikers’ preferred trail type (Fitzgerald, 2012; Zajc and Berzelak, 2016). To avoid conflicts on singletrack the experts agree on two important factors, controlling the speed of riders and sight lines, giving the mountain biker enough time to avoid crashes. .

‘Fast’ and flowing singletrack has been used to describe mountain biking nirvana (Taylor, 2010), but Terry admitted that key to enabling that experience is “managing speed without making the rider feel like they are being managed”. He explained how “the really key thing... is sight lines, making sure that they can see, that they know what’s coming up and that they can make the best decision based on their judgement at the time”. Other studies have highlighted how other elements of the landscape can be employed to control speed, such the proximity of trees to the trail (Hagen and Boyes, 2016), or ‘corrals’: objects, such as rocks, that define the sides of the trail (IMBA/BLM, 2017). At the end of the day, however, “I think that as long as people know who’s using the trail they can co-exist” (Henry).

The trail builders from both countries agree that separate trails for mountain bikers and good signage are important to avoid conflicts. As there are few purpose-built mountain biking-only trails in Germany there is the potential for higher levels of conflict on shared trails. In both countries mountain bikers build their own illegal, ‘guerrilla’ trails (Black and Cherrington, forthcoming), raising ethical, environmental and safety issues – a subject ripe for future research in its own right.

Conclusions

This qualitative study examined the art of mountain bike trail building and sought to provide insights into the key stages of the construction process and the core considerations for creating the challenging, ‘playful’ experience that mountain bikers expect and demand of purpose-built trail infrastructure. Limited scholarly attention has been paid to the role of the trail builder in facilitating the broad range of intrinsic rewards that motivate people to mountain bike.

Here the trail builder plays a pivotal role in manoeuvring the rider through a purpose-built infrastructure that seeks to thrill and entertain trail riders, while cognisant of the risk-avoidance strictures of contemporary society. The trail builder’s brief encompasses a wide range of design considerations that must allow the trail to flow, and in doing so permit desired affective highs, while ensuring that the challenge is broadly commensurate with the skill level of the average rider at any given level. They must also balance hedonic needs with the more prosaic issue of trail sustainability and seek to ensure that the finished product, as far as possible, sits in harmony with the landscape.

The results complement and support existing findings on mountain bike trail characteristics, but they also shed new light on the art of trail building. The findings may not only help to catalyse future trail builds but also raise awareness of the trade in the fields of recreation, tourism and destination

management. The expectations of purpose-built trail centres as destinations do not always match the possibilities of trail building, or indeed the needs, motivations or desires of riders. This paper will hopefully aid comprehension of matching expectations and realities, and how a trail build should be approached and implemented.

It was the intention of this study to understand trail building per se, and the comparative approaches taken by trail builders in different countries may form an interesting future research avenue. No direct comparison between Scotland and Germany was undertaken; while findings demonstrated that there are no substantial differences in terms of trail design or construction, it was clear from responses that Scottish trail building is a more mature industry than in Germany. This is apparent in both the proliferation of purpose-built infrastructure in Scotland and the planning and design of new trails or bike parks. While the desire for trail centres in Germany is rising, there still remain a number of legal and regulatory issues to overcome.

This paper focused on selected aspects on the trail building process itself, the elements that were considered core to the riding experience. The underpinning research also examined other aspects of the trail build felt to be secondary in nature, such as design considerations for uphill trails, desired trailhead facilities, balancing risk and safety and how to make trails and trail centres economically sustainable. These nonetheless important elements may warrant future discourse. It would also be instrumental to test if mountain bikers' feelings are commensurate with the approach taken by the trail designers, building on the work of Hagen and Boyes (2015).

Recognising the limitations of this study, which interviewed trail builders from Germany and Scotland, it might be desirable to verify, or challenge, the results, by enhancing the sample size or interviewing trail builders in disparate locations, to expand the generalisation of the findings. Different climatic conditions may entail diverse approaches, while regional variations may also see alpine regions, such as in the south of Germany, requiring different trail building styles to mid-range mountains and valleys. Further research on the art of trail building could also investigate the tools and materials used in the shaping of the landscape to create flowing trails.

As mountain biking continues to grow in popularity there will remain demand for the type of thrilling and accessible riding encapsulated by the contemporary trail centre, where riders can be relatively certain of the type of experience they will get, even if this engenders it with a certain predictability and domestication (Brown, 2013). Indeed, for the frantic inhabitant of contemporary society they can provide the desired, condensed adrenalin hit (Taylor, 2017), even if cerebral celebrations of place, wildness and elemental vicissitudes are generally absent. The orchestrations of the rider are finely manipulated by the trail builder. Pulling together all necessary design elements, it is their role to create a suitable stage for the rider's performance (King and Church, 2015), balancing the mundane obligations for safety and trail maintenance with the sublime co-creation of the trail experience (Gibbs and Holloway, 2018), that enables the mountain bikers, as one participant put it, to 'feel like heroes'.

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