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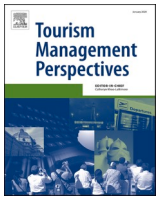

Tourism experiences in motion. Mobile, visual and psychophysiological methods to capture tourists "on the move"

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ABSTRACT

Experience measurement and design have become leading management objectives to ensure destination competitiveness in recent years. This paper applies the user-centred perspective of mobile video ethnography with bio-sensing and facial action coding to study journey experiences – i.e. those tourist experiences happening in motion. The use of mobile, visual and psychophysiological methods represents a novel opportunity to deeper explore physical, sensory, social and emotional shades of tourist experiences. Experience measurement and design in the field of tourist transport has the potential to shape more sustainable and experientially rich forms of mobility. Results show and compare unique features of cycling and motorcycling journeys, highlighting the interface between riding and non-riding tasks, as well as the importance of speed variation and time duration in assessing the relationship with land- and soundscapes.

1. Introduction

The idea of designing exceptional and memorable experiences for consumers has become a leading management objective for tourism research and practice (Aho, 2001; Lugosi & Walls, 2013). However, the understanding of tourist experiences to date is mostly developed around touchpoints, lacking focus on the complex continuum of the customer journey (Lemon, 2016). To date, although it is accepted that tourism travel signifies much more than just an opportunity-cost to reach a destination (Mokhtarian & Salomon, 2001) a body of knowledge on the *experiences* made *in motion*, i.e. by actively travelling in and through a tourist destination, is still missing (Larsen, 2001; Lohmann & Pearce, 2012), leaving a gap in the literature. Perhaps the predominance of a technical approach to transport *for* tourism using the disciplinary lenses of transport geography and planning has been the reason for this gap. Nevertheless, understanding the experiential features of tourists' displacement across space is crucial for sustainable destination management, because it can help to shape attractive *and* low-carbon forms of transport (Scuttari, della Lucia, Martini, 2013), and to reduce the environmental impacts on site (Guiver, Lumsdon, & Weston, 2008; G. Larsen & Guiver, 2013).

The consideration of transport as part of tourism (Les Lumsdon & Page, 2004) implies the inclusion of journey experiences *as* (part of) tourist experiences, and – in some extreme cases – the identification of journey experiences as the main "moving visitor attractions" of a vacation (Les Lumsdon & Page, 2004, p. 6). Understanding tourist experiences in motion requires thereby the development of a set of theoretical and methodological tools to conceptualize the construct of journey experiences and operationalize its measurement *in motion*. In this research, the holistic approach to conceptualize journeys is based on a *multidimensional* perspective on experience (Verhoef et al., 2009), encompassing sensory, affective, cognitive, physical, and social-identity experience components (Schmitt, 1999). The operationalization of its measurement is also based on the awareness that all perceptions and interactions are influenced by motion and should be monitored while on the move, because "a mobile subject demands a mobile method" (Cresswell, 2012, p. 647). To embrace both this multidimensionality and the dynamic perspective of analysis, the paradigmatic shifts within mobilities geographies (Urry, 2007) and experience economy (Pine & Gilmore, 1998, 1999, 2013) offer new theoretical and methodological prospects. Thus, this paper conceptualizes an innovative and user-centred approach to assess journey experiences on motorcycles and bicycles by relying on tourism, transport, mobilities and affective science literature. It integrates approaches of mobile methods, visual ethnography and affect science, measuring journey experiences in transit according to their diverse features. Thus, this research addresses the

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Table 1
A range of approaches from transport and mobility geography, experience economy and affective science used to frame journey experiences in tourism.

Topics	Transport geogr.	Mobilities geogr.	Exp. economy	Affective science
Focus on motion and displacement in time and space	●	●		
Focus on subjective appraisal of reality			●	●
Macro-perspective	●		●	
Micro-perspective		●		●
Dominance of the tangible	●		●	
Dominance of the intangible			●	●
Focus on the system	●		●	
Focus on individual		●		●
Analysis of infrastructural features	●	●		
Analysis of physical, behavioral, emotional features		●	●	●
Constructive sensing (creativity), co-creation		●	●	
Dramaturgical metaphors (staging)		●	●	
Predominance of qquantitative research approaches	●		●	●
Predominance of qualitative research approaches		●	●	●

Source: based on Scuttari (2019).

following question: *How can journey experiences and their physical, sensory, emotional and social features in space and time be described and measured?* Journey experiences are defined here as tourist experiences on the move "made up of processes (social, emotional, sensory and physical)" (Delaney, 2016, p. 6). This definition also reflects the "orchestra model for tourist experience" (Pearce & Zare, 2017), which uses the same dimensions of analysis. The body of literature on tourist experiences, starting with the seminal works of MacCannell (1973) and Cohen (1979), and developing across the last forty years with the contribution of several scholars (e.g. Arnould & Price, 1993; J.-H. Kim, Ritchie, & McCormick, 2011; Kim, Ritchie, Brent, & Tung, 2010; Otto & Ritchie, 1996; Ryan, 1997; Tung & Ritchie, 2011) enriches the background knowledge needed to assess journey experiences, but its detailed review is out of the scope of this paper.

2. Journey experiences defined: physical, sensory, social and emotional features

The definition of journey experiences mentioned above links back to several disciplines and streams of thought, mostly outside the tourism field. Two of them – transport and mobilities geography – relate to the analysis of a physical displacement across space, i.e. the *journey*; the remaining two – experience economy and affective science – focus on the subjective nature of travel, i.e. the *experience* (Scuttari, 2019). Table 1 provides an overview of the commonalities and differences between the four approaches presented and works as a reference for the definition of journey experiences.

At the core of the construct of journey experiences are the mobilities geography (Hannam, Sheller, & Urry, 2006; Sheller & Urry, 2006) and experience economy (Pine & Gilmore, 1998, 1999). Working more as broad frameworks than as established disciplines, both focus on the *performative acts of consumers*, analyzing – mostly qualitatively – the physical, behavioral and emotional features of consumption. They develop at the exact interface between *tangible* elements of reality and *intangible* perceptions of individuals during consumption. Considering this objective-subjective interface, they indirectly introduce the idea of *co-production*: Pine and Gilmore (1999) acknowledge that the method of supply for experiences includes some kind of participation of consumers; mobilities scholars theorize – based on the post-Lefevbrian spatial theorists (e.g., Soja, 2009) – a relational notion of space, created through relationships between environment, individuals and objects while in motion (Hannam et al., 2006). The co-production of journey experiences is peculiar in that it does not focus on business to consumer interfaces only: it rather considers relationships between consumers, with the environment and with specific objects. Hence, the "mobilities" turn and the "performance" turn advocate a renewed attention towards the individual and its behavior, relationships and perceptions, stressing the importance of time and space as mediators of experiential processes at the interface between demand and supply. Experience as a verb means "live through an emotional sensation" (Ek, Larsen, Hornskov, & Mansfeldt, 2008, p. 128), and therefore understanding journey experiences means using process-based perspectives (Lin & Kuo, 2016). The experience economy framework has been applied as a grid to study tourist experiences (see e.g., Mehmetoglu & Engen, 2011; Oh, Fiore, & Jeoung, 2007), as has mobilities research (see e.g., Farías, 2010; Habeck & Broz, 2015; Reeves, 2018).

Two further fields of research help to analyze journey experiences: transport geography, which theorizes a systemic view of transport networks, modes and flows (Shaw & Hesse, 2010; White & Senior, 1991); affective sciences, which investigate the complex and subjective sphere of feelings, and particularly emotions (Davidson, Scherer, & Goldsmith, 2009).

The first contextualizes individual travel journeys into a physical context, enabling a predominantly quantitative description of the transport network structure, the specific features of transport modes and the aggregated information on transport demand. Affective sciences offer methodological tools to assess the emotional features of travel journeys, an underexplored field so far (Larsen, 2001). The assessment of individual (emotional) reactions in motion, and the precise description of the tangible (objective) characteristics of transport supply enable the interpretation of journey experiences as *context-specific, individual and subjective performative acts*. In the upcoming sections, the physical, sensory, social and emotional features of journey experiences are more precisely addressed. The focus is on cycling and motorcycling, two types of travel experience where the rider is actively involved in keeping control of the vehicle and the sensory perceptions are more intense, due to the absence of a cabin (Scuttari, 2019).

2.1. Physical features

Physical features of journey experiences relate both to objects, infrastructures, resources or more generally tangible elements of the individuals, the environment or the transport system. The ways these objects look and interact influences the sensory perceptions of consumers. For instance, the presence of a cabin in a car may inhibit the perception of smells and sounds, the use of sunglasses while travelling by bicycle might change the perception of colours, the shape or steepness of a road might change the sensation of riding a motorcycle. According to Latour (1992, p. 1551), objects can intentionally shape experiences: "artefacts can be deliberately designed to both replace human action and constrain and shape the actions of other humans". Traffic lights (Hornsey, 2016), walking boots (Michael, 2000), and seat belts (Latour, 1992) indeed play an active role in generating travel rhythms and defining interactions among individuals and with the environment. Sometimes, objects work as markers for social identities, e.g. in the case of a chopper motorcyclist and its community; sometimes they can inform individual choices along the journeys, e.g. a GPS tool and its power to enable informed decisions along the way, in relation to anticipated features of the route. According to Urry "networks of

machines, technologies, organisations, texts and actors, constitute scapes: various interconnected nodes along which the flows can be relayed. Such scapes reconfigure the dimensions of time and space" (Urry, 2000, p. 36). Scapes also work as spatial, infrastructural and sometimes institutional moorings (Williams, 2013) or as mediators of travel rhythms (Hornsey, 2016). Similar to this interpretation of the physical features of journey experiences is the marketing concept of servicescape: the "built environment" (Wakefield & Blodgett, 1996, p. 67), or "the man-made, physical surroundings" (van Heerden, Botha, & Durieux, 2009, p. 60).

A crucial element among the physical features of travel is related also to "the way in which the body experiences, perceives and engages in the world" (Delaney, 2016, p. 33), i.e. embodiment. Particularly when using active means of transport, bodies are actively generating and controlling movements and they responsively relate to objects and scapes. Individual (bodily) behaviors and choices are therefore crucial to define and control the travel rhythm, the speed and the safety of the journey. Nevertheless, bodies can also multi-task when they travel. Hence, actions taken to control the vehicle are defined as "main tasks", or "driving tasks" whereas physical actions aimed at other purposes (e.g. the social habit of greeting other vehicles) are referred to as "secondary tasks" (Rodrick, Bhise, & Jothi, 2013, p. 560). The "embodied" nature of travel experiences makes it difficult to investigate and represent these tasks through language only (Spinney, 2015): mobile methods based on the use of visual material are therefore developed to address them, as explained later in the methodological section.

2.2. Sensory features

According to Taylor (2016), the experience of traffic is multisensory, kinaesthetic and vicarious. All five senses are involved – with a predominance of sight and hearing and a marginal inclusion of taste – and the perception of scapes is mediated through a sixth sense, *kinaesthetics*, which "informs one of what the body is doing in space through the sensation of movement registered in the body's joints, muscles, tendons and so on" (Urry, 2001, p. 243). Kinaesthetic perceptions occur also in a flow of visual and tactile sensations (and occasionally of smells and sounds) while in motion. In fact, assert that Carneiro et al., (2015, p.1229) "[l]andscape is not just what can be seen. It is what can be heard (or not heard), it is about the smells and the scent of the countryside" (2015, p. 1229). Hence, soundscapes (or sonic spaces) work as sonorous subjects characterizing a specific place, and they are important descriptors of the atmosphere (Blesser & Salter, 2007). Their perception is often subconscious, because the main focus while travelling is on driving tasks.

Visual, aural, olfactory and tactile elements of experiences can vary among individuals, time and cultures (Classen, 1993; Howes, 1991; Howes & Classen, 2014), so that the sensory perceptions of a space/time context may be very different for each individual. Not only single perceptions, but also the sensory modality – i.e. the classification of perceptions into modes – can be different from culture to culture (Ritchie, 1991), which makes the interpretation of sensory perceptions even more complex.

If considered within the framework of journey experiences, sensory perceptions enable individuals to grasp "glimpses" and "breaths" of travel journeys (Brown & Spinney, 2010; Spinney, 2011), sometimes provoking emotional reactions or social interactions along the way.

2.3. Social features

The analysis of socialities during journey experiences includes encounters and negotiations in space. These are not only verbal and non-verbal interactions, but also corporeal tactics of negotiation in motion (Symes, 2013), and tactics of self-presentation (Delaney, 2016). These are all features of consumer-to-consumer interactions, because often they do not directly involve the tourism service providers along the way. Consumers involved in the social interaction on transport systems might be other tourists or accompanying persons, but also locals (Neuhofer, 2014), and the peculiarity of these encounters is that they occur on the move, between destination touchpoints (or sometimes on moving attractions). The motion makes these interactions quicker and often ambiguous, but sometimes also very intense. Without making direct reference to a touristic context, Seamon (1979) identifies different engagement degrees in social interactions on the move: from obliviousness, watching, noticing, heightened contact, basic contact, and at-homeness. Goffman, too, investigates techniques and gazes used by individuals to negotiate space using non-verbal language, referred to as "body idioms" (Goffman, 1963). These are, for instance, "dress, bearing, movements and position, sound level, physical gestures such as waving or saluting, facial gestures and broad emotional expressions (Goffman, 1963, p. 33). In particular, acts of "body gloss" (Goffman, 1971, p. 125) are those situations where the human body, through non-verbal speech, can achieve some kind of order in public spaces, for instance by negotiating actions, or apologizing for one's behavior. These relational dynamics occur in the form of frontal meetings, orthogonal meetings, or parallel meetings along the way (Jensen, 2010). Meetings may – or may not – be accompanied by verbal interactions, and in some (few) cases they can also last for a significant part of the journey experience. Long-lasting social encounters are, for instance, the so-called velo-formations, i.e. "specific arrangements of bodies on bikes and configurations of a 'vélomobile with'"(McIlvenny, 2014, p. 137): individual vehicles sharing the same travel rhythm and moving in a group as if they were all one vehicle. Interactions, just like physical objects, stimulate emotional reactions.

2.4. Emotional features

Emotions are addressed as "a complex psychological state that involves three distinct components: a subjective experience, a physiological response, and an expressive response" (Hockenbury & Hockenbury, 2007, p. 117). These responses might be analyzed differently according to the theoretical approach applied to categorize emotions and to process their analysis (Scuttari & Pechlaner, 2017). In relation to travel, a few studies have been carried out to investigate the psychological aspects of journeys (Anable & Gatersleben, 2005), but they mostly relate to non-recreational travel. A rich field of investigation refers to commuting practices and commuter stress (Gatersleben & Uzzell, 2007; Spinney, 2011) and negative feelings are associated with the unpredictability of journeys (Evans, Wener, & Phillips, 2002), the delays (Koslowsky & Krausz, 1993), and an increased travel time (Wener, Evans, Philips, & Nadler, 2004). Conversely, positive mediators of stress are the perceived control of the journey (Evans & Carrère, 1991), and pleasant road aesthetics (Drottenborg, 1999).

The way tourists emotionally deal with routes, itineraries and the journey experience as a "hybrid system" (Sheller & Urry, 2006) is not likely to be identical to day-to-day experiences in ordinary life, therefore additional and more specific insights are needed. So far, what was found in the tourism sector seems to confirm these possible discrepancies between commuting and leisure travel: slow mobility in tourism is believed to provoke more intense and positive experiences than fast mobility (Lumsdon & McGrath, 2011), although it assumes longer travel times. Being slow enables different perceptions of landscapes while in motion (Larsen, 2001) and might offer room for (tourism-related) secondary tasks while on the move. Based on these considerations, the research strategy was designed.

3. Methodological strategy: mixed methods to describe journey experiences

In the framework of a critical realist approach to knowledge production (Bhaskar, 2008), a comprehensive mixed methods strategy of concurrent quantitative and qualitative methods (Creswell, 2013; Khoo-

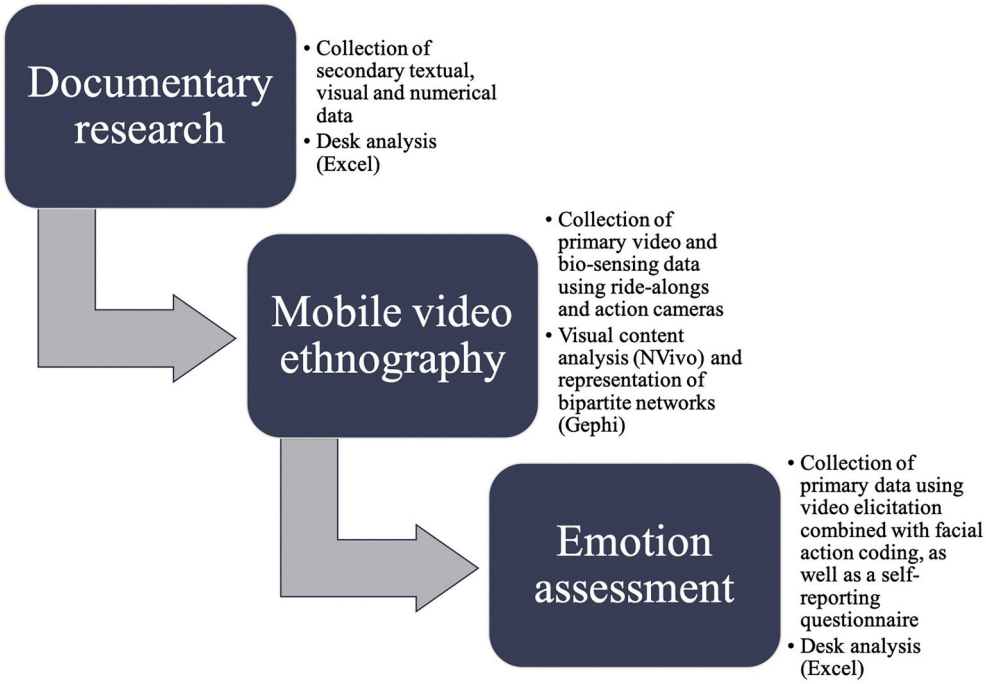

Fig. 1. Methodological steps, methods and type of data collected.

Lattimore, Mura, & Yung, 2019) is developed and tested to analyze journey experiences. The adopted mixed methods strategy is inspired by the non-representational theory, an approach to knowledge production that "seeks to better cope with our self-evidently more-than-human, more-than-textual, multisensual worlds" (Lorimer, 2005, p. 83) and often makes use of visuals to achieve this goal. It comprises three main research phases: a) documentation and secondary data analysis on the transport system and travel demand features; b) mobile video ethnography, based on ride-alongs (Büscher, Urry, & Witchger, 2011) with bio-sensing, and finally c) emotion measurement, based on self-report, video elicitation and facial action coding (SHORE TM) (Wierzbicki, Tschoeppe, Ruf, & Garbas, 2013) (see Fig. 1). This methodological approach allows for the triangulation of the findings and the creation of a holistic knowledge of the physical, sensory, social and emotional features of journey experiences. These journey features are both assessed at individual level using traditional Excel graphs (see e.g. Fig. 6) and at aggregated level, using either average metrics (see Fig. 7) or bipartite network graphs (see Fig. 3-5). The latter consist of a set of nodes (corresponding to all individuals and actions) and a series of edges, showing the overall time durations of actions for each individual. The need to analyze multiple units of analysis (individuals) in one single space (the destination) justifies the selection of a single case study, carefully chosen because it "represents an extreme case or a unique case" (Yin, 2006, p. 40). The case selected was a mountain pass, the Sella Pass, located in the surroundings of the Dolomites area (Italy). It was selected not only because of its tourism intensity, beauty and multifunctionality (Orsi, Scuttari, & Marcher, 2020), but also because of its unique richness in research activities performed on site: preliminary analyses on tourism-related traffic issues were developed already in the late 90s (Pörnbacher, 1995), while more recently several research projects were conducted to support a sustainable (tourism) development of the area (Scuttari, Marcher, & Vanzi, 2018; Scuttari, Orsi, & Bassani, 2018). Grounded in a solid existing knowledge of the area, the research is also suitable to support future decision-making processes on sustainable travel in the Dolomites area, part of which was recognized as a UNESCO World Heritage Site (WHS) in 2009.

Research design quality is ensured by applying the guidelines developed by Yin (2006): construct validity, external validity and reliability. Construct validity, i.e. the ability to select the "correct operational measures for the concept being studied" (Yin, 2006, p. 35), is ensured by triangulating different sources of evidence: different units of analysis in one space, multiple data sources for each experience feature, several methods within the research design to address experience features. External validity of the case study, i.e. the possibility to generalize findings, is aimed at by linking the case study back to existing theoretical frameworks, e.g. the experiential value of travelling (Mokhtarian & Salomon, 2001), the higher experiential power of slow travel (Dickinson & Lumsdon, 2010), and the compositional features of journey experiences (Delaney, 2016). Nevertheless, it should be stressed here that a single case study only offers the possibility of analytical generalization (Yin, 2006), i.e. the possibility to use results to link empirical results back to an existing theory. Finally, reliability of the case study, i.e. the possibility of repeating the research design and achieving the same findings, is pursued through a clean and transparent research protocol and data storage procedure, using NVivo 11ProTM software as a digital platform.

The developed method offers the possibility to perform both an aggregated analysis of spatial and temporal features of journey experiences and a micro-analysis of individual second-by-second actions and interactions. Based on this twofold analysis, journey experiences can be explored from a cumulative perspective – e.g. through the creation of network graphs – and from an individual perspective – e.g. using emotional maps, video clips and video stills.

3.1. *Documentation and secondary data analysis*

Documentation and secondary data analysis work as a preliminary research strategy to contextualize the analytical work, i.e. to understand the transport system on site and the mobility practices within it. It consists of the collection of text data – including documents, reports, descriptions of the study area – but also of descriptive statistics on traffic and tourism flows, travel patterns, critical issues and specific points of interest. This preliminary work is of vital importance, because it not only supports the development of an informed research design, but it also allows the construction of an overview of the case study over a longer time span than that of empirical data collection. Documents were

accessed in online and paper form, and sometimes on-demand. They all informed methodological choices along the next steps of the research design.

3.2. Mobile video ethnography with bio-sensing: strengths, critical issues and application

The mobilities turn advocated for new methods to grasp movement while on the move. These methods – the so-called mobile methods – enable a "double transparency" effect (Büscher et al., 2011): on the one hand, they report on journeys using visual content and on the other hand, they record and reflect upon methodological challenges of measuring while in motion. Their strength lies in the ability to understand embodied experiences, to "catch the glimpse" of mobility (Brown & Spinney, 2010), as well as to investigate subjective elements of experiences through individuals' eyes. Their weakness is related to the novelty of these methods, the use of digital technologies that are not designed ad hoc for research purposes, and therefore the exploratory nature of the research. Their implementation requires therefore a deep level of resonance and reflection about reality and its representation.

Among mobile methodologies, mobile video ethnography is selected in this research for its ability to bring the research process "as close to the mobile practice as possible" (Fincham, McGuinness, & Murray, L. (Eds.)., 2010), by using video recordings individually collected by research participants. Videos are very rich sources. They offer a continuous representation of the real and of motion, and they record multiple cues (Dinhopl & Gretzel, 2016). Video ethnographic methods, particularly ride-along techniques (Spinney, 2011), helped to record individual tourist experiences through the handling of action cameras. The recordings of the journey experience provide a micro-analytical level for travelling practices, while at the same time registering verbal and non-verbal interactions, soundscapes and landscapes. Notwithstanding the richness of these sources, video clips should not be interpreted as objective: subjectivity (both in the act of framing the reality to record, and in the researcher's interpretation) is a distinguishing character of visual research. The technique of ride-alongs was previously used by Spinney (2011) to investigate cycling practices, and he encouraged the use of bio-sensing techniques to improve data quality (Spinney, 2015).

Based on these considerations, the research design included action cameras supporting an add-on tool capable of measuring biometric data (heart rate), as well as movement-related information (GPS, altitude, speed). Although very basic and not designed for research, these sensors had the advantage of being synchronized with the video cue, thereby allowing a direct link between heart rate, speed and actions taken.

Fourteen cyclists and motorcyclists were selected based on a purposive sampling technique (Robson, 2002). The amount of participants was chosen making reference to previous studies using mobile video ethnography in transport (Brown, 2015; Delaney, 2016; Spinney, 2011). Participants were recruited on site, equipped with action cameras and sensors, and invited to take their journey along the Sella Pass. After the end of the journey, their emotions and sensations were assessed, as explained below. Video content analysis (Hanjalic, 2004) via NVivo™ software was used to analyze video cues, whereas heart rate was processed with a traditional spreadsheet and descriptive statistics. Coding categories were first related to micro-events/micro-actions along the journey (e.g. overtaking, dialogues, velo-formations) and they were later grouped into physical, sensory, social and emotional features. Network graphs were then drawn using the open-source network analysis and visualization software Gephi and applying radial axis layout of the network, an algorithm that can highlight homophily between nodes (representing thereby both participants and actions). This allowed the analysis of multiple phenomena, their frequency and – most importantly – the amount of time dedicated to each phenomenon or action along the journey, because "[t]ime is the primary currency for experiences" (Pine & Gilmore, 2013, p. 38). To interpret those graphs it is important to highlight that they represent bipartite networks, i.e. networks among which there are two different sets of nodes, corresponding to the participants themselves and to the coding categories developed in the content analysis. Performative actions are therefore reproduced by both nodes, corresponding to the type of action itself, and edges linking each action to the corresponding performer (participant). The thickness of the edge represents the overall duration in seconds of each encoded action. The radial axis layout of Gephi is used to spatialize the network, to show node groups along axes.

3.3. Psychophysiological and self-reporting methods: strengths, critical issues and application

Among the several possible techniques to analyze emotional arousal in consumer experiences (see, e.g. Isomursu, Tähti, Väinämö, & Kuutti, 2007), psychophysiological methods were used as a main source of data on emotion in this research. Psychophysiological techniques are observation methods that quantitatively monitor the physiological/expressive nature of emotional reactions. In general, they rely on behavioral (facial expressions, speech, gestures) or neuro-physiological responses (skin conductance, eye tracking, bio-signals, e.g. pulse rate, blood pressure, brain activity) (Lohmeyer & Meboldt, 2016). These methods have the advantage of measuring reactions in their evolutionary process and without the need for cognitive processing of feelings, which minimizes the risk of biases (Babakhani, Ritchie, & Dolnicar, 2017, p. 959). Research in tourism has just recently started to consider such instruments to analyze emotions in real time, e.g. using skin conductance (Kim & Fesenmaier, 2015; Shoval, Schvimer, & Tamir, 2018).

In this research, the measurement of heart rate was achieved using Get On Data Music – an add-on tool synchronized with the action camera via a paired smartphone that could enrich the video cue with additional layers of information. Although biased by physical fatigue, the analysis of heart rate was particularly interesting in the case of motorcyclists, where it served as a proxy for emotional arousal.

Further, SHORE™ (Sophisticated High-speed Object Recognition Engine) was used for facial action coding (Kueblbeck & Ernst, 2006; Wierzbicki et al., 2013). SHORETM is a fast, reliable and real-time capable software developed by the Fraunhofer Institute for Integrated Circuits in Erlangen, Germany (https://www.iis.fraunhofer.de/en/ff/sse/ils/tech/shorefacedetection.html). In enables the detection of information on gender, age and four emotional states (happiness, anger, sadness and surprise) with about 25 measurements per second. Since its use requires optimal light conditions and an uncovered face, after a first test it became clear that it was not feasible to measure emotions precisely while on the move, because of the use of helmets, sun glasses and the changing lighting conditions. Instead, the video recordings of the journey worked as video elicitation material, and the face detection software was running in the background as participants were watching their journey video, just a few minutes after the end of the journey itself. Video elicitation is a common technique to stimulate recollection, imagination or reflection on a specific action or interaction (Henry & Fetters, 2012) and it has also been used to stimulate and analyze emotions (Soleymani, Pantic, & Pun, 2012). In this case, it recalled the riding sensations and enabled a delayed second-by-second analysis of emotional states related to micro-actions during the ride. These were processed using data sheets and averages as well as individual metrics were calculated.

Finally, to enrich the data on emotional states and to triangulate different methods for emotion measurement it was decided to also integrate a traditional questionnaire for self-reporting of emotions, using the set of emotional states elaborated by Richins (1997) for consumption emotions. Each of the eleven selected emotional states (optimism, happiness, peacefulness, loneliness, envy, shame, fear, sadness, worry, discontent, and anger) was evaluated through a 5-point Likert scale and a qualitative description of the moment(s) when the emotion was felt. The questionnaire also assessed sensory perceptions that were

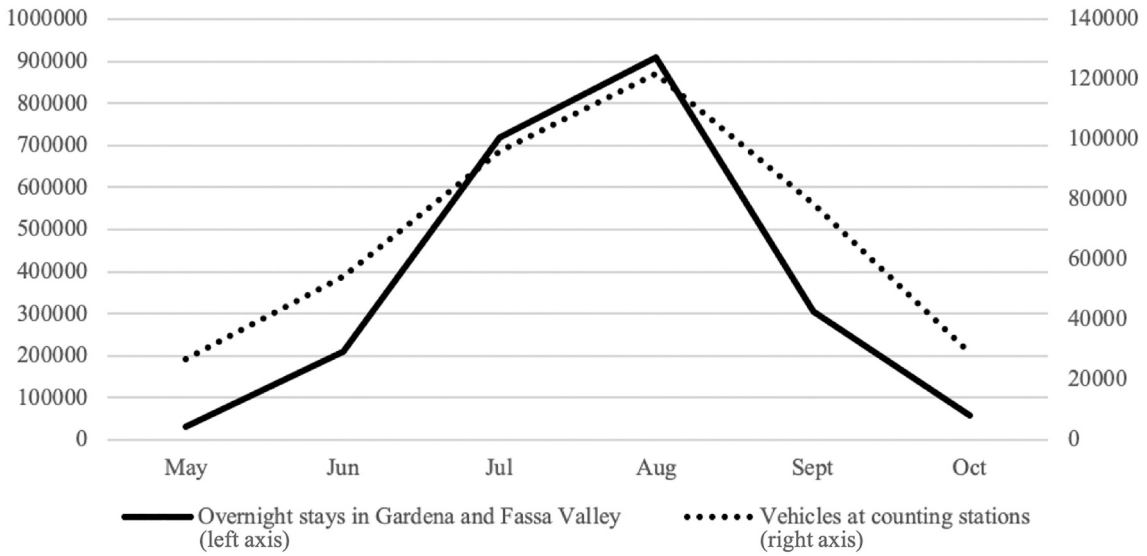

Fig. 2. Overnight stays and vehicles registered in the area of the Sella Pass – 2016.
Sources: Statistical offices of the provinces of Bolzano (ASTAT) ad Trento, data available on demand; own elaboration.

also observed in parallel through the video ethnographic material. Data was processed using data sheets and descriptive statistics were produced.

4. Results

Results are presented here by replicating the three steps of data analysis. Results on documentation and secondary data are kept short, because they worked as inputs to design mobile video ethnography, bio-sensing and psychophysiological and self-reporting methods.

4.1. Documentation and secondary data analysis: setting the framework

The many data and research outputs on the case study area informed

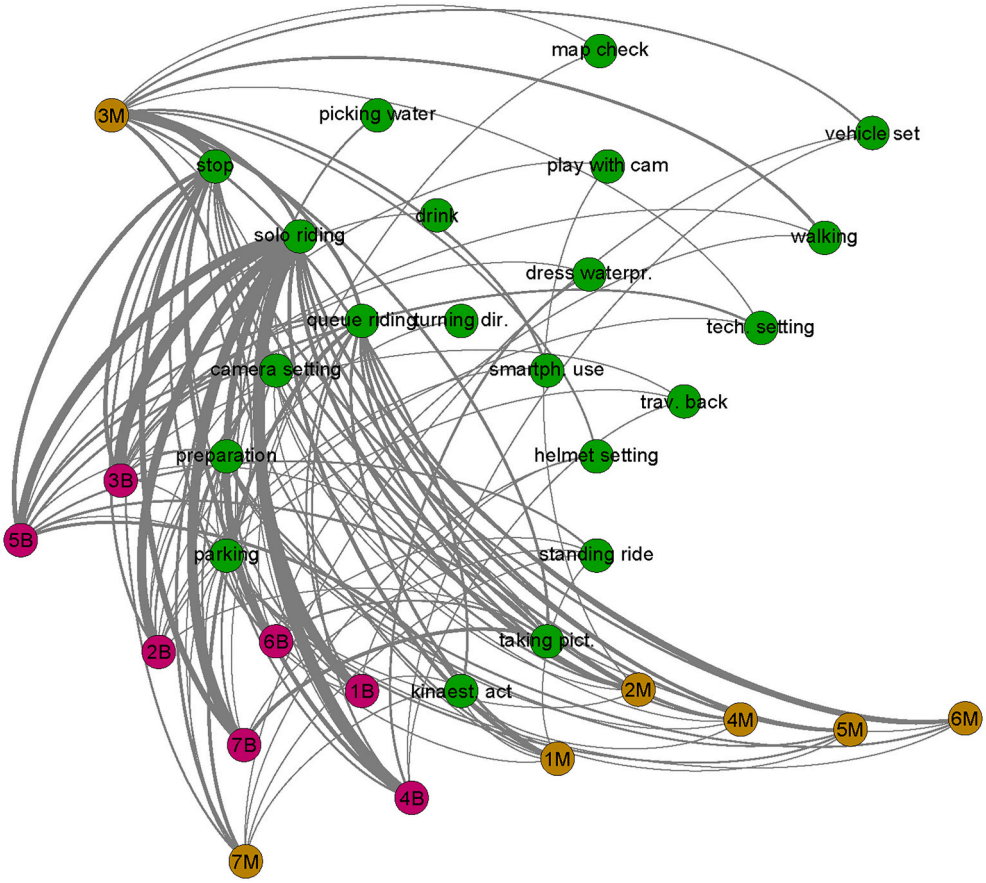

Fig. 3. Physical features of journey experiences – Gephi with radial axis layout.

step-by step decision making in the research design. Each year, between 1.1 and 1.4 million vehicles access the Dolomites area for tourism purposes, with a peak in flows during July and August, and a lower intensity in June and September (Scuttari, Orsi, & Bassani, 2018). The important relationship between tourism and traffic in summer is further confirmed by the high direct correlation ($\rho = 0.968$) between the overnight stays in the valleys bordering the Sella Pass (Val Gardena and Val di Fassa) and the number of vehicles in transit registered by traffic counting stations on the Sella Pass road (ASTAT, Provincial Institute of Statistics – Data available on demand) (Fig. 2). Based on these considerations, a high-season and a middle season period (corresponding respectively, to August and September) were selected as time frames for data collection.

Several impacts were found to be connected to traffic in the Sella Pass area, in particular noise, mostly associated with motorcycling tourism, but also congestion and some concerns about road aesthetics, related to illegal parking (Orsi et al., 2020). All these were the reasons for paying particular attention to aural and visual perceptions during data collection and analysis.

Further, the study of the technical features of the Sella Pass, in particular altimetry, steepness and road shape, as well as the examination of existing social practice of climbing this pass in a 50 km long tour (Sellaronda tour), supported the selection of one preferred direction to study the journey: from Val Gardena to Val Badia valley. The geo-referencing of restaurants and refreshment points across the road finally helped understand the most suitable starting and ending points for a monitoring of the Sella Pass journey.

Ultimately, it was decided to use mobile video ethnography and bio-sensing on a section of the road lasting 10 km, and to conclude the experience in a restaurant, where the video elicitation and emotion measurement procedure took place.

4.2. *Mobile video ethnography: exploring physical, sensory and social features of journey experiences*

The content analysis of the fourteen journeys based on video parsing and indexing produced a coding scheme that was later re-organized according to the features of journey experiences: physical, sensory, social and emotional.

Fig. 3 explains through a bipartite network graph all *physical* actions encoded, and clusters to the left those actions taking most of the journey time (e.g. riding solo or in line, stops, preparation of the vehicle and parking), and to the right all other actions performed for shorter moments and by a few participants (e.g. technology setting, walking, vehicle setting, map checking, taking pictures, etc.). Typically, the second types of actions are quick and heterogeneous among participants, while the first are common and last longer. This first remark seems to suggest a possible difference between driving and non-driving actions along the ride, where driving action are in a constant flow while in motion, whereas non-driving tasks work as interrupting spots. The figure also illustrates that all cyclists (1B to 5B) have similar timely patterns of riding (solo or in line), represented by the similar thickness of edges; motorcyclists (1 M to 7 M) are more heterogeneous, since the action of overtaking or standing in line is more related to the personal riding style and to the motorcycle, than to the steepness of the climb/descent.

The travel time of the whole journey was indeed different across participants, ranging from 36:00 to 57:26 min for cyclists and from 12:51 to 14:08 for motorcyclists, with the only exception of case 3 M, whose journey lasted around 41 min (41:16). This motorcyclist was travelling on a naked bike – i.e. a standard bike without motorcycle fairing (see Henshaw, 2012) – in couple with a friend with a tourer bike, and from the video cue it is possible to reconstruct that the travel companion wanted to enjoy the pass area as much as the riding journey. Participant 3 M is the only one among the motorcyclists who stopped in the pass area for about half an hour to look at the marvellous landscape and take some pictures; none of the other motorcyclists interrupted the

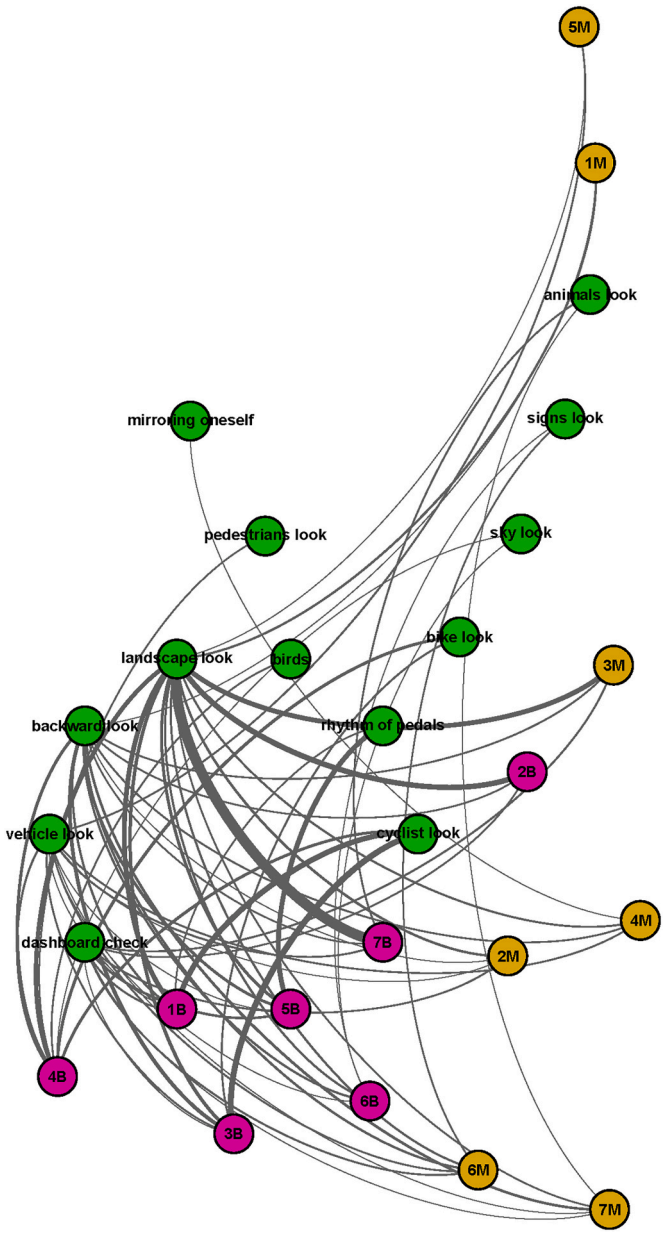

Fig. 4. Sensory features of journey experiences – Gephi with radial axis layout.

riding flow until the end of the journey. This suggests that different attitudes of riders expand or restrict the time of stops, creating different choreographies between what is felt in motion and what is perceived on site. The case of the motorcyclist 3 M is unique in that he is very similar to a cyclist and perceives the pass area as a main target for the journey, as it is confirmed by the pictures taken close to the pass sign.

Fig. 4 sheds a light on *sensory* features of journey experiences. The radial axis layout of Gephi clusters cyclists together and highlights their constant visual attention towards landscape and towards other cyclists – this happened mostly during dialogues, and in the climbing part of the journey. Interestingly, motorcyclists also have an interest in looking at the astonishing landscape of the Dolomites while on the move, but their gazes are much more elusive and quick, probably because the higher the speed, the more the visual focus must remain on the road. This issue is also true for cyclists when they face the descent of the pass road: since they travel with peaks of 50 to 60 km/h in speed, they completely quit their interest in the landscape and just stare at the paved road. A further interesting feature common to both cyclists and motorcyclist is the gaze back, i.e. the use of rear mirrors (for motorcyclists) or the habit of

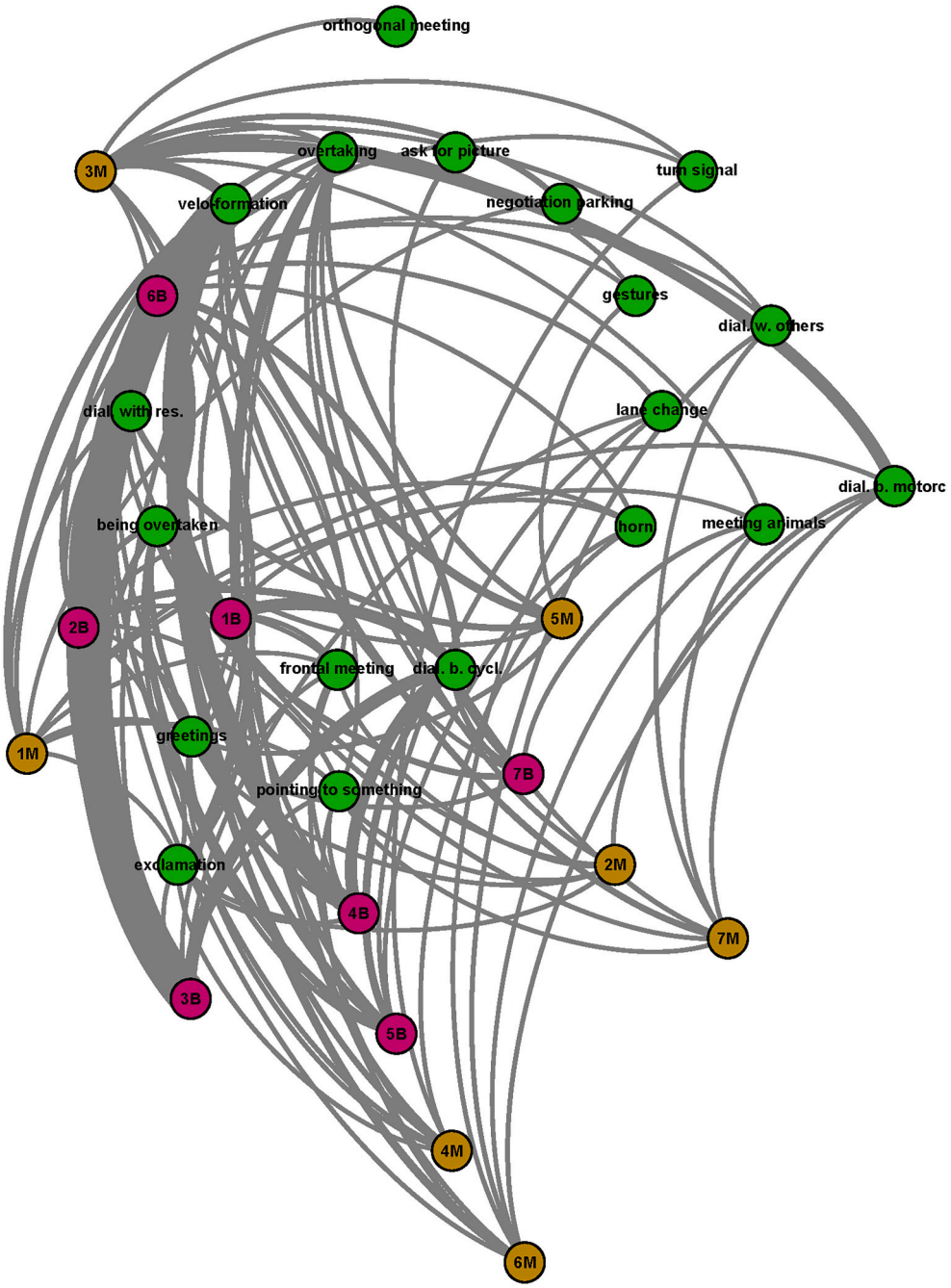

Fig. 5. Social features of journey experiences – Gephi with radial axis layout.

turning the head (for cyclists). This action is repeated very often by travellers, in a sort of routine – especially by those travellers leading a group – to check that the group united, in a velo-formation. Typically, for motorcyclists the backward look happens afterafter overtaking, to check the companion's position. Finally, the routine of checking the dashboard by motorcyclists has the aim to keep control of the speed, since the road speed limit of 60 km/h is often exceeded. Indirectly, both routines seem to shape a sort of ritual of safety check, to ensure that everyone in the group is safe on the road.

A few perceptions are detectable that are not related to sight: the sound of birds, also reported in the questionnaire for self-assessment, and the rhythmical sound of pedals. Based on the questionnaire and the reconstruction of sound waves it is also possible to assess aural perceptions of travellers. Cyclists' soundscapes tend to be poly-rhythmic: during the climb, the isorhythmic (repetitive) patterns of pedalling and breathing intersects with the arrhythmic (irregular) patterns of other quicker vehicles; during the descent there is a dominance of the arrhythmic sound of wind, which makes cyclists' soundscapes very similar to those of motorcyclists. Bikers are sound producers and they record and listen almost only to the sound of their engine, following the arrhythmical pattern that reflects accelerations, decelerations and banking. In the self-reporting questionnaire, they did not report any sound perception other than that of their engine, which somehow reproduced sonorously the interaction between their driving style and the shape of the road.

Fig. 5 reports *social* features of journey experiences and reveals that most of the social interaction is a dialogue between vehicles. This interesting form of choreography is called velo-formation and creates relationships and a sense of journey sharing among travellers, because it ensures that the distance between vehicles is kept under control, and

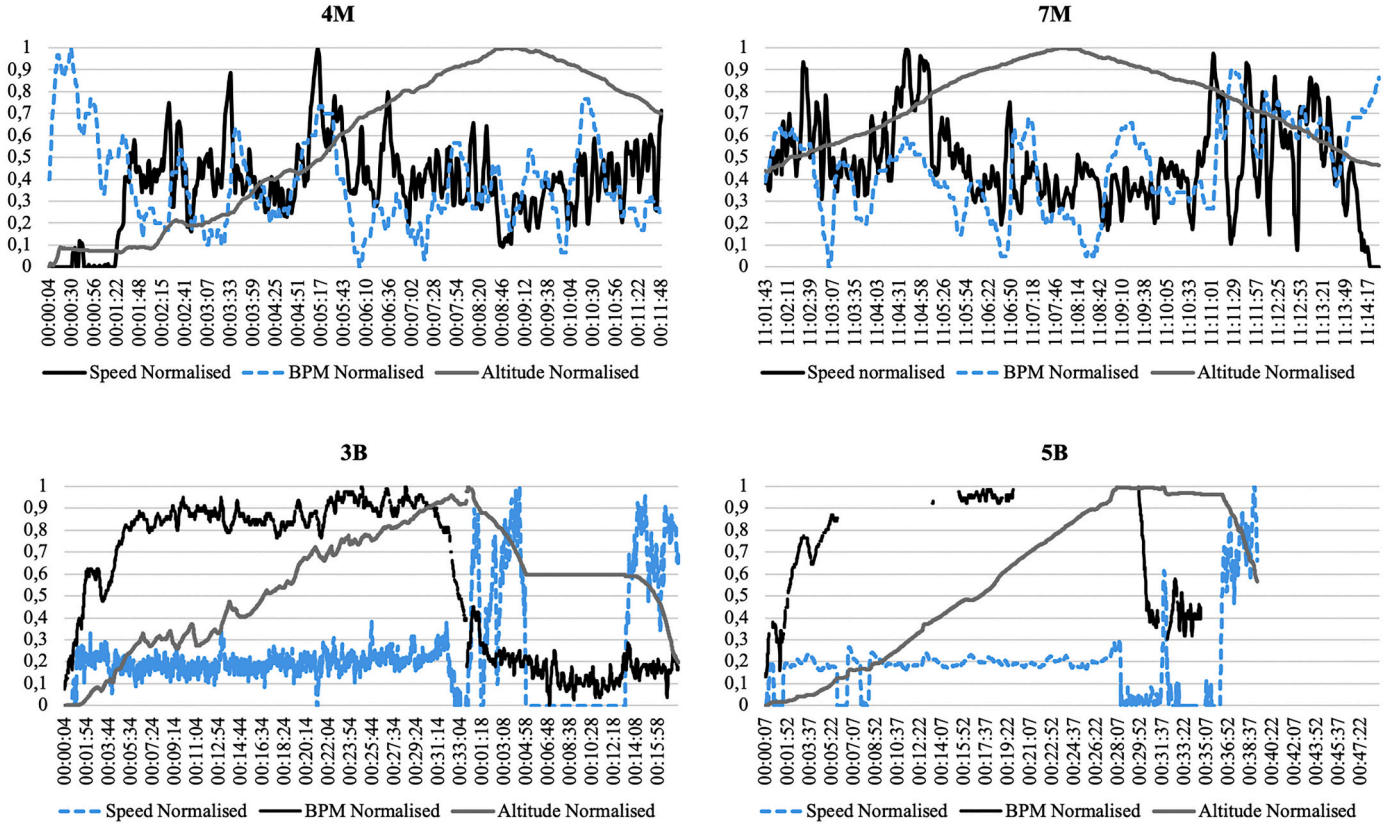

Fig. 6. Bio-sensing data on journey experiences – Examples of four participants' data (4 M and 7 M are motorcyclists, 3B and 5B are cyclists).

never reaches the tipping point that compromises the idea of "travelling with". Both motorcyclists and cyclists were mostly travelling in a group – with friends or in a guided tour – and only one (7B) was taking the tour completely alone. All of them, including the participant starting the journey alone, experienced some moments of velo-formation, and let their travel rhythms adjust to those of other travellers. Nevertheless, this fascinating phenomenon often does not last for the complete journey, because – especially for cyclists – after a few kilometres sometimes individual rhythms prevail over collective aims, and the velo-formation dissolves until the top of the pass. In the pass area, normally by the sign of the pass, cyclists meet again and reconstruct their group, in a second velo-formation that can often last until the end of the journey. A second type of social interaction among vehicles is the overtaking manoeuvre. Motorcyclists are active overtakers, while cyclists tend to be overtaken, with the exceptional case of the descent, where they can even be faster than cars and take the risk to pass them. Overtaking manoeuvres are much quicker interactions than velo-formations, therefore they involve short time spans, but – as will be reported later – high emotional engagement. Vehicles also interact by using turning signals and the horn, often used to warn about overtaking manoeuvres or a situation of danger.

Not only vehicles interact, but also bodies: greetings, exclamations, dialogues are often recorded along the journeys. Once again, these secondary tasks are glimpses in the flow of the journey, and are different among travellers. Motorcyclists tend to interact mostly with the bikers' community, waving to other riders; conversely, cyclists seem to be more open to talk and interact not only to cyclists, but also to pedestrians along the road. An interesting form of interacting with the travel companions and the landscape is the act of pointing: hands help create a connection with the surroundings, often by signalling an attraction along the road or far away, but also used to imagine the route forward, when in doubt where to go. While social interactions among vehicles are repeatedly happening all along the way, social interactions of bodies, if not directly related to driving tasks, tend to occur when the technical difficulty of riding and/or the speed are low.

4.3. Psychophysiological and self-reporting methods: emotional features of journey experiences

The use of psychophysiological and self-reporting methods to grasp emotional states along the journey was particularly challenging and showed more individual and subjective reactions than common patterns among participants, especially when it came to the categories of feelings experienced along the journey. Bio-sensing data relating to heart rate seemed to reveal regular patterns, as reported in Fig. 6, comparing two motorcyclists (4 M and 7 M) with two cyclists (3B and 5B). The figure enables a cross-individual comparison and a cross-modal comparison, showing common individual patterns within a mode of transport, as well as visible cross-modal differences. The heart rate seems inversely proportional to speed for cyclists – who experience physical fatigue when climbing the mountain pass – and directly proportional to speed for motorcyclists – whose heartbeat increases when taking risky actions on the road. Interestingly, during the descent there are cases where, even for cyclists, the heart rate rises with speed.

Finally, the comparison of self-reporting and psychophysiological observation techniques for the measurement of emotion revealed very contradictory results. While a predominance of positive feelings was reported in the participants' questionnaire, a more accurate description of negative emotions came out from the evaluation with the facial action coding software. For instance, participant 5 M, a motorcyclist, was chosen as an example to highlight how reported happiness and optimism might not correspond with revealed happiness, as in Fig. 7 his reported anger scores are higher than his reported happiness scores and the opposite is true in the questionnaire's scores. Incoherencies like these were found all along the dataset, and they might be related to the technical characteristics of the SHORE™ device and its sensitivity

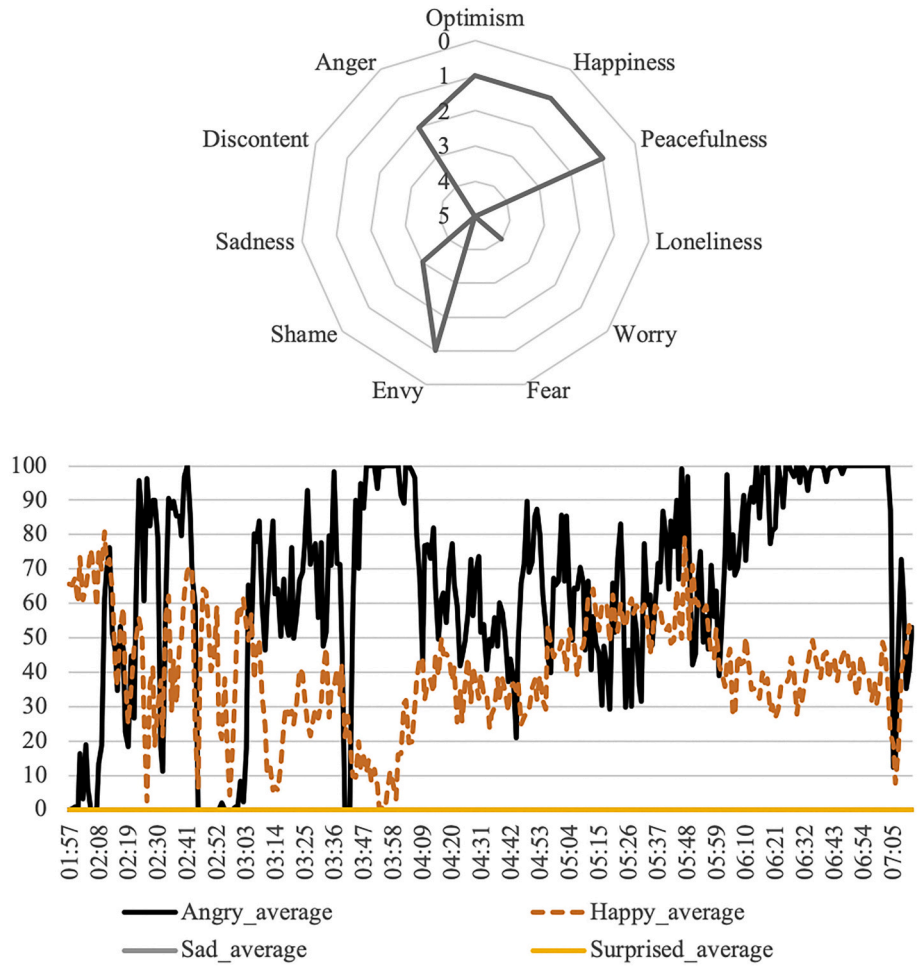

Fig. 7. Emotion data on journey experiences – Examples of self-reported data (7a) and facial coded data (7b) of participant 5 M.

(Nordhorn, Scuttari, & Pechlaner, 2018), but might also be explained acknowledging possible discrepancies between self-reporting and observation monitoring techniques (Scuttari, 2019). Nonetheless, overall the stimuli described in the questionnaire as responsible for emotional arousal seemed to coincide with those evoked by the video cue during the elicitation procedure. For instance, the action of riding in line provoked anger, as did the arrival at the pass area, because the road was congested. Both stimuli were mentioned and revealed, although the intensity of the emotional arousal was different, depending on the measurement technique, as if the cognitive processing could mediate the intensity of negative feelings.

In other cases the analyzed feelings differed among sources also in their categories, probably because of a time gap between the experienced action and the recalled action: when describing feelings associated with a risky overtaking manoeuvre, participants reported feeling negative-valenced reactions, but when these same risky actions were seen on the video screen, they provoked a sense of happiness and fulfilment. Time played a crucial role not only in the perception of space, but also in the arousal of emotions.

5. Key findings

Based on the triangulation of multiple evidences coming from mobile, visual and psychophysiological methods, journeys on bicycles and motorcycles are found to be socially rich, physically challenging experiences that share common features. Riding tasks occur in a flow and are of primary importance, and non-driving tasks work like glimpses – additional layers of meaning that make each journey unique. Social interaction during these journeys occurs among vehicles, bodies, and voices. Physical actions of the travellers analyzed have mostly the aim to keep control of the vehicle and govern motion, but sometimes they have the power to interrupt the journey flow and enable a more complete enjoyment of the landscape and the destination area on site. When speed is reduced to zero, i.e. during stops, travellers dedicate their time only to the destination space, e.g. they take pictures, which seem to work both as souvenirs and signs of goal achievement. When in motion, speed is a powerful mediator of the relationship between riding and non-riding (potentially touristic) activities. Speed also mediates sensory perceptions of the environment, narrowing down the attention of individuals to the essential activity of riding in order to avoid risks. The vehicle also plays a crucial mediating role: silent bicycles leave room for the soundscape of the destination, whereas noisy motorcycles play their own music for the destination – often in the form of sound pollution for other users. Speed and sounds – both related to the individual patterns of acceleration/deceleration – represent important stimuli for emotional arousal. However, findings did not support the theory of slowness being a main mediator for tourist experience (Dickinson & Lumsdon, 2010). They rather suggest that speed and *speed variations* trigger diverse experiential outputs, varying from subject to subject. Indeed, emotional sensations appear very aleatory, they seem to be heterogeneous across individuals and variable in time.

6. Discussion and conclusion

This work is significant and original in that it is among the first studies to explore the concept of tourist experiences on the move –

journey experiences – and to create an innovative complex of mixed methods to deeply understand them. This research proposes that journey experiences on the move represent much more than instances for spatial displacement of tourists: they *are* tourist experiences in their own right, and – as such – they need to be carefully designed and managed. Unpacking journey experiences, this research provides a more precise understanding of mobility *as* tourism (Lumsdon & Page, 2004) and identifies social, physical, and affective features that shape this type of mobility.

The developed qualitative market knowledge on cyclists and motorcyclists highlights the possibility to interpret transport systems as socio-technical systems co-created by users, bridging the gap between transport geography (White & Senior, 1991) and the experience economy (Pine &Gilmore, 1998, 1999, 2003). It might inform future research on transport planning about multiple shades of travel demand analysis and multiple methodologies to collect evidence on it. The strength of this work thus lies in the analytical detail of analysis, in the way micro-data on intangible aspects of experiences are triangulated, as well as in the crystallization of multiple data sources in synthetic representations.

The most significant findings of this research have methodological implications for future research. This work develops: a) an innovative methodology to assess the granular features of journey experiences (on bicycles and motorcycles), with the possibility to extend the method to consumer experiences in general; b) a novel visualization of multiple experiences through networked graphs, that enables cross-mode comparison of motorcycling and cycling tourism; d) a set of mobile visual and psychophysiological methods to grasp the underexplored social and emotional dimensions of experiences (Rajaobelina, 2018). This methodological knowledge could have wider managerial implications, on the one hand on tourist experience design and niche marketing, on the other hand on traffic management and transport policy. For instance, traffic management initiatives in overcrowded destinations could profit from novel data insights, as they have the potential to be designed by analyzing not only aggregated travel demand figures, but also individual practices and routines, vehicle interactions, and the unique features of each travel mode. Tourism products might be innovated by leveraging on mobility, e.g. by marketing sustainable, safe and thrilling experiences "on the move" or by providing proper and safe tourist information "on the move" and adequate infrastructures for rest areas. While focusing on motorcycle and bicycle journeys, the research techniques pioneered here should also be valuable for walking trails, heritage rail routes, canal boat based tourism, and the growing interest in themed activity corridors as a planning concept. The implementation of such methods, besides being challenging from the operational point of view, represents a necessary paradigm shift in research (Shoval & Birenboim, 2018). The exploratory nature of this research determines some major limitations. First, the use of single case study research strategies and small samples limits generalization possibilities. The investigation of further destination areas would definitely improve the understanding of journey experiences and transcend its place-specific shades. Further, the novelty of the used methods and their unusual combination caused some operational difficulties in data collection. A real-time quality control of sensor data and an automatic synchronisation between visual and sensor data could definitely improve data quality. Finally, ethical issues might arise when it comes to the analysis of emotions in real-life settings or to the use of facial action coding systems. Future research should address these issues and formalize more specific codes of conduct beyond the traditional formal written consent of participants.

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