Alma Mater Studiorum - Università di Bologna

DOTTORATO DI RICERCA IN

PHILOSOPHY, SCIENCE, COGNITION, AND SEMIOTICS (PSCS)

Ciclo 33

Settore Concorsuale: 11/E1 - PSICOLOGIA GENERALE, PSICOBIOLOGIA E PSICOMETRIA

Settore Scientifico Disciplinare: M-PSI/01 - PSICOLOGIA GENERALE

LANGUAGE, ACTION, AND SENSORIALITY: A MULTIMODAL ANALYSIS OF INTERACTIONS IN INCLUSIVE SPORT CLIMBING WITH VISUALLY IMPAIRED ATHLETES

Presentata da: Monica Simone

Coordinatore Dottorato

Claudio Paolucci

Supervisore

Renata Galatolo

Esame finale anno 2021

Ringraziamenti

Questa tesi è stata scritta in tempi di emergenza sanitaria a causa della pandemia da COVID-19. Il mio primo ringraziamento va a Gabriele, il mio compagno, per essersi preso cura di me e per aver rispettato le esigenze del mio lavoro ogni giorno, per tutti i mesi in cui ho svolto la mia attività restando a casa perché non era possibile frequentare gli spazi dell’Università.

Sono profondamente grata alla Prof.ssa Renata Galatolo per avermi istruita, consigliata, e supportata con grande passione scientifica, dedizione e costanza sin dagli albori del mio percorso di ricerca. La sua guida è stata ed è tuttora fondamentale nella mia esperienza accademica e umana.

Special thanks go to Prof. Paul Drew, whose unique generosity made my research stay at the University of York a very special intellectual journey. Learning from Paul is one of the most exciting experiences I had during my PhD. Grazie!

Abstract

In sport climbing, athletes with vision impairments are constantly accompanied by their guides – usually trainers – both during the preparatory inspection of the routes and whilst climbing. Trainers are, so to speak, the climbers' eyes, in the sense that they systematically put their vision in the service of the climbers' mobility and sporting performance. The synergy between trainers and athletes is based on peculiar, strictly multimodal interactive practices that are focused on the body and on its constantly evolving sensory engagement with the materiality of routes. In this context, sensory perception and embodied actions required to plan and execute the climb are configured as genuinely interactive accomplishments.

Drawing on the theoretical framework of Embodied and Situated Cognition and on the methodology of Conversation Analysis, this thesis engages in the multimodal analysis of trainer-athlete interactions in *paraclimbing*. The analysis is based on a corpus of video recorded climbing sessions.

The major findings of the study can be summarized as follows. 1) *Intercorporeality* is key to interactions between trainers and athletes with visual impairments. The participants orient to perceiving the climbing space and acting in it as a 'We'. 2) The grammar, lexicon, prosody, and timing of the trainers' instructions are finely tuned to the ongoing corporeal experience of the climbers. 3) Climbers with visual impairments build their actions by using sensory resources that are provided by their trainers. This result is of particular importance as it shows that resources and constraints for action are in a fundamental way constituted in interaction with Others and with specific socio-material ecologies, rather than being defined *a priori* by the organs and functions of individuals' body and mind. Individual capabilities are thus enhanced and extended in interaction, which encourages a more ecological view of (dis)ability.

Table of Contents

Preface 9

Introduction 13

I. Language and embodied action: cognitive and interactional perspectives 17

1.1. Introduction 17
1.2. The embodied perspective in cognitive sciences 17
1.2.1. Language from the embodied perspective 21
1.2.2. The centrality of simulation and resonance 24
1.2.3. Beyond the individual body: language as a social tool 25
1.3. The situated perspective in cognitive sciences 28
1.4. The interactional perspective on language and embodiment: Conversation Analysis 34
1.4.1. Origins and key concepts 34
1.4.2. CA and cognitive sciences 39
1.4.3. Embodiment from CA's perspective 42
1.4.4. Closing the loop: embodied cognition in and through social interaction 48

II. Data and Methods 51

2.1. The research setting 51
2.1.1. Competitive climbing 51
2.1.2. The material environment of competitive climbing 52
2.2. Fieldwork and data collection 56
2.2.1. Participants 56
2.2.1.1. Ethical procedures in participants recruitment 58
2.2.2. Data collection 58
2.2.2.1. Practicalities of the recordings 60

2.2.3. Composition of the corpus 60
2.3. Data transcription procedures 61

III. Climbing preparation: route preview as cooperative perception 65

3.1. Introduction 65
3.2. Analysis 66
3.2.1. Positioning in space for sensing the route jointly 66
3.2.2. Framing the start of the route within a multisensory domain of perception 71
3.2.3. Combining tactile mapping and listing to sequentially locate footholds in the lower part of the route 73
3.2.3.1. The 'E hai' formula: a window into the distribution of action, and the normativity and accountability of touching. 80
3.2.4. Depicting and enacting: embodied resources for enabling the climber to realize the affordances of remote handholds 89
3.3. Discussion 96

IV. Auditorily guided climbing: how verbal instructions structure embodied action and perception 99

4.1. Introduction 99
4.2. The ecology of instructions in guided climbing 102
4.2.1. Basic instruction sequence 104
4.3. Assisting the unfolding of movement 107
4.3.1. Expanded instruction sequence 107
4.3.2. Mutual adjustments of instructions and instructed body movements 108
4.4. Instructive uses of repetition to calibrate the climber's ongoing body movement 113
4.4.1. Formats and sequential environment of repetition in the data 116
4.4.2. Precision timing and prosody of repetition to make continuation relevant 118
4.4.3. Series of repeats as corrective instructions 129
4.5. Discussion 134

Conclusion 139

Transcription Conventions 147

Bibliography 145

Preface

In the *Convention on the Rights of Persons with Disabilities*, adopted in 2007, the United Nations state that it is a right of disabled persons to be able to participate not only in sports specifically designed for them, but also in mainstream sports. At European level, a specific commitment to this aim has been undertaken since the publication of the *European Sports Charter* in 2001. In this context, the motto "All Sport For All" (Guett *et al*., 2011) has been formulated, to summarize the commitment of EU member states to undertake policies specifically aimed at breaking down the barriers that prevent people to access mainstream sports on an equal basis.

But what does inclusive participation to sport mean? And what are the barriers preventing persons with impairments to access mainstream sports that need to be broken down? In common perception, by barriers we often mean those material obstacles that prevent the mobility and physical access of persons to certain places (i.e., architectural and sensory barriers). While being essential to ensure the physical inclusion of persons with impairments (i.e., the possibility of attending the same spaces as their able-bodied peers), breaking down physical barriers is not in itself sufficient to guarantee inclusive participation. As Valet (2018) notes, there are also social and cultural barriers that prevent persons with impairments from sharing sports experiences with (and being valued by) their able-bodied peers.

Sport climbing practiced by visually impaired athletes (known as *paraclimbing*) is a particularly meaningful case, showing how both physical and social barriers can be overcome.

To be sure, the presence of a physical barrier is the *sine qua non* condition of sport climbing, which revolves around the idea of ascending to the top of a rock formation or artificial wall, challenging the force of gravity. To some extent, a cliff or a boulder test everyone in the same way because every human being is subjected to the same physical constraints when climbing, irrespective of being able-bodied or disabled. Therefore, in the climbing culture much emphasis is put on technical equipment as well as on social sharing and collaboration among peers, all aspects being central to the way members face the challenge posed by verticality and overcome individual limits. Collaboration appears to be particularly relevant insofar as climbers usually engage in collective expeditions outdoor, or attend the climbing gym with partners, and routinely commit to providing mutual support, for instance by exchanging tips and looking after each other's safety whilst climbing. While being counted among the individual sports disciplines as regards the practice at a competitive level, sport climbing is in fact experienced by members as an intrinsically collaborative sport in the context of ordinary practice.

The centrality of collaboration characterizing sport climbing overall is reflected in paraclimbing as well. In this context, the form of adaptation envisioned to meet the needs of climbers with visual impairments is indeed based on providing them with partners (usually trainers) to guide them whilst climbing, both in training and in competition. Thus, paraclimbing configures an example of inclusion achieved through the cooperation between participants with different abilities, which makes it a particularly interesting case study in relation to the broader theme of the participation of persons with impairments in mainstream sports.

The foundations for the research work presented in this thesis were laid in 2016, when I first met paraclimbing in Bologna, thanks to a group of trainers and athletes with visual impairments who had been active for some years already in the Italian sport climbing federation (F.A.S.I, *Federazione di Arrampicata Sportiva Italiana*). At the time when this exciting encounter took place, I was generally interested in the social issue of disability, but I had never undertaken specific research in sports yet. It was through paraclimbing that I became interested in the practicalities of inclusive participation in sports, especially in the communicative, embodied, and sensory practices characterizing the collaboration in paraclimbing which I will explore in detail in this thesis.

This work represents the first attempt to systematically reconstruct the interactional practices employed in paraclimbing. It also has a further element of novelty, as it combines an approach inspired by cognitive sciences with an empirical methodology developed in the microsociology of interactions, whose contribution, as will be seen, is particularly useful for understanding the functioning of paraclimbing and, more generally, cooperation in sports performance.

Introduction

1.

In the last forty years, a radical transition has taken place in the cognitive sciences. The classical cognitivist view, postulating the mind as information-processing occurring in the brain, is increasingly replaced by evidence suggesting that the mind is embodied and extended beyond the skin and skull of individuals (Clark, 1997; Gibbs, 2006; Hutchins, 1995a; Shapiro, 2011; Varela, Thomson & Rosh, 1991). In this latter perspective, the dualistic oppositions between mind/body and individual/environment are overcome in favour of an ecological vision, in which cognitive and bodily activity are strictly interconnected and constrained by the physical and social environment. The fundamental principle of embodied cognition is that the reach and the very nature of cognitive functioning constitutively depend on being tied to actions, and to the material and temporal details of their implementation.

The embodied perspective also increasingly characterizes the approach to communication adopted in the anthropological, social, and linguistic sciences, within which the model of communication as the transmission of mental contents in the form of sensible signs (e.g., Saussure's "talking heads" model, Cf. Meyer, Streeck & Jordan, 2017) is nowadays subjected to criticism (Streeck, 2015). Communication is increasingly seen as a process which is deeply rooted in the contexts of activity where people interact socially. In these contexts, in addition to verbal language, interactants also make use of other semiotic resources, either equally originated from the biological body (gestures, gaze, body posture, etc), and from the material configuration of spaces and objects.

This 'embodied turn' has led to an increased interest in sports both in the field of cognitive psychology and among scholars interested in social interaction. From the psychological perspective, sport settings are attractive because they offer the possibility to observe how cognitive skills specialize to serve complex forms of bodily interaction with the environment. More specifically, patterns of perception and action are increasingly recognized as crucial factors in explaining the athletes' specialized cognitive skills in perceptual discrimination, attention, anticipation, and response to environmental changes (see the collection of papers edited by Cappuccio, 2019).

From the perspective of scholars interested in embodied interaction, sport settings are engaging because they entail not only co-presence, but also co-engagement in various forms of bodily contact and coordinated motion that are often subjected to rapid changes. In this context, communication and coordination are highly temporally constrained. The *sequentiality* which characterizes turns in talk-in-interaction (Sacks, Schegloff & Jefferson, 1974) gives way to patterns of multimodal actions closely responding to one another at a micro-sequential level (e.g., Stukenbrock, 2014), or even characterized by synchronicity (Cf. Deppermann & Streeck, 2018). Also, in sports settings, *intersubjectivity*, i.e., the sharing of subjective states that allows interactants to make sense of each other's actions, takes on a character that is anything but mentalistic (Fuchs & De Jaegher, 2009). What interactants share in terms of meanings during sports performance rather falls within the sphere of *intercorporeality* – in the sense suggested by Merleau-Ponty (1964), to feel into one another – and of *interkinaesthesia* – in the sense suggested, from an equally phenomenological perspective, by Behnke (2018), to feel Others' bodily motion with one's own body (Cf. Meyer & v. Wedelstaedt, 2017).

Driven by the interest in these issues, in recent years studies on social interaction in the sport field have proliferated. By applying the analytic tools of multimodal conversation analysis, several scholars have investigated the moment-by-moment production of sport activities such as basketball (Evans & Fitzgerald, 2017; Evans & Reynolds, 2016; Meyer & v. Wedelstaedt, 2020), synchronized swimming (Muntanyola-Saura & Sánchez-García, 2018), boxing (Okada, 2018) and martial arts (Råman, 2018), focusing mostly on instructional contexts.

Compared to the literature just mentioned, the present study represents a novelty for two main reasons. First, it investigates a sport setting which, although not being strictly *instructional* (i.e., it is not about teaching paraclimbing as all participants are expert athletes), nonetheless revolves around various *instruction practices* used by the trainers to guide the visually impaired climbers at every stage of climbing. Furthermore, the present study is the first – to the best of my knowledge – to employ multimodal interaction analysis to investigate an inclusive mainstream sport.

2.

Placed in the field of cognitive sciences, this thesis blends theoretical insights from the various approaches that flow into the post-cognitivist tradition (particularly, embodied, situated, and distributed cognition) with an empirical methodology of investigation which is drawn from multimodal conversation analysis. The thesis aims at offering an in-depth analysis of embodied interaction in paraclimbing. Participants in the study are visually impaired climbers and able-sighted trainers. Drawing on videorecorded training sessions, the study focuses on the detailed and systematic reconstruction of the interactional practices involved in the co-accomplishment of climbing.

The analytical goals of the study can be summarized as follows.

First, the study aims at illustrating how language participates of the moment-by-moment, situated production of embodied action, as well as of the intercorporeal and interkinesthetic dimensions of interaction. Second, it analyses how participants in paraclimbing build on each other's actions, and how, in this process, the climbers' individual sensory abilities are extended and enhanced. Third, since in paraclimbing the achievement of mutual understanding and coordinated action crucially implies sharing a common perception of the surrounding material environment, the analysis seeks to grasp both the multimodal and the multisensory dimension of interaction.

This thesis is organized as follows. In Chapter I, I expand on the theoretical background of the study. The following Chapter II details the materials and methods of the study. Chapters III and IV illustrate the results of the analysis. More specifically, Chapter III deals with the analysis of the preparatory activities to climbing, showing in detail how the participants inhabit the gym space and become familiar with the route layout before engaging in the ascent. Chapter IV gets to the heart of climbing, focusing particularly on the crucial role played by the trainers' instructions in enabling the visually impaired athletes to fulfil their goals while they climb.

The results show that climbers with visual impairments build their perception of space and their bodily action by also making use of 'external' resources that are made locally available in the embodied interaction with the trainer and with the specific material ecology of the activity. The results lead to the conclusion that perception and action in paraclimbing are configured as inherently situated, embodied and cooperative accomplishments.

I.
Language and embodied action: cognitive and interactional perspectives

1.1. Introduction

In this chapter, I outline the theoretical background for the present dissertation. The discussion focuses on issues relating to language, embodiment, and action, and to how these dimensions are articulated in cognitive science and in conversation analysis. The aim is to show not only how these two areas differ in their approach, but also how they can complement each other.

The chapter is organized as follows. In Section 1.2, I articulate the background in cognitive sciences, starting from a general outline of the embodied perspective, and moving on to the embodied theories of language. In section 1.3, I dwell on the situated approach to the study of human activities, highlighting its contribution to the understanding of cognition as a culturally shaped and distributed reality. In section 1.4, I illustrate the perspective adopted by ethnomethodology and conversation analysis, highlighting how research in this field has contributed to the development of situated and embodied perspectives in cognitive sciences. In the final section 1.5, I show how the conversation analytic approach can provide relevant contexts of observation to the embodied approach to language and how it can help to overcome the limits of the latter approach in understanding the situated and interactive dimension of language, body and action.

1.2. The embodied perspective in cognitive sciences

Contemporary cognitive sciences mainly adopt an *embodied* approach that gives the body a central role in the constitution of mind and cognition (Barsalou, 2008; Clark, 1997; Clark & Chalmers, 1998; Gibbs, 2006; Lakoff & Johnson, 1999; Shapiro, 2011; Varela, Thomson & Rosch, 1991). This approach has been established starting from the mid-

1980s in the context of what has been regarded as a revolutionary movement (Glenberg, Witt & Metcalfe, 2013; Núñez et al., 2019) aimed at overthrowing the computational model of mind supported by traditional cognitive sciences (Fodor, 1975; 1983; Pylyshyn, 1984)[1]. The embodied movement assumes a critical position especially with respect to the alleged separation between body and mind postulated by classical cognitivism. For the latter, cognitive processes such as thought, language, memory, decision making, etc., have their seat in the brain, while the body performs the mere function of receptor of sensory stimuli and executor of behavioural outputs.

In opposition to such model, the embodied perspective supports the following interlocked positions:

- Cognition arises from the material body and its interaction with specific environments (cognition is *embodied* and *embedded*).
- Cognition is always directed to an end. Agents perceive the outer world in terms of action possibilities (cognition is *enacted*).
- Not all resources for cognition are bound in the individual's brain: cognitive activity engages non-neural resources from the environment (cognition is *extended*).

---

[1] In the following quote, Shapiro provides a vivid illustration of the computational model of mind, as he takes a critical stance toward it:

> Cognition, on the traditional view, is the same kind of process one finds in a calculator. An organism's sense organs serve as input devices, translating stimulation from the environment into a syntactic code that the nervous system can then manipulate according to various rules that are either innate or learned. This symbol manipulation is cognition, and its products are additional symbols, some of which might be translated into a form that causes bodily motions or other sorts of behavior. The nervous system, on this account, performs the same function that a CPU does in a computer. For this reason, traditional cognitive sciences has typically claimed that cognition is computation and that minds are programmes that run on brain hardware. (Shapiro, 2007:339, emphasis in the original).

Clearly, this account is by no means exhaustive of early cognitive sciences, which included diverse and more nuanced orientations (reviews are provided by Boden, 2006; Gardner, 1987; Miller, 2003; Posner, 1993). However, since a more extended discussion would go beyond the scope of the present chapter, I will therefore not elaborate further on this but limit myself to observe that there is currently large consensus on the incapacity of the computational model to provide a viable and empirically grounded account of human mind, cognition, and experience.

Although different in some respects (Cf. Gallagher, 2011; Shapiro, 2007; Wilson, 2002), these theses agree on rejecting that cognitive activity is first and foremost mental operations, arguing that, on the contrary, *action* is the foundation and primary purpose of cognition (Clark, 1997). In this regard, it has been observed that the embodied movement has led to a “pragmatic turn” (Engel et al., 2013; Madzia & Jung, 2016), that is, a turn from seeing cognition as a process for creating mental representations of the world to an action-oriented view that explains cognitive activity in terms of action-control and action-coordination within and between situated embodied agents.

The ground for this paradigm shift had already been prepared for a long time thanks to intellectual developments and scientific advances in various disciplinary fields.

Crucial impulses to the development of the embodied view of cognition come from European phenomenology, in particular from the reflections elaborated in this area about the continuity and intimate relationship between bodily and mental states. More specifically, the idea that the body (in particular, perception) is the very condition of experience and thought has its roots in the works of Edmund Husserl (1913/2002) and Maurice Merleau-Ponty (1962), whose influence is explicitly recognized in Varela, Thomson and Rosch’s seminal work *The Embodied Mind* (1991) (for further references see Cf. Gallagher, 2014).

Embodied cognitive sciences push phenomenological accounts in new directions, seeking to specify the mechanisms that explain just how cognition is grounded and deeply constrained by the motile body. This perspective is condensed in the concept of *enaction*, that is, the idea that the experience of the world is based on the continuous interplay between the physiology of the organism, its sensorimotor circuit, and the environment in which the organism lives and acts. In this perspective, cognitive activity is enacted by the whole-body, not just “embrained” (Damasio, 1994:118). Contributions in this direction also come from biology and neuroscience, both contributing to frame cognitive activity in the biological realm by explaining the development of the nervous system to support increasingly complex forms of interaction with the environment (Jarvilehto, 1998a, b; Maturana & Varela, 1991).

Another precursor of the embodied perspective, particularly as regards the fundamental role of action and the environment in the constitution of cognitive processes, is to be found in the tradition of American pragmatism. Very relevant in this respect are James's (1984/1956) reflection on the primacy of goal-oriented action on perception and cognition and Dewey's (1896) idea of a reciprocal constitution between agent and environment (both physical and social) (for a detailed review, see Caruana & Borghi, 2013; Gallagher, 2009; Menary, 2015). Equally fundamental is Peirce's conception of thought as "executed work" accomplished through signification processes that incorporate external resources (Cf. Kirsh, 2004:206), which is commonly identified as an antecedent of the *extended mind* hypothesis (Clark & Chalmers, 1998).

Moving on to psychology, the most influential precursor of embodied-embedded views of cognition is commonly identified in Gibson's ecological theory of perception (Gibson, 1966, 1979), in which prior ideas from phenomenology and American pragmatism are developed in a unified account of cognition, action and environment. According to Gibson, perception occurs when the sense organs "are active, that is, when they adjust and explore so as to obtain information" (Gibson, 1966:45). Thus, rather than inheriting passive reception of sensory stimuli, perception is actively pursued through looking, listening, touching, smelling, and tasting – notice that, to put the emphasis on action, Gibson labels the perceptual systems with verbs, rather than nouns (i.e.: sight, touch, olfaction and so on). In Gibson's view, perception is informed by action insofar as organisms perceive the environment in terms of action possibilities, or *affordances* (Gibson, 1979). Crucially, affordance is not entirely given as an objective property of the environment nor as a subjective property of the perceiver, but is rather specified by the interaction between the characteristics of the organism, its goals and skills, and the properties of environment:

> [A]ffordance is neither an objective property nor a subjective property; or it is both if you like. An affordance cuts across the dichotomy of subjective-objective and helps us to understand its inadequacy. It is equally a fact of the environment and a fact of behavior. It is both physical and psychical, yet neither. An affordance points both ways, to the environment and to the observer (Gibson, 1979:29).

Pointing "both ways", the notion of affordance brings the perceiving organism and the perceived environment in a relationship of reciprocal constitution, as the organism actively *constructs*, rather than registers, the environment[2]. In this perspective, low-level (perception, motor control) and high-level cognitive processes (thought, language, memory, and so on) are connected. Indeed, since perception is of affordance, organisms perceive the environment as *meaningful* from the start (Still & Costall, 1991).

1.2.1. Language from the embodied perspective

Research on language (semantics) has played a crucial role in the inception of embodied approaches in cognitive sciences. A seminal contribution to its development is certainly represented by Lakoff & Johnson's seminal work *Philosophy in the flesh* (1999). In that work, the authors discuss the case of the spatial concepts we commonly use, such as 'in front', 'behind', 'up' and 'down', arguing that such concepts provide a clear example that embodied experience constraints and structures conceptualization. Indeed, these concepts identify the dimensions of space that are salient for us as humans because our body structure requires us to move in space in a certain way. More precisely, since we assume an upright position and move forward, the opposing pairs 'in front'/'behind' and 'above'/'below' are salient for us. Probably – the authors suggest – these concepts would have been absent if our body and locomotion had shaped differently.

Besides holding that cognitive processes are not independent from de body but rather constrained and shaped by the body and its interaction with the world, the embodied perspective also challenges the idea that the mind is modular (Fodor, 1983) and that

[2] In this respect, Gibson's theory of affordance was heavily influential to the development of embodied and enactive accounts of perception. Consider for example the opening of Noë's *Action in perception*:

> Perception is not something that happens to us, or in us. It is something we do. Think of a blind person tap-tapping his or her way around a cluttered space, perceiving that space by touch, not all at once, but through time, by skillful probing and movement. This is, or ought to be, our paradigm of what perceiving is. The world makes itself available to the perceiver through physical movement and interaction. [...] Perceptual experience acquires content thanks to our possession of bodily skills. *What we perceive* is determined by *what we do* [...] it is determined by what we are *ready* to do [...] [W]e *enact* our perceptual experience; we act it out (Noë, 2005:1, emphasis in the original).

cognitive processes are separated from sensorimotor activity. In this respect as well, research on language has played a crucial role in showing that cognitive processes and sensorimotor activity are in fact inherently interdependent. In the perspective adopted by classical cognitive sciences, language is viewed as an innate and stimulus-independent system located in the brain (Chomsky, 1959; Pinker, 1994), which performs operations on symbolic representations occurring in a propositional form (Fodor, 1975; Laurence & Margolis, 1999).

The thesis that the constitution of linguistic concepts is independent of external stimuli and context has been falsified by experimental evidence showing that, on the contrary, people construct concepts quite differently in distinct contexts (Barsalou, 1993; Solomon and Barsalou 2001). Besides being context-dependent, linguistic concepts are also dependent upon physical interaction with their referents. Hence, in the embodied perspective, rather than amodal (non-perceptual) and symbolic, concepts are modality-specific and *grounded* in the same neural correlates of sensorimotor activity (Barsalou, 2008; Fischer & Zwaan, 2008; Kemmerer *et al.*, 2008).

This thesis is demonstrated by compelling evidence showing that the patterns of interaction entertained with the physical properties of objects are engaged in categorization tasks. In a classical experiment conducted by Tucker and Ellis (2001), participants observed a series of images depicting objects of varying size. They were asked to categorize each object by deciding whether it was natural or artifact. To provide their response, the participants used a device similar to a joystick. To indicate that the object they just saw was natural, they had to perform a power grasp (i.e.: with the palm of the hand on the object and the fingers closed all around); conversely, to indicate that the object was artifact, they had to perform a precision grasp (i.e.: with the fingertips). The researchers eventually found that, although it was irrelevant to the task, the size of the displayed object affected the timing of the participants' motor response. In other words, participants were faster in responding when the appropriate grasp-type (power *vs* precision) for the category of the object (natural *vs* artificial) was consistent with the size of the object (large *vs* small). The researchers concluded that merely seeing objects activate a motor response compatible with their physical characteristics, that is, the brain ‘sees’ objects in terms of action possibilities (affordance). The authors replicated the same results in a similar task involving the presentation of stimuli consisting of either images of objects or object names (Tucker & Ellis, 2004). They found that even following linguistic stimuli a motor response is activated, which allowed them to conclude that linguistic processing involves sensorimotor patterns of brain activity.

In addition to those just described, numerous other experimental studies have shown that object names are represented in terms of motor action affordances (to cite just a few contributions, Bub & Masson, 2012; Borghi & Riggio, 2015; Glover et al., 2004; Marino et al., 2014; Zhang, Sun & Humphreys, 2016). Moreover, other experimental studies have demonstrated that motor information also drives the processing of linguistic units larger than words, such as sentences, particularly in the case of sentences describing actions (Borghi, Glenberg & Kaschak, 2004; Glenberg & Kaschak, 2002; Borghi & Riggio, 2009; Scorolli & Borghi, 2007; Zwaan & Madden , 2005).

Altogether, this evidence supports the hypothesis that the brain resources used to plan and carry out actions are also used in language comprehension. More specifically, it demonstrates that the brain automatically re-activates (simulates) the motor patterns associated with objects/actions in response to relevant linguistic stimuli, even in the absence of concrete commitment to perform action.

Besides having produced specific evidence concerning language, on a more general level, the relevance of these studies lies in having suggested that high-level (thinking, language, etc) and low-level cognitive processes (motor planning and perception) are much more interconnected than previously thought. This has been further confirmed by studies aimed at investigating the influence of language on perception. As an instance, Meteyard, Bahrami & Vigliocco (2007) demonstrated that listening to motion verbs affects the detection of motion-path in visual stimuli; Lupyan & Ward (2013) have demonstrated experimentally that language (object names) can provide cues to visual detection of hidden stimuli.

1.2.2. The centrality of simulation and resonance

As I mentioned in prior section, research on language from the embodied perspective increasingly relies on the notion of *motor simulation*, that is, the idea that observing actions and understanding sentences about actions activate corresponding motor processes in the observer-comprehender (Zwaan & Taylor, 2006). This idea has been strongly encouraged by research in neurophysiology, especially after the discovery of the *mirror neuron system* (Rizzolatti & Craighero, 2004) in the premotor cortex of macaques and humans. Using brain imaging techniques, it has been shown that, while *canonical* motor neurons "fire" equally when the subjects manipulate objects and when they only observe the objects, in addition to this, *mirror* neurons also 'fire' when the subjects observe somebody else performing a goal-oriented action. This discovery seems to support the idea that understanding Others is rooted in a *motor resonance* mechanism (Fabbri-Destro & Rizzolatti, 2008; Gallese *et al.*, 1996).

The relevance of this discovery for the embodied research perspective on language rests on the fact that the cortical area of the primates' brain where mirror neurons are located corresponds to an area in the human brain (the Broca's area) that is crucially involved in language processing (Buccino *et al.*, 2001). This supports the hypothesis that linguistic abilities might have evolved based on neural infrastructure for action-control and action-coordination (Arbib, 2008; Gallese, 2008).

Such hypothesis is increasingly supported also by cross-disciplinary evidence. As an instance, studies in social psychology show that people spontaneously mirror Other's behaviour and synchronize own motion with Others (to mention just a few contributions, Chartrand & van Baaren, 2009; Richardson et al., 2007; Schmidt, *et al.*, 2007). Even more interesting is evidence concerning perspective-taking, that is, the process whereby an individual understands a situation from another individual's point of view. This process was studied, among others, by Tversky & Hard (2009). The researchers asked participants to describe the position of a target-object in a scene displayed on a screen. When the scene included only objects, participants used an *ego*centric frame of reference (they described the position of the target-object from their own standpoint). Conversely, when the scene also included another person, they exhibited a tendency to describe the position of the target-object relative to that person's perspective (they used an *allo*centric frame of reference), even though this operation entailed a cognitive cost (i.e.: mental rotation). Such effect was stronger in the trials that included the depiction of another person acting upon the target-object, in which case the participants were significantly more akin to describe the position of the object by adopting the other person's perspective. The results show that understanding Other's action is relevant and drives cognition (i.e.: the perception and linguistic encoding of spatial relations), thus revealing a spontaneous propensity to prepare to respond to Other's action, that is, to interact socially. Finally, research on joint actions has demonstrated that, when engaged in a shared task, participants not only adjust to each other's ongoing bodily actions, but also anticipate each other's ensuing actions based on an integrated view of own and the co-participant's motion plans (Sebanz & Knoblich, 2009).

In the field of developmental psychology, significant contributions to understanding the importance of intersubjective resonance have been produced by Tomasello and collaborators, who studied the emergence of prosocial behaviour in early infancy. Their works allow to hypothesise that language is rooted in intersubjectivity (Tomasello, 1999), particularly in the capacity to share attention (Carpenter *et al.*, 1998) and understand other's intentions (Tomasello *et al.*, 2005), both emerging very early in human infants as they spontaneously engage in cooperative activities (Moll & Tomasello, 2007).

1.2.3. Beyond the individual body: language as a social tool

Partly driven by the findings illustrated in prior section, current approaches to language from an embodied perspective are increasingly acknowledging that the intersubjective dimension of embodiment might be even more crucial to language than is the grounding in the individual's sensorimotor experience (Fusaroli, Demuru & Borghi, 2009; Tylén et al., 2010).

It has been observed that, if on the one hand, the embodied grounding approach to language has been decisive in demonstrating that the body is central to linguistic processes, on the other hand, assuming patterns of sensorimotor activity as a sufficient explanation for all sorts of linguistic processes has led to overemphasizing the body. The "Words As social Tools" (WAT) theory (Borghi & Cimatti, 2009; Borghi & Binkowski, 2014), developed within the embodied language perspective, attempts to amend such "excess of body" (Violi, 2009:58) by appeal to the social dimension of language.

The WAT theory has been developed specifically to overcome the limits of embodied theories of language in explaining abstract knowledge (i.e.: words denoting abstract concepts such as 'freedom') (Borghi et al., 2017; Dove, 2018). It proposes that, in addition to sensorimotor experience, abstract concepts also draw on linguistic and social experience. The WAT theory refers to Vygotskij's (1934/1992) theory of language and thought. Vygotsky argued that there is a difference between *spontaneous* concepts, that children, although under the guidance of adults, form by themselves through direct experience of their referents in the material world, and *scientific* concepts, that, on the contrary, children learn thanks to the mediating role of explanations provided by adults, or otherwise said, through other concepts to which the former are related. Equally, the WAT theory holds that, while words for concrete concepts, albeit being learned from adults, incorporate physical interaction with their referents, words for abstract concepts, which do not have concrete referents, mostly incorporate prior social and linguistic experience. Without excluding the role of the body, which this perspective articulates by considering the physical dimension of words (i.e., words are concrete entities that we can see, listen, etc.), the WAT theory stresses the role of social and intersubjective aspects pertaining the acquisition and development of abstract concepts. Indeed, the acquisition of words referring to abstract concepts is, to a great extent, based on the mediation of the "explanations" provided by adults and, more broadly, on sociality.

The WAT theory is also based on behavioural evidence. For instance, Borghi and colleagues (Borghi *et al*., 2018; see also Mazzuca *et al.*, 2018) experimentally demonstrated that, while the processing of words for concrete concepts activates a motor simulation in the hand (which is consistent with the literature previously reviewed, Cf. § 1.2.1), the processing of words for abstract concepts activates a motor simulation at the level of the mouth. Drawing on these findings, the authors argue that the activation of motor patterns involving the mouth reflects the fact that abstract concepts (and language overall) incorporate prior linguistic and social experience.

As we can see, in the perspective adopted by proponents of the WAT theory, language is regarded as a social tool only insofar as it enables the acquisition and development of individual thought and conceptualization. While stressing the role of the social dimension as regards the acquisition of concepts, this perspective does not address the important issue of how language functions as a social tool in the social interactive dimension.

To summarize what has been said so far, this review started by outlining the fundamental characteristics of the embodied approach in relation to traditional cognitive science. While the latter postulates a clear separation between body and cognition, and assigns the body a peripheral role in processes such as thought, conceptualization and language; by contrast, the embodied perspective highlights the role that sensorimotor experience and embodied interaction with the environment play in these processes. In this context, research on language has played a fundamental role, demonstrating the close link between sensorimotor activity, conceptualization, and linguistic processing. More specifically, important evidence has been produced in this area to support the idea that linguistic processing relies on a neural infrastructure that is primarily oriented to motor action. Furthermore, it has been shown that the intersubjective dimension of embodiment is also heavily involved, as linguistic processes seem to be rooted in a more basic ability to 'read' the actions of others. In this sense, it can be hypothesised that language has evolved together with increasingly complex forms of social interaction. In turn, language scaffolds the development of cognitive capacities for conceptualization. This is confirmed by evidence showing that abstract concepts are rooted in social as well as embodied experience. However, embodied theories of language have limitations in including the social dimension in their unit of analysis, which remains essentially an individual one. More generally, it has been observed that, in embodied cognitive sciences, the commitment to show that *cognition is for actio*n is largely assumed as a matter of identifying the interaction between cognitive processing and sensorimotor patterns of activity (Menary, 2015). While there is evidence for arguing that cognition is grounded in this interaction, it is not possible to demonstrate that *all of cognition* can be adequately described in these terms. As far as language is concerned, the tendency just described results in overemphasising the connection between linguistic processes and their sensorimotor correlates at the expense of the pragmatic and intersubjective dimension of language. This prompts us to look to another perspective that has developed in cognitive sciences in parallel, and partly in conjunction, with embodied approaches. This perspective, which I will define as 'situated', is the object of the following section.

1.3. The situated perspective in cognitive sciences

The term 'situated' has assumed different meanings in cognitive sciences.

Wilson (2002) uses the term with reference to cognition which takes place "in the context of task-relevant inputs and outputs", as opposed to what she terms "off-line cognition", by which she means cognitive activity (i.e., planning, remembering, and day-dreaming) occurring in contexts where it is not directly relevant to current tasks. Conversely, other authors use the term in a broad sense as a unifying label for all the *4Es* approaches (embodied, embedded, enacted, and extended) (see the collection edited by Robbins & Aydede, 2008; see also Roth & Jornet, 2013), to allude to the common feature that characterises these orientations and opposes them to the internalist, neurocentric approach of traditional cognitive sciences.

In the ensuing discussion, I will refer to a narrower meaning of the term 'situated', which differs from the two just described insofar as it does not identify neither a type of cognition nor all 4Es-approaches, but rather identifies a precise research orientation aimed at investigating cognition within groups of interacting agents in particular contexts of human activity.

Before going on to describe the situated cognition approach, let me take a step back to the historical background from which it stems. In his *Steps to an ecology of mind* (1972), Gregory Bateson argued that, just as understanding the functioning of biological organisms requires considering their environment and the relationships with other organisms, equally, understanding the mind entails consideration of the environments in which cognitive processes develop and operate. For the situated cognition approach, such environment is essentially a social and cultural one.

Early on (Cf. §1.2), I have illustrated Gibson's (1979) theory of affordance, highlighting its significance for the embodied perspective. As I mentioned, according to Gibson, all perception is of affordance, because the organism perceives the environment in terms of action possibilities. I also highlighted that, conceived in this way, the notion of affordance does not identify neither a property of the environment alone, nor of the organism. Rather, it captures a relationship between the two, thereby suggesting that the dividing line between the organism and its environment might be subtler than previously thought. An additional insight from Gibson's theory of affordance concerns the acknowledgement that perception of affordances can be shared among organisms. Such capacity is especially far reaching in the case of human beings, who specialized in the making of displays of various nature (facial and manual gestures, postures, speech) to draw Others' attention toward affordances available in the environment. According to Gibson, when individuals use these devices, they achieve *indirect* perception, or information *about* the world. However, in Gibson's view, direct and indirect perception are not separated. Rather, indirect modes of perception (ways of sharing common perception through displays) consolidate the capacities of direct perception. As Reed points out in an illuminating review of the ecological approach based on Gibson's unpublished writings, one implication of this is that all human perception is socialized, as "what we attend to, many of the processes of attention, and of our various practical activities are in large part results of socialized upbringings" (Reed, 1991:181).

If Gibson only sketched, but did not fully articulate, this theme (Heft, 2007), it was in fact at the heart of scientific inquiry within the cultural-historical psychological tradition established in Soviet Russia in the early 1900, particularly in the works of Vygotskij and Leont'ev. It is therefore possible to identify an ideal complementarity between the contributions of ecological and cultural-historical psychology, despite these two traditions belong to two distinct eras and cultural backgrounds (Still & Costall, 1991).

With their focus on language-use and material practices, both Vygotskij and Leont'ev have been fundamental precursors of subsequent works orienting to a more encompassing view of cognitive activity as a socially and culturally *situated* reality. According to Vygotskij, all higher-level psychological processes appear first as the child participates with Others in culturally shaped forms of social interaction, and only later they are appropriated and *internalized* by the child (Still and Costall, 1991; Vygotskij, 1978). In this process, a crucial role is played by cultural artifacts, primarily language, through which physical and mental activity is coordinated in interaction (Vygotskij, 1992; Wertsch, 1991). Hence, individual's cognitive skills are shaped by cultural tools and social practices. If Vygotskij is renowned for his studies on cognitive development in childhood, Leont'ev is instead known for his commitment to explain the processes enabling the division of labour among social actors (Cole & Engeström, 1993). Central to his approach is the notion of *activity system*, which encompasses both human actors engaged in a common task and the wide range of tools they use together to fulfil the task, capturing the temporal and dynamic unfolding of their mutual relation.

Gibson's ecological psychology and the cultural-historical Activity Theory (Brown, Heath & Pea, 1999) originated within Soviet psychology played a central role in the development of the situated perspective, which flourished between the 1980s and the 1990s in the fields of anthropology (Hutchins, 1995a, b; Lave, 1988) computer science and AI (Clancey, 1997; Suchman, 1987), education and educational psychology (Brown, Collins & Duguid, 1989; Greeno & Moore, 1993; Kirshner & Whitson, 1997; Resnick, Levine & Teasley, 1991; Resnick, Pontecorvo & Säljö, 997; Rogoff & Lave, 1984). These studies mainly focus on specific settings of human activity, which are investigated based on qualitative methods. This methodological choice allows the situated perspective to grasp the many ways in which human beings perform cognitive tasks in relation to changing contexts, purposes and locally available resources. In her study on human-machine interaction, Suchman (1987) demonstrates that planning skills are the result of a plastic adaptation to circumstances *through* action. In other words, instead of being prior to action, planning emerges from action. In her study on mathematical reasoning, Lave (1988) shows that people employ different mathematical skills depending on the activity they are engaged in and that such skills are not confined to formal mental operations.

Among the representatives of the situated perspective, Hutchins is also known for being the father of the *Distributed Cognition* hypothesis (hereafter DCog), which assumes that "cognitive processes are always distributed in some way" (Hutchins, 2006a:376-377). Accordingly, in the DCog's perspective, "a group of people working together is a distributed cognition system. In such a case, cognition is distributed across brains, bodies, and a culturally constituted world" (*ibid.*)[3]. Viewed as distributed processes that are achieved by coordinating various components (often external to the individual brain), cognitive activities "do not have a single locus *inside* the individual" (Salomon, 1993a:112). Rather, they are "'stretched over' [...] They are 'in between' and are jointly composed in a system" (*ibid.*). In this perspective, "distribution means interaction" (Hutchins, 2006a:376), or coordination (Kirsh, 2006), among the components of the cognitive system, within and across its multiple levels. Accordingly, as an empirical approach, DCog privileges ethnographic methods, although observation under controlled conditions in the laboratory (Kirsh & Maglio, 1994) and computer modelling (Hutchins, 1991) are also used. Still, it is through *in situ* observation of cognitive processes as they unfold within large assemblies of social agents and cultural artifacts that DCog has contributed the most in the field of situated cognitive science.

A crucial insight from Hutchins' works concerns the fact that cognition and action are shaped in culture-specific ways. His studies of maritime navigation among Micronesian sailors (Hutchins & Hinton, 1984; Hutchins, 2005) and on board of a Western commercial ship (Hutchins, 1995a) provide evidence that cognitive processing involved in the accomplishment of navigation tasks differs greatly in the two cultures because of the accumulation of diverse adaptive strategies and techniques. This observation is reflected in contemporary research, which is increasingly demonstrating

---

[3] Also, Hutchins continues, cognition is distributed within in the individual as well:

> An individual working alone with material tools is also a distributed cognitive system, as is an individual working alone without material tools. So too is an individual brain situated in the body, or the brain without consideration of the body because cognition is distributed across areas of the brain. Even single areas of the brain are studied now as systems in which cognitive function is distributed across layers of neurons. And the same is true down to the level of a network of neurons in the brain. (Hutchins, *ibid.*)

that the mind is shaped by culture via language and material practices[4], with the important implication that evidence obtained by studying members of industrialized Western societies alone cannot be assumed as representative of the whole human species (Henrich *et al.*, 2010).

Finally, DCog has proved to be particularly effective in showing that the cognitive properties of groups can be quite different from the cognitive properties of any individual in the group. This is brilliantly demonstrated in *How a cockpit remembers its speeds* (Hutchins, 1995b), in which Hutchins reworks the concept of memory:

> The cockpit system remembers its speeds, and the memory process emerges from the activity of the pilots. The memory of the cockpit, however, is not made primarily of pilot memory. A complete theory of individual human memory would not be sufficient to understand that which we wish to understand because so much of the memory function takes place outside the individual. In some sense, what the theory of individual human memory explains is not how this system works, but why this system must contain so many components that are functionally implicated in cockpit memory, yet are external to the pilots themselves. (Hutchins, 1995b:286).

In conclusion, in this section I have shown that the situated perspective ideally complements the embodied mind project (Varela, Thomson & Rosh, 1991), stressing the importance of seeing "individual and environment, social, cultural, or physical, as integrated units" (Salomon, 1993b: xiv; see also Norman, 1993) and thus opening a scenario in which the mind is seen as a property of *cognitive ecosystems* (Hutchins, 2010). A crucial legacy of this research tradition rests in having shown that, in order to grasp the embodied and ecologically situated nature of cognition, cognitive science must adopt an

[4] In keeping with the theme of space and navigation, cross-cultural studies such as those by Levinson (2003) and Majid et al., (2004) have challenged the assumption that the tendency to encode and conceptualize space from of an egocentric (observer-centred) perspective, typical of Western cultures, is universal. Indeed, languages encode spatial relations differently, also using allocentric perspectives. Crucially, differences in linguistic encoding of spatial relations reflect in non-linguistic spatial reasoning, which supports Whorfian hypothesis of linguistic relativism (Whorf, 1956). One reason underlying such diversity is that both cognition and culture adapt to environmental conditions. For example, Palmer (2007) collected evidence that conceptual representations of space and their linguistic expression among Oceanic atoll-based indigenous fishermen are linked to topographic properties of the territory they inhabit, making some features more salient than others in relation to everyday orientation and navigation. Also, the constraints of the specific activity in which people are engaged inform the way they perceive and think about space. For example, sailing involves spatial dimensions and physical forces that are not normally required in everyday locomotion on horizontal surfaces (Tenbrik & Dylla, 2017).

empirical research methodology based on situated activity systems. This requires starting from field observation in perspicuous settings, where the cognitive phenomenon of interest – be it mathematical reasoning, such as in Lave (1988), or remembering, such as in Hutchins (1995b) – is made relevant and therefore observable in relation to practical purposes, in and through the practices adopted by participants to achieve such purposes. Therefore, in the situated cognition perspective, the shift from focusing on individual units of analysis to considering "larger meaning-making systems of which our bodies and brains are only one part" (Lemke, 1997:37) goes hand in hand with leaving the laboratory, to research cognition "in the wild". This testifies to the importance that empirical research methods are adequate to the theoretical perspective that is taken. In the situated cognition perspective, the adoption of groups of people doing things together as a unit of analysis and of *in situ* observation as a method of investigation are contingent upon adopting an embodied, situated and socially distributed view of cognitive activity.

Embracing the principle just discussed, namely that research methods should be consequential to the theoretical perspective which is adopted as well as appropriate to the object of investigation, in my study I employ ethnographic research methods to explore the system of activity of paraclimbing training. More specifically, in the next chapters I will describe in a systematic and detailed way the interactional processes through which the participants, despite the diversity of their sensory abilities, arrive at the co-construction of a *world perceived in common*. The analysis of the interactional practices used by the participants to deal with the practical purposes of paraclimbing support the thesis of the embodied nature of language and illustrate the social nature of an activity – sensory perception – which is commonly conceived of as individual. For this purpose, I will use the analytic tools developed in the field of ethnomethodology and conversation analysis, which I describe in detail in the following sections of the chapter.

1.4. The interactional perspective on language and embodiment: Conversation Analysis

1.4.1. Origins and key concepts

Conversation Analysis (hereafter, CA) is a multidisciplinary, micro-analytic, empirical approach to the study of talk and social interaction originated in American sociology in the mid-1960s from the work of Harvey Sacks and his colleagues Emanuel Schegloff and Gail Jefferson (Sacks, 1992). CA received crucial impulses from two main strands of sociological research active in the same years. The first one is personified in Erving Goffman who, starting from the 1950s, prompted a decisive change in sociology as he made everyday social life the object of scientific inquiry. Particularly important in this respect are his investigations on the social and multidimensional constitution of the *self* in face-to-face social interaction as well as on the ritual aspects of human sociality (Goffman, 1959; 1967).

The second, and most decisive, influence on the foundation of CA comes from Harold Garfinkel's Ethnomethodology (EM) (Garfinkel, 1967; 2002; Garfinkel & Sacks, 1970). EM deals with the *methods* through which members of a community *endogenously* constitute social order in and through the ongoing accomplishment of everyday activities. In Garfinkel's words, EM concerns "the investigation of the rational indexical expressions and other practical actions as contingent ongoing accomplishments of organized artful practices of everyday life" (Garfinkel, 1967, cited in Psathas, 1968:509). Unlike mainstream sociology, EM does not interpret social dynamics through the lenses of prepacked categories (such as class, gender, age and so on), but rather attempts to uncover the internal logic characterizing social interaction from the members' perspective, that is, by investigating how social action is ordinarily produced and made publicly intelligible.

Reference to the two philosophical traditions of American pragmatism and European phenomenology that, as I already pointed out, were fundamental to the *pragmatic turn* (Engel et al., 2013; Madzia & Jung, 2016) in cognitive sciences, characterizes Ethnomethodology as well. It has been argued that the importance given in

EM to real social experiences, routine practices, and language is inherited from the work of Peirce, Mead and Dewey (Domke and Holly, 2011). For some authors, EM could even be seen as the continuation and fulfilment of the pragmatist program in the social sciences (Emirbayer and Maynard, 2011). Also, Psathas observes that "[Garfinkel's] concern with the everyday, routine commonplace activities as phenomena in their own right, deserving of detailed study, is certainly consistent with the views of phenomenology" (Psathas, 1968:509). More specifically, EM's interest toward the methods participants in social interaction employ to make sense of each other's actions stands in continuity with Schutz's (1960/2018) notions of 'understanding' and 'objectivity'. In his view, the objectivity of the life-world presupposes *intersubjective* understanding since it is grounded in socially shared categorizations, interpretations, and expectations (Cf. Deppermann, 2015a).

Coming back to the object of investigation in EM, as I mentioned, this approach considers the social situation as a practical accomplishment of the participants who are involved. Therefore, the social situation is, for EM, continually and contingently produced and maintained through the participants' actions. A fundamental characteristic of social action is its *accountability*, which means that, at any moment, participants in interaction make sure that the course of action can be reconstructed and explained, that is, that it exhibits an intelligible trajectory. In this sense, for EM, social actions are intrinsically rational. The accountability of social actions is in turn linked to two other fundamental properties: *reflexivity* and *indexicality*. Reflexivity means that the participants themselves make use of accounts of their own actions. Accountability is therefore not a result of the action, but a constitutive component of it. Indexicality means that social action is rooted in a specific context (setting, participants, etc), from which it draws part of its meaning. As in the case of the words of a language, the meaning of an action is not determined *a priori*, but is defined locally, in relation to situated circumstances and practical purposes (Fele, 2002).

Drawing on EM, CA investigates talk-in-interaction as the most basic and ubiquitous form of social organization and the primordial ecology of language (Schegloff, 1992). Crucially, in CA's perspective, language *is* social action. In this respect, CA stands in continuity with the philosophy of ordinary language, particularly speech acts theory (Austin, 1962; Searle, 1969). As is well known, for speech acts theory, not all speech acts are locutionary (i.e. propositions that state something about the world), but there are also illocutionary speech acts that *perform* social actions. However, speech act theory is limited to classifying linguistic acts according to the action they perform by focusing on isolated utterances, abstracted from the real situation of use. Drawing on Wittgenstein (1974/1953), Sacks argues instead that speech acts cannot be conceived as meaningful entities *per se*, since they achieve their meaning only through their situated use (Caniglia, 2007). The action performed by an utterance is therefore contingent and relative to the interactional circumstances in which it is produced. On this premise, CA adopts a strictly empirical approach based on the transcription and analysis of recordings of *naturally occurring* social interactions (Schenkein, 1978). Such materials allow a very close and repeated examination, enabling the analyst to observe even the tiniest details of the participants' conduct that contributed to the accomplishment of the recorded interactional event (Mondada, 2013a).

CA's empirical approach to the analysis of talk-in-interaction entails adherence to the participants' internal, or *emic*, perspective. This principle informs the definition of the units of analysis. Indeed, as I already mentioned, CA is not concerned with the analysis of linguistic units *per se*, but rather with the analysis of the way social action is assembled using language and other resources (Sidnell, 2013). Hence, the minimal unit of analysis in CA, the *turn-at-talk*, is best conceived as a *pragmatic* unit, rather than a linguistic one, locally constructed and negotiated by the participants in interaction.

The same emic principle applies to the selection of the phenomena to be analysed. More specifically, in CA, providing evidence of a certain phenomenon requires not only that such phenomenon "can be viewed in the way suggested, but that it actually is so conceived by the participants producing it" (Levinson, 1983:319). Therefore, "anything that participants treat as relevant for their interaction may be considered a candidate phenomenon for investigation" (Hoey & Kendrick, 2017:155). Analytically relevant phenomena are analysed with respect to their situated context, which means, by carefully considering their positioning within the course of the interaction. CA is indeed particularly attentive to the *temporality* of interaction, which refers to the locally negotiated, sequential unfolding of actions.

Based on the methodological principles just outlined, CA has historically contributed to systematically investigate the most basic structures of social interaction, among which turn-taking, sequence organization, and repair.

In the foundational paper *A simplest systematics for the organization of turn-taking for conversation*, Sacks, Schegloff and Jefferson (1974) argued that the fundamental mechanism of conversation securing its "local particularization potential" (*ibid.:*700), that is, its flexibility and adaptation across situations, is the turn-taking system. The system allocates one turn at time, therefore ensuring the distribution of opportunities for participation. Sacks and colleagues observed that, during a conversation, speakership is allocated based on some basic principles. More specifically, current speaker may select the next speaker by addressing them in various ways (e.g.: naming next speaker, gazing at them, etc.). If current speaker does not select the next one, then any other participant may self-select by taking the floor. Finally, if no speaker self-selects, current speaker may continue to hold the floor, or the conversation may be brought to an end.

In the same article (*cit.*), the authors also provided a systematic description of how turns are built, by introducing the notion of *turn constructional unit* (TCU). TCUs can be constituted of different verbal (and non-verbal) materials. Sentences, clauses, phrases, or even single words can be recognized as units depending on context (Selting, 2000). A central feature of TCUs is their *projectability*, enabling participants to predict their ensuing development and anticipate the point in which a transition toward a further TCU or a different speaker is likely to occur (a *transition relevant place*, TRP) (Sacks, Schegloff & Jefferson, 1974; see also Clayman, 2013). Drawing on syntactic, prosodic as well as pragmatic details of ongoing TCUs, participants in a conversation are therefore able to predict the likelihood that current speaker is keeping the floor any longer or, conversely, is possibly about to leave it to other speakers. Thus, it is based on projections (Auer, 2005) arising from the emergent production of turns that interactants can coordinate in a sequentially ordered and smooth way, minimising gaps and overlaps – but projections also explain why, when overlaps do occur, they exhibit systematic patterns (Drew, 2009).

Precisely because of its sequential development, obtained through the alternation of speakers, conversational structure provides the fundamental "architecture for intersubjectivity" (Heritage, 1984:254), ensuring reciprocity to the participants' actions. Indeed, each turn displays the speaker's uptake of prior turn and, at the same time, provides a context for subsequent moves. In this respect, each interactional move is at the same time *context-shaped* – it is produced and understood indexically based on its relation to prior sequential environment – and *context-renewing,* because every interactional move forms the context for some following action (Heritage, *ibidem*).

A further fundamental topic in CA is *sequence organization*, which pertains to how subsequent turns are linked to one another within coherent courses of action (Schegloff, 2007). According to CA, the basic sequence structure is constituted by a pair of adjacent turns (the *adjacency pair*), within which the first one (*first pair-part*) projects a range of possible following turns as the relevant next (*second pair-part*). Such projection concerns *conditional relevance*. For example, an initiating greeting like 'Hi!' makes a returning greeting conditionally relevant, likewise questions project the relevance of answers, offers the relevance of acceptance/rejection, requests and directives their fulfilment and so on. While the organization of such sequences goes mostly unnoticed in everyday life, if the initiating action (say, a request) is not followed by the conditionally relevant next action (i.e.: the request is not fulfilled), the absence of the second pair-part is indeed perceived and noticed, which demonstrates that sequence organization is a structuring device to which participants in interaction do orient.

Connected to the sequential unfolding of interaction is the mechanism of *repair* (Jefferson, Sacks & Schegloff, 1977; Jefferson, 1983), a set of practices whereby interactants secure the progression of the interaction and the maintenance of intersubjectivity by detecting and fixing problems. Such problems may concern any aspect of the interaction, such as the articulation of TCUs, the design of references, the selection of the next speaker, overlap, troubles in hearing and understanding, and so on. The repair is composed of two parts: an initiation and a solution. The initiation may be done by any of the participants in the interaction by 'pointing' toward the problematic aspect of prior talk. More specifically, initiation may be done by the participant whose talk contained the trouble-source (*self-initiated*) or by a co-participant (*other-initiated*). Equally, the solution to the trouble may be implemented by either of the two (or more) participants.

1.4.2. CA and cognitive sciences

The brief review of CA key concepts and interactional patterns provided above makes it possible to observe how a systematic investigation of talk-in-interaction can illuminate some fundamental aspects concerning the situated, intersubjectively shaped and action-oriented nature of language, with important implications for cognitive sciences as well. Indeed, with its focus on the emergent, sequential unfolding of action in interaction, CA furnishes an alternative view on the relationship between language, cognition and interaction, in which these phenomena do not originate 'in the head' of individuals, but are rather accomplished through practices whereby participants design, deal with and repair their action online.

Consider, for example, the organization of the conversation by successive turns and the fact that it is made possible as the participants continuously monitor the development of ongoing turns, orienting to the details of their incremental production that allow to anticipate their possible completion. More generally, a fundamental contribution of CA is in having shown that the participants anticipate what will come next on the basis of the temporal and sequentially ordered development of the interaction, that is, without the need for a plan formulated in advance. The notion of projection, which applies to multiple levels of the production of talk and conduct in interaction (Auer, 2005; Drew, 1995; Mondada, 2006; Schegloff, 1996; Streeck, 1995) is key to understanding how the cognitive dimension does not pre-exist to the interaction (for example, in the form of programs, or representations), but occurs in real time together with it. In other words, interactional phenomena do not merely give a social shape to autonomous cognitive processes that take place in the individuals' head, but rather, enter at any level of the conception and composition of actions, which are therefore to be seen as a co-accomplishment of participants in interaction.

Despite not being interested in issues pertaining the cognitive sphere, CA has nonetheless exerted a decisive influence on the development of the *pragmatic turn* (Engel et al., 2013; Madzia & Jung, 2016) in the cognitive sciences that I mentioned at the beginning of this chapter (Cf. §1.2). Perhaps the earliest example of this influence is represented by Suchman's (1987) work *Plans and situated actions* (Cf. §1.3). The author discusses how research on human-robot interaction could overcome the limitations of classical cognitivist approaches by adopting an ethnomethodologically grounded conception of understanding and meaning as practical, temporally unfolding interactional accomplishments. About the same period, another prominent contribution to a more situated development of research in cognitive sciences is Schegloff's paper *Conversation Analysis and socially shared cognition* (Schegloff, 1991). In that paper, which was explicitly addressed to an audience of scholars in psychology, the author focuses on "the interactive foundations of the cognitive" (*ibid.*:153), showing that talk-in-interaction is interactive not only because it is locally and cooperatively produced by participants in interaction step-by-step, but crucially because "the kinds of language components from which it is fashioned – sounds, words, and sentences – have the character they do and are formed the way they are in part because they are designed to inhabit an environment in which the apparatus of repair is available and in which, accordingly, flexible arrangements can be permitted" (*ibid.*: 155). In other words – Schegloff argues – natural language can be under-specified and ambiguous as it is (think of phenomena such as deixis or polysemy) precisely because in its ecology (talk-in-interaction) speakers can find the structures that enable them to secure that the interlocutor understands, and to repair any problems of understanding that may arise (see also Levinson, 2006).

CA methods have also exerted an influence on the inception of DCog. This is evident in Hutchins' analysis of the interactions originally investigated in *Cognition in the wild* (1995a) and further elaborated in a couple of contributions appeared some years later (Hutchins, 2006a, b). In these latter articles, Hutchins employs CA methods to show the multimodal, sequential achievement of collaborative decision-taking on the command deck of a commercial ship.

Furthermore, it is worth mentioning Discursive Psychology (DP) (to provide just a few references, Edwards & Potter, 1992; te Molder, 2015; te Molder & Potter, 2005). Using similar techniques as CA, DP deals specifically with phenomena typically understood as belonging to the cognitive sphere, such as belief, intention, knowledge, motivation, etc., investigating (and redefining) them as practical concerns of the participants in interaction.

Besides contributing to the growth of situated investigations on human social activities, CA approach to language as social action has also oriented research in other fields connected to cognitive sciences, such as psycholinguistics (Clark, 1992; 1996; Clark & Clark, 1977) and social psychology (Holtgraves, 2012) toward an understanding of the inherent interactive nature of language.

More recently, CA has inspired research adopting different methods. Within experimental psychology, a growing interest is presently devoted to testing (in the laboratory) phenomena previously analysed within CA framework. As an instance, CA foundational observations on the turn-taking system (Sacks, Schegloff & Jefferson, 1974) have been confirmed by experimental research in psycholinguistics (see the collection of contributions edited by Holler *et al.,* 2016) and neuroscience (Bögels and Levinson, 2016). It has been also demonstrated experimentally that turn-taking emerges already in pre-verbal interaction, as infants engage in turn-type vocal exchanges with caregivers at a very early age (Gratier *et al.*, 2015; Hilbrink, Gattis, & Levison, 2015)[5].

1.4.3. Embodiment from CA's perspective

Most of CA foundational studies deal with talk-in-interaction. However, this is not to mean that CA only focuses on verbal components of social interaction. Rather, privileging

[5] As a further confirmation of the impact of CA's perspective in cognitive sciences, a recent study (Wang, Yan & Guo, 2019) has evidenced that CA is having an increasing impact in terms of citation scores in the field of embodied cognitive sciences, which, according to the authors, allows to predict that it will continue to be influential in the domain in future years.

This scenario would be very welcome, since, despite combining situated observation and experimental methods has proven to be advantageous for both CA and psychology as regards the study of specific phenomena of talk-in-interaction (Kendrick, 2017), the latter object of investigation is still a minority in cognitive psychological research on language (but see Fusaroli, Rączaszek-Leonardi & Tylén, 2014; Fusaroli & Tylén, 2016).

talk was, at least initially, a matter of convenience, as in the 1970s audio-recordings were far more affordable than audio-video ones. Over the years, the increased availability of portable technologies for audio-video recording has led to an increase in video-based CA studies, starting with the pioneering work of scholars such as Charles and Marjorie Harness Goodwin (C. Goodwin, 1979, 1980, 1981; M. H. Goodwin, 1980, and Cristian Heath and colleagues (e.g.: Heath, 1986, Heath and Luff, 1992) who were among the first to apply CA analytic methods to video recorded interactions in ordinary as well as in professional activities. Since then, the list of CA studies of embodied interaction has been growing constantly, covering a vast range of settings (to mention just a few studies, De Stefani, 2011; Goodwin, 2017; Haddington, Mondada & Nevile, 2013; Heath & Luff, 2000; Nevile *et al.*, 2014; Rasmussen, Hazel & Mortensen, 2014; Streeck, 2009; Streeck, Goodwin & LeBaron, 2011), and the interest in topics connected to embodiment and materiality has increased so much that reference has been made to an *embodied turn* in research on social interaction (Nevile, 2015). Clearly, this turn was "a consequential move for a discipline which aims at a comprehensive understanding of human interaction and which sets as its goal to uncover the practices by which social interaction is produced" (Deppermann, 2013:2).

Video recordings allow to see how participants in interaction build their actions by combining and coordinating various modalities, that include talk (phonation, grammar, and lexis), gesture, gaze, body posture, bodily movement, as well as material resources in the environment, such as objects, technologies, and inscriptions (C. Goodwin, 2000; 2003). Moreover, video materials allow to observe how space structures discourse (Mondada, 1996) and, conversely, how the participants construct space in interaction, both linguistically, by articulating representations of space (Mondada, 2011), and physically, that is, by arranging their bodies in such a way as to configure the *interactional space* (Goffman, 1963; Kendon, 1990; Mondada, 2013b), as well as by acting upon the material surroundings to *inscribe* the relevant perceptual field within the encompassing physical space (Goodwin, 2000; Mondada, 2011). Furthermore, video-recordings allow to observe how participants deal with changes in both spatial and temporal contingencies due to motion (Haddington, Mondada & Nevile, 2013).

Besides broadening the range of details that can be observed and analysed using CA methods, the availability of video materials also poses important challenges to CA (Mondada, 2016). First, it raises a terminological question concerning the way we refer to the material and embodied dimension of interaction. While the term 'embodied interaction' may seem redundant (no interaction is actually *dis*embodied, as telephone conversations also include physical aspects related to speech articulation and voice modulation that are actually embodied); the term 'multimodal interaction' exposes to the risk of misconceiving modalities as if they were separate entities or channels, while in fact they are part of integrated assemblages, or *multimodal Gestalts* (Mondada, 2014a), both in the lived experience of the participants and in action-formatting.

Furthermore, the analysis of multimodal components leads to revisiting the centrality of language with respect to other resources. In this regard, Mondada (2014a) efficaciously emphasizes that "[t]aking seriously the constitutive plurality of these [multimodal] resources has an important consequence: to consider that language is integrated within this plurality and that it is one among other resources, without any *a priori* hierarchy. *In situ*, participants might use these resources in a way that is selective and that prioritizes one of them" (ibid.:138). Therefore, the task of CA is to justify the analytical relevance of each modality or detail of the physical and material circumstances of interaction by reflecting the way in which the participants themselves orient to it as relevant (Goodwin, 2000).

Another crucial analytical issue concerns the fact that embodied interaction unfolds on different and interconnected temporal scales (Mondada, 2018a). For example, while speakers generally minimize the overlapping of turns-at-talk by virtue of the fact that speech engages the auditory channel, making it difficult for two participants who speak simultaneously to listen to each other, the simultaneous production of spoken and bodily actions is instead possible. Consequently, in addition to sequentiality, the temporal dimension of *simultaneity* is also relevant to multimodal analysis (Deppermann & Günthner, 2015; Deppermann & Streeck, 2018). Simultaneity may indeed characterize both the organization of different resources within a single stream of action (e.g.

Stukenbrock, 2014), and the organization of multiple action trajectories occurring at the same time, as in the case of multi-activity (Haddington et al., 2014).

Going into more detail of the temporal relationship between language and embodied aspects in the organization of face-to-face interaction, it is worth observing that embodied components may enter the level of turn-construction, both because interactants visually monitor their interlocutors' bodily displays of recipiency and understanding, and because they may produce actions by assembling diverse materials. As for the first point, a famous example is Goodwin's (1979) analysis of a dinner conversation during which one participant (John) announces to his friend that he gave up smoking for a week. Goodwin shows that John produces his turn in an incremental way, by adjusting his ongoing utterance online based on whom he gazes at, whether the recipient meets his gaze, and whether what he is saying is new to the recipient. Goodwin concludes that many contextual aspects are involved in the emergence of John's turn, which cannot therefore be adequately analysed without paying attention to the interactional contingencies of its production. Therefore, Goodwin's analysis stimulates a reflection on the very notion of *interactivity*, which in the case of embodied interaction, emerges "not only as a matter of consecutive responding actions, but is already implicated in the ongoing production of turns mediated by monitoring interlocutors simultaneous activities and responses" (Deppermann, 2013: 3).

As for the second point previously mentioned (the multimodal constitution of action), drawing on data from dance classes, Keevallik (2013; 2014) shows how the teacher produces multimodal demonstrations by integrating body movement into the emergent structure of her ongoing TCUs. Multimodality affects the organization of sequences as well. As an instance, studies on interaction during driving lessons show numerous examples concerning the fact that, usually in this setting, while teachers design instructions by combining verbal utterances and bodily resources such as gesture (e.g.: to indicate the direction to be undertaken), students mostly accomplish the requested action in a tacit way, performing operations such as steering, breaking, signalling and so on (Deppermann, 2018; De Stefani & Gazin, 2014). These and other findings show that linguistic structures and bodily movements are inherently interdependent, and that grammar is often fitted to the temporality of embodied activities (Keevallik, 2018). Pushing the analysis of the embodied constitution of action even further, Iwasaki and colleagues (2019) show how turn-construction and turn-taking in tactile signed conversations between deaf-blind participants are *entirely* achieved by employing embodied resources.

Remaining on the topic of interactions involving participants with language impairment – and also connected to the broader issue, previously discussed, of the interplay between different resources in the constitution of action – there is evidence that the multiplicity of resources available to participants to produce meaning and action may extend and enhance individual capacities. C. Goodwin (1995; 2004) made a case in point by studying spontaneous conversations involving a man with aphasia (Chil). Despite having a restricted vocabulary – limited to three words: *yes*, *no* and *and* – Chil regularly and efficiently engaged in conversations. That was possible thanks to his persisting ability to combine multiple resources, including lexis (although limited), intonation, gesture, gaze, and environmental affordances, and crucially because, despite not being able to even imagine a sentence[6], he was still able to understand Others talking and to exploit language structure produced by them. Thus, albeit, as a speaker, Chil was *impaired*, as a participant in interaction, he was able to build meanings and construct actions in concert with Others. The situated *semiotic field* (C. Goodwin, 2000), within which Chil could find multiple resources to construct meaning and action, included other participants' talk, enabled him to produce grammatical structures that were beyond his individual capacity. Hence, Goodwin's studies also demonstrate that language itself is inherently a distributed and multimodal activity, interactively co-constructed by *laminating* (C. Goodwin, 2013) a range of verbal and embodied resources and environmental affordances.

The complex interplay between the body, materiality and language evidenced within CA literature not only leads to reconsider the centrality of language relative to other resources for meaning making and action, and to rework the notions of competence and ability in praxeological rather than cognitive terms, but also sheds new light on the

[6] As the author reports: "I asked him once whether he could construct sentences inside his head, even though he could not speak them, and he said that he could not" (Goodwin, 2017:64).

corporeal dimensions to which the participants orient in social interaction. While early studies on embodied interaction mostly focus on visual components of embodied conduct (i.e., components that are *designed to be seen* and are *available to visual analysis*), such as gesture, gaze, and postural shifts, more recent studies have begun considering perceptual dimensions other than the visual one, such as touching, smelling, tasting through which participants observably engage with the materiality of social settings. Together with multimodality, current research also explores the *multisensoriality* of social interactions in relevant contexts of activity (Mondada, 2019a). Albeit not being an interactive phenomenon *per se*, sensoriality can indeed become a relevant part of social activity (Cf. Hausendorf, 2013). One of the ways this happens is by making one's sensory experience accessible to Others. Mondada (2018b) provides a striking example of this by analysing tasting episodes in cheese shops. She shows that, rather than being confined to the private sphere, the tasting experience is indeed configured as a social action, which is interactionally coordinated and sequentially organized. In another study on beer-tasting events for amateurs (Mondada, 2020), the author investigates how individual smelling activity is made interactionally relevant (i.e., checked, responded to, and assessed by other participants) through non-lexical vocalizations.

In the intersection between multimodality and multisensoriality, a special mention goes to the practices of *touching*, which, as we shall see, are particularly relevant for the analysis proposed in the remainder of this dissertation. An impressive number of studies in multimodal CA address the diverse forms and uses of touch in social interaction[7]. Since I cannot make an exhaustive review of this entire body of research here, I will only focus on selected studies that appear particularly relevant to the purposes of my work.

A first level of analysis pertains to the type of interaction that is established through interpersonal body contact. By touching others in specific ways, participants can establish a form of control, constraining the movements of others within trajectories of action that are managed asymmetrically. As Cekaite (2016) shows, touching to control embodies an

[7] Among the most recent contributions, it is worth mentioning the collection of papers in Cekaite & Mondada, 2020 as well as the special issue of *Social Interaction. Video-Based Studies of Human Sociality* on touch in professional settings (Burdelski, Tainio & Routarinne, 2020).

asymmetry of epistemic rights, such as the asymmetry in adult-child dyads. In addition to exercising a form of control, however, in specific contexts of activity, touching others can be aimed at orienting their perception within a perceptual field that is configured as a shared one. This is the case shown, for example, by Nishizaka (2007) in his analysis of the tactile practices adopted in the training of midwives. Another example is provided by the data collected by Ursi (analysed in Greco *et al*., 2019) in the context of guided visits with visually impaired pupils, where teachers use touch to guide the children while reading Braille panels. In both the cases mentioned above, touch enables the construal of a shared attentional focus within which the perceptual experience of one participant (the one who is trained/guided) is scaffolded.

Another level of analysis pertains to how practical engagements with the material world are achieved through touching procedures. Particularly relevant for the analysis presented in this thesis are exploratory procedures through which objects are located, felt, made relevant for action, and also enacted. In this respect, Goodwin's analysis of drawing practices used by geologists in excavation sites (C. Goodwin, 2003) are particularly interesting. The author shows how touch can be used to make specific portions of a larger scene perceptually salient and interactionally relevant. In his analysis, by tracing a line in the soil, geologists select and bring certain phenomena to the fore for shared inspection. This function of touch in establishing a figure-ground relationship illuminates the cognitive as well as the pragmatic dimension of touching practices. Touching is indeed configured as a form of meaning-gathering (Streeck, 2009). The touched surface/object is not simply subjected to sensory reception but is actively constructed as an object perceived for a purpose. This dimension of touching, which can be observed in different contexts of social interaction, is particularly in line with the *enactivist* account of perception as something that subjects *do* (Cf. Noë, 2005). In this perspective, grasping objects and grasping meanings can be placed along a continuum and seen as manifestations of the more general human propension to think through the hands (Streeck, 2009). Indeed, not only are the hands capable of extracting information from the material world in the immediacy of tactile contact (i.e., through exploratory touching procedures), but also, by repeatedly engaging with the material world, they can accumulate knowledge and skills, which in turn may subsequently surface other domains of embodiment, such as communicative gestures (Streeck, *cit.*).

1.4.4. Closing the loop: embodied cognition in and through social interaction

The theme of skilled embodied knowledge of the world is central to an understanding of embodied interaction from both a cognitive and a conversation analytic perspective. The analysis of hand gestures can disclose such dimension. Drawing on video recordings of social interaction in a car repair shop, Streeck (2013:71-73) analyses an episode in which the owner of the shop (Hussein) instructs a worker on how to repair a spot of a car door where the inside cover is damaged. At some point, Hussein tells the coparticipant to go inside the shop and take some glue and adhesive tape. However, he has a trouble in finding the word 'tape'. As he searches for the word, he produces a gesture with both hands depicting the action of unrolling the tape from the roll holder. According to Streeck, the analytic interest of such gesture rests not only on its functioning as an embodied resource for achieving the instruction – the gesture is indeed locally fitted to the emergent structure of the instruction and contributes to its delivery; on a deeper level of analysis (nonetheless accessible through visual scrutiny), the gesture also *enacts* its maker's tacit embodied knowledge. Indeed, Streeck argues, in making the gesture of unrolling the tape, "Hussein's hands display the significance that adhesive tape has *for them* independently from its significance in the current situation" (*ibid.:*72); they enact what they know about the affordances (Gibson, 1979) of the adhesive tape. In this regard, Streeck observes, "hand gestures are performed by *lived bodies*, that is, bodies that have accumulated tactile and haptic experiences and skills in their owner's life-world" (Streeck, 2013:73).

From this observation it is clear that the situated analysis of embodied conduct in social interaction can enrich and enhance evidence supporting the embodied view of language, particularly embodied cognitive accounts of semantic processing revolving around the notion of simulation (Cf. § 1.2.1.). On the other hand, this last perspective can stimulate greater attention to the fact that the embodied resources that participants mobilize in interaction are not only communicative devices, but have to do, more deeply, with sharing a world of bodily experiences and is in part from this dimension that they derive their meaning and their intelligibility for Others. C. Goodwin (1997) brilliantly illustrates this point in his study on geochemistry lab work, drawing on the analysis of an episode involving a student (Gina) and a professor (Billy) who are monitoring a chemical reaction in a fibre. In the episode, Gina comments to the professor that, when the fibre is done, it has a distinctive texture. The author observes that, as the participants verbally mention the texture of the fibre, they both make a 'feeling' gesture with their hands to specify the quality of that texture, which is not otherwise articulated. The participants eventually agree on the point that when the chemical reaction is completed, the fibre has *that* particular texture. Goodwin observes that "[t]he frameworks that make possible mutual understanding of this gesture and of the sensation it makes visible are not constituted by preformulated representations, but through co-membership in a relevant community of practice" (*ibid.*:128).

Hence, the embodied cognitive perspective and the interactional approach can converge on the issue of how we make sense of each other's embodied actions. As I already mentioned in previous sections (Cf. §1.2.2.), current research in neuroscience and embodied cognition increasingly emphasizes the role of *action resonance,* which occurs as our brains simulate observed actions executed by Others. Such picture can be further enriched by considering that human body is always an enculturated and culture-making body, therefore embodiment is not explainable solely on the basis of its anatomical-physiological underpinnings in the individual, but crucially involves forms of motion and physical engagement with the world that are learned through shared engagements in practical activities. This is a fundamental point to be considered. Just as humans are not anchored to a specific ecological niche (Gibson, 1979), but rather inhabit diverse cultural worlds, the same goes for human body, which is not a single entity, but is rather constructed in multiple ways depending on the cultures, the habits, and the discourses in which it is embedded (Violi, 2009). While in many theories of embodiment in cognitive sciences there is a tendency to naturalize and universalise the notion of body based on the assumption that standard bodies/cognitions involve the same sensorimotor patterns and, crucially, by assuming the individual body as the unit of analysis[8], the situated approach to human activity (Cf. §1.3) as well as EM/CA perspective both can contribute to show the making and functioning of the lived body (in the sense of *skilled and enculturated* proposed by Streeck, 2013) within and across cultures, activities and interactional situations.

[8] In this respect, Violi observes: "If one of the critical aspects of classical cognitivism could be seen in its *isolated mind*-style stance, a risk of embodiment theories is the construction of an analogous *isolated body,* which becomes the source of meaning and the basic structural matrix of all semiotic processes". (Violi, 2009:59).

II.
Data and methods

2.1. The research setting

This empirical study investigates social interaction within paraclimbing training sessions involving expert climbers and trainers. As already mentioned in the introduction, paraclimbing means a form of competitive climbing adapted to the needs of athletes with disabilities – in the specific case analysed here, those having visual impairments.

In a nutshell, the difference between mainstream competitive climbing and paraclimbing with visually impaired climbers rests on the adaptation of some organizational aspects. Basically, the IFSC (*International Federation for Sport Climbing*) regulation provides that visually impaired climbers can be accompanied by their trainers in the competition and be guided by them both during the pre-climbing inspection of the route from the ground (usually referred to as *route preview*) and during the ascent. Otherwise, visually impaired climbers train and compete in the same facilities and following the same rules as their able-bodied peers.

In the following, I will provide an overview of the core characteristics of competitive climbing that are required to understand the setting and the activities documented in the data. Then I will detail the materials and methods of this study.

2.1.1. Competitive climbing

Competitive climbing consists in ascending an artificial rock face by only relying on hands and feet. The ascent is accomplished following a *route* and using *handholds* (i.e., hand grips) and *footholds* (foot rests) to anchor the body and propel it upwards. The progression follows a path called *route*, which can be longer or shorter and more or less sloping, depending on whether it is set on a vertical cliff or boulder.

The difference between climbing a high wall and a boulder also concerns the danger associated with them. Climbing very high walls such as those used in competitions requires the use of specific technical equipment which is meant to preserve the climber's safety against possibly life-threatening falls. Such equipment includes a seat *harness* supporting a metallic *belay* for the anchoring of the *safety rope*, which can be locked to *quickdraws* placed on the surface of the climbing wall all along the ascent (as in *lead* climbing), or alternatively, be suspended to a single quickdraw placed on top of the route (as in *top-rope* climbing). During the ascent, the climbing rope is attached to the climber's harness on the one end, while the other end is threaded through a braking device (the *grigri* or simply *gri*) hooked to the harness of a partner (the *belayer*) who assists the climb from the ground. By manually operating the *grigri,* the belayer regulates the slide and tension of the rope and stops it in case of a fall.

The safety devices and belaying techniques just mentioned are not required in *bouldering,* because boulders have normally limited height. In this case, the climber's safety is secured by placing a cushioning *pad* at the basis of the boulder. Moreover, a partner (the *spotter*) places herself behind the climber, ready to intercept and direct the climber's fall toward the pad for landing.

2.1.2. The material environment of competitive climbing

As already mentioned, competitive climbing is practiced on artificial rock.

Built structures for climbing were initially established as an alternative to the mountains to train in the cold and rainy season[9], but technological advancement has made

[9] According to White (2013), the history of artificial climbing walls can be traced back to the 1930s, when the first human-made climbing wall, the Schurman Rock, appeared near Seattle (USA). It was built of real stone blocks, purposely arranged to form a wall where climbers could learn and consolidate specific skills, such as belaying techniques, required to climbing in the mountains. The precursor of contemporary artificial climbing walls, however, dates to a more recent time, namely the 1970s, when the Leeds Walls were realized in the UK. They were the first structure built as an alternative to natural rock for climbing whole routes. Another crucial development in the history of indoor climbing came in the mid-1980s, when manufactured bolt-on holds were introduced. These holds reproduced the protrusions and cavities as well as the changing texture and grip of natural rock, with the advantage of being flexibly re-arrangeable to configure new routes from time to time.

The advent of contemporary artificial climbing walls has led to a change in the approach to climbing. Born as an adventure activity focused on regaining contact with the wild nature, climbing has turned into an them increasingly attractive and flexibly adaptable to the requirements of both leisure and agonistic practice. The growing availability of climbing facilities in urban environments has also resulted in the progressive diversification and autonomy of *indoor climbing* from rock climbing (Kulczycki & Hinch, 2014; Mittelstaedt, 1997). This process has resulted in the birth of competition climbing, which will debut as an Olympic discipline on the occasion of the Tokyo 2020 Olympic Games[10].

Artificial walls installed in contemporary climbing gyms appear like the one depicted below (Fig. 1), which I photographed during the data collection for the present study. In the gym, each wall was equipped with several routes composed of bolt-on-holds of varying size and shape. The routes were periodically updated to offer always new climbing opportunities. Each route was designed to offer a different climbing experience and confront climbers with specific challenges. To facilitate their identification, routes were marked by distinctive colours, and identified by individual name and the corresponding level of difficulty expressed in grades. This information was displayed on panels placed at the foot of the wall (Fig. 2).

athletic activity focused on putting the body to the test with sequences of movements of increasing difficulty (Ferrero Camoletto & Marcelli, 2020). Nowadays, artificial climbing gyms host walls equipped with several routes of varying difficulty to meet the needs of both leisure and competitive climbing, at all levels of expertise.

[10] The *Games of the XXXII Olympiad*, informally known as 'Tokyo 2020', were supposed to be held in Tokyo, Japan, from July 24 to August 9, 2020. Due to the COVID-19 pandemic, the event was postponed by one year, and is currently scheduled for summer 2021. However, for marketing and branding reasons, it was decided to keep the original name of the event (i.e., 'Tokyo 2020'), despite it will be held in 2021.

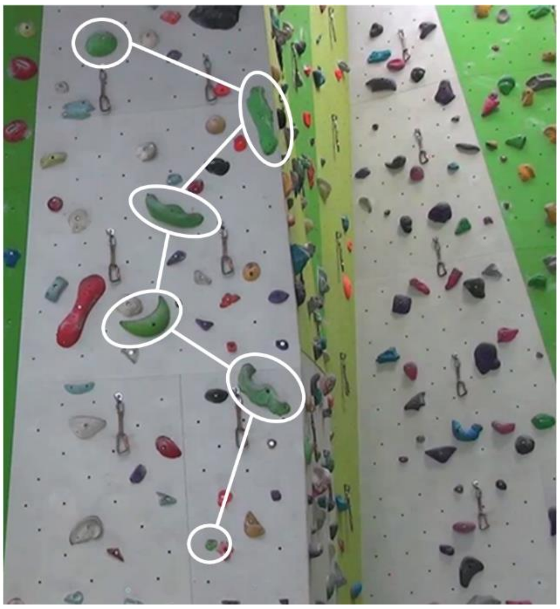


Figure 1 *depicts part of an artificial climbing wall hosting several holds, screwed into place through pre-drilled holes – in the picture, empty holes are visible as well. The holds come in varied size, shape, and orientation. Holds marked with the same colour form part of the same route. To increase the clarity and comprehensibility of the figure for the reader, I highlighted a set of green coloured holds configuring a section of the same route.*

Figure 2 *depicts a panel displaying a list of five routes set on the same wall. For each route, the colour mark (on the left), name and difficulty grade (upper row), date of setting and route-setter (lower row) are provided. In the picture, the difficulty grades are expressed according to the French numerical system, which is the most widely used convention for assessing the overall difficulty of the route. The system is based on numerical degrees (typically 1 to 9) to which optional letters (e.g., 'a', 'b', 'c') and '+/-' symbols are added to indicate difficulty grades that lie in between two consecutive numerical values.*

As can be seen in the figures above, artificial routes for climbing are configured by combining resources as diverse as colours, shapes, spatial arrangements, and inscriptions, each making a specific contribution to the intelligibility and organization of both pre-climbing route preview and climbing[11]. However, these resources are designed for an

[11] Clearly, this semiotically rich environment is only meaningful to a skilled observer, that is, an observer capable of seizing its relevant features for climbing. The way climbers perceive the climbing space is indeed informed by their climbing skills and practical goals, in other words, by their *professional vision* (Goodwin, 1994). This issue has been investigated from a variety of perspectives. For example, some scholars in experimental psychology (Pezzulo et al., 2010) have measured climbers' ability to recall the arrangement of a route after observing it from the ground. Their findings show that experienced climbers performed better at this task than novices when they were confronted with difficult routes; however, the performances were similar in the two groups when they were confronted with a route impossible to climb, which the researchers had arranged purposedly. According to the authors, these results suggest that climbers recall the route in terms of motion sequences, and the better performance of expert participants related to their larger repertoire of motor patterns compared to that of less experienced participants. The failure in recalling the artefactually created 'impossible' route among both experienced and novice participants confirms that they could not envision any possible sequence of movements in it, and hence they did not retain a reliable representation.

eminently visual use, that is, assuming the able-sighted climber as default. Hence the need, in paraclimbing, to constantly support the visually impaired climbers with sighted guides who can instruct them on the arrangement of the route and the location and shape of the holds, both while previewing the route and while climbing.

2.2. Fieldwork and data collection

The fieldwork was conducted between February and April 2016 in two climbing gyms in Bologna (Italy). As evidence of the increased popularity of indoor climbing in Italy, at that time five sporting venues were operating in the territory of the city of Bologna, which also hosts the chief seat of the the Italian federation for sport climbing (*FASI*: *Federazione Arrampicata Sportiva Italiana*).

2.2.1. Participants

Participants in the study are three climbers with visual impairments (one female and to males) and two trainers (one female and one male), all based in Bologna.

When the fieldwork took place, the three athletes had already been top-ranked competitive climbers for some years. More specifically:

- MARCO[12] (CLI-1) had been practicing paraclimbing for six years in the category B1 (blind), according to the classification provided by the IFSC (IFSC, 2018)[13].

Moving on to a rather different research approach, it is worth mentioning that scholars in Ethnomethodology (Sánchez-García, Fele & Liberman, 2020) have stressed that the way climbers anticipate possible motion patterns based on the inspection of the route from the ground rests not merely on hidden mental simulation, but rather on public practices such as embodied simulations and verbal descriptions which are accomplished in a collaborative and interactional context.

[12] To protect the participants' privacy, the names reported here are fictitious.

[13] According to the IFSC (2018) classification, paraclimbing includes three categories, each one grouping similar physical impairments:

1. Visual Impairment
2. Amputee
3. Limited range, power, or stability.

The category *Visual Impairment* (conventionally identified with the letter B for "blind"), includes three visual classes:

- GUIDO (CLI-2) and GAIA (CLI-3) had been practicing competition paraclimbing for four years in the IFSC category B2 (severe visual impairment).

Figure 3. CLI-1.

Figure 4. CLI-2.

Figure 5. CLI-3.

As for the trainers, they were expert climbers and professionals. More specifically:

- MARTA (TRA-1) was a climbing trainer and a sight-guide. She devised the guiding method that will be described in Chapter IV together with the three athletes mentioned above, whom she had been guiding for some years both during training and competition climbing.
- ANTONIO (TRA-2) was a university student in Sport Sciences, a climbing trainer and a sight-guide.

- B1**:** blind athletes. The class includes:
  - those who have complete sight loss in both eyes
  - those having mere perception of light and shadow or of a moving hand in the eye with better visual acuity
  - those who have a residual visual field lower than 3% in the eye with better visual acuity.
- B2**:** athletes with severe impairment (residual visual acuity no greater than 2/60 and visual field up to 5%).
- B3**:** athletes with moderate-severe impairment (residual visual acuity between 2/60 and 6/60 and a visual field between 5-20%).

Figure 6. TRA-1.

Figure 7. TRA-2.

2.2.1.1 Ethical procedures in participants recruitment

All the phases of the research presented in this thesis (fieldwork, data production and treatment) were formally approved by the Ethics board of the University of Bologna.

The participants took part to the study on a voluntary basis. They gave their consent to both the recording and treatment of the data after I provided them with written disclosure of the aims and procedures of the study and with the declaration concerning the privacy policy according to the law in force at that time (Italian data protection law 2013/196, later replaced by UE GDPR 2016/679).

To secure that the process was fully accessible to the participants with visual impairment, I provided a digital version of all the documents concerning aims and procedures of the study and the privacy policy in advance.

2.2.2. Data collection

Field observation and data collection were carried out in 2016. Since at that time I was not familiar with climbing, prior to realizing the recordings, I engaged in participant observation, attempting to getting myself more and more *tuned up* (Goffman, 1989) with the lived reality of the setting and of the participants. In addition to preceding and accompanying the data collection, this immersion into the social world of indoor climbing continued even after the data collection was completed, when I decided to take indoor climbing classes in order to become a competent member of the climbing community of practices and improve my embodied understanding of the activities I had been documenting.

The collection of the data was organized in two stages. During the first stage, a group of colleagues and I recorded the paraclimbing training sessions held at the university centre for sports (CUSB, *Centro Universitario Sportivo Bologna*). In this venue, the climbing facility was installed in a large room which was subdivided into two distinct spaces by a thin partition. One half of the room hosted a basketball field, where a youth team routinely had classes; the other half was a shared space where, in addition to paraclimbing, fencing lessons were held. As a result, paraclimbing training routinely took place in an extremely noisy environment, which was consequential to the quality of the recordings my colleagues and I were able to collect.

The paraclimbing training sessions taking place at CUSB were led by TRA-1 and TRA-2 separately. More specifically, TRA-1 trained CLI-2 and CLI-3; TRA-2 trained CLI-1. Each session built on a routine of activities including warm-up exercises, targeted exercises for muscle strengthening and coordination, stretching exercises. In one case, the training consisted in an extended bouldering session involving CLI-1 and TRA-2.

The second part of the data collection took place in a venue exclusively dedicated to indoor climbing. The gym was equipped with several structures for roped climbing and bouldering providing the opportunity to attempt regularly updated routes of varying grades of difficulty.

The training sessions were led by TRA-1 alone and involved all the three climbers, who were preparing to participate to the *IFSC 2016 Paraclimbing World Championship* which will have taken place in Paris in the late summer. The training sessions consisted in several rounds of climbing. For each round, the climbers alternated in climbing and in belaying. All climbers were guided by the trainer, both during the route preview preliminary to the ascent and whilst climbing.

2.2.2.1. Practicalities of the recordings

Recordings were realized by using equipment provided by the University of Bologna.

During the first phase of the data collection, video-recordings were made by using two cameras and two microphones. During the second phase, I only used one mobile camera. Overall, it was often necessary to move the camera around and follow the participants' displacement across the gym.

During the second phase of the data collection, I asked TRA-1 to wear a wireless microphone connected to the camera for the duration of the whole training session. The microphone had a coverage wide enough to capture the climbers' voice when climber and trainer were interacting closely, such as during route preview. During the ascent, due to the increased distance between trainer and climber (the trainer guided the climber from the ground), the microphone did not always record the climbers' talk. However, I would consider this a negligible deficit because climbers usually performed the ascent in silence, without speaking to the trainer.

2.2.3. Composition of the corpus

The recorded data amount to about 12 hours including:

- 1 extended bouldering session (about 1h 30m), performed by CLI-1 under TRA-2's guidance.
- 53 rounds of climbing on different routes, among which 9 rounds were first attempts on routes new to the climber who was involved at each time. The rounds were distributed among the three athletes. As I already mentioned, the climbers were in all cases guided by TRA-1.
- The remaining recordings document various training activities (listed in § 2.2.2.). Unfortunately, the sound quality is mostly poor due to the noisy environment. Therefore, these data will not be analysed in the following chapters of the thesis.

2.3. Data transcription procedures

The process of *doing* the data in CA involves crucially the transcription of the recorded materials. Transcribing is a core activity in CA[14], because it involves understanding the sequential unfolding of the recorded interactions and the constitutive details through which they were produced *in situ*. In general, transcripts should build upon the way the interactional episodes were taken up by the participants and represent as much as possible the perceptible details based on which the participants made sense of the circumstances of their interaction. Especially at the beginning of the analysis, it is advisable to include as much detail as possible, because at this stage the analyst may not know which of the details will turn out to be important for the analysis. Conversely, at later stages, once the analytic focus has been defined and the analysis developed, simplified transcripts can be useful to emphasize the phenomenon of interest and enhance the reception of the analysis, especially to an audience not specialized in CA (Peräkylä, 2009). Indeed, transcripts are the most important means of disseminating and sharing the data among the academic community and the public. Hence, an analyst may select what to capture and present in the transcript and produce different versions of the transcripts for different purposes (analysis, publication, restitution of results, etc).

As far as the present study is concerned, the data were transcribed by paying attention to the relevant features of talk, embodied action, and of the material surroundings, especially concerning the layout of the climbing routes. Transcripts were continually updated as the research progressed, also following collective inspection and analysis within CA *data sessions*[15].

An analytical issue specifically related to the nature of the data under consideration here concerns the segmentation and annotation of body movements. According to CA approach, I adopted *action* as the main criterion, letting myself be guided by the

---

[14] As evidence of the importance that transcription has in CA as an analytical practice, numerous contributions have addressed its theoretical and practical aspects, such as the ones by Ayaß (2015), Duranti (2006), Fatigante (2006) and Hepburn and Bolden (2017).

[15] In CA, data sessions are informal gatherings of researchers aimed at discussing some data. For CA scholars, data sessions play an important role in the process of understanding and analysing the data insofar as they enable to validate, redirect or enhance individual interpretations by subjecting the data and transcripts to collective inspection and discussion (see Ten Have, 2007:140-142).

orientation of the participants themselves with respect to the situated production and interpretation of embodied conduct. Hence, I described the actions as they were made publicly observable and interpretable within the sequential development of the activity, and in relation to activity-specific needs and contingencies. Another interpretative resource comes from my personal competence as a member of the climbing community, which has allowed me to recognize some climbing-specific aspects pertaining the organization of body movements that may escape the eye of a lay person.

The annotation and analysis of the data also required paying attention to the multisensory, as well as multimodal, dimension of the interactions between trainers and athletes with visual impairments during the paraclimbing activities, particularly with regard to the role of tactile practices.

A final, more general, issue concerns the timing and organization of embodied and linguistic resources. Indeed, while the latter are produced incrementally, segment after segment, and unfold sequentially, embodied resources afford simultaneous and continuous forms of temporal organization. In order to capture the dimensions just described, data were transcribed by using specific digital tools. More particularly, I transcribed talk by using *PRAAT* (Boersma & van Heuven, 2001), an opensource software package for speech analysis, which I also used to analyse relevant phonetic features characterizing the delivery of instructions during the climb (Figure 8).

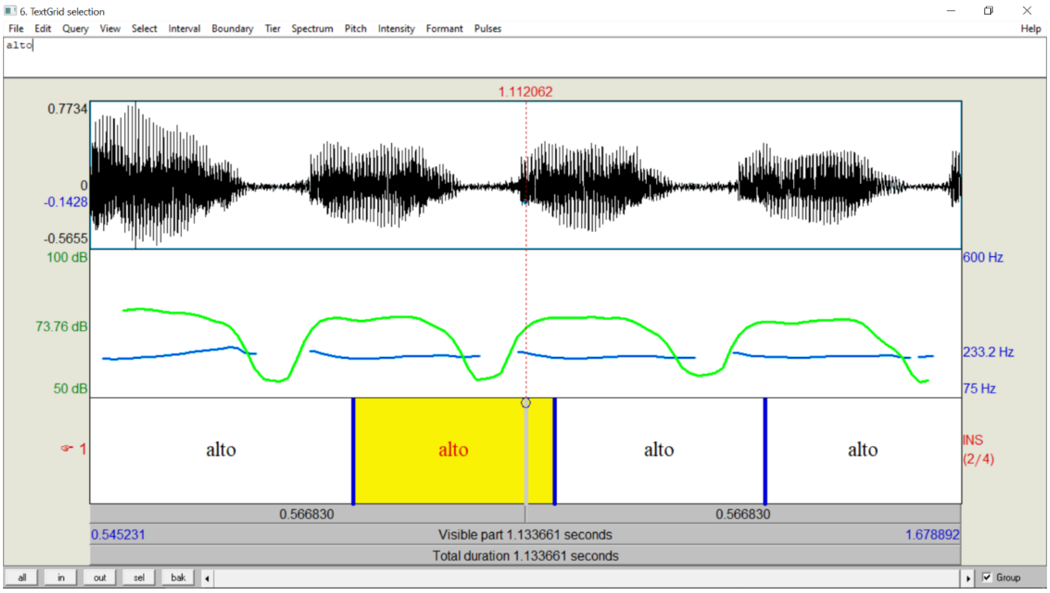


Figure 8. An example of PRAAT interface displaying the waveform (top band), pitch, intensity (both in the central band, marked in blue and green, respectively) and textgrid (bottom band) .

The transcription of embodied actions was realized using *ELAN* (Brugman & Russel, 2004), an opensource annotation tool for audio-video recordings enabling the creation of multiple annotation tiers connected and synchronized with the media timeline (Figure 9), as well as the import and alignment of *PRAAT* text-grids.

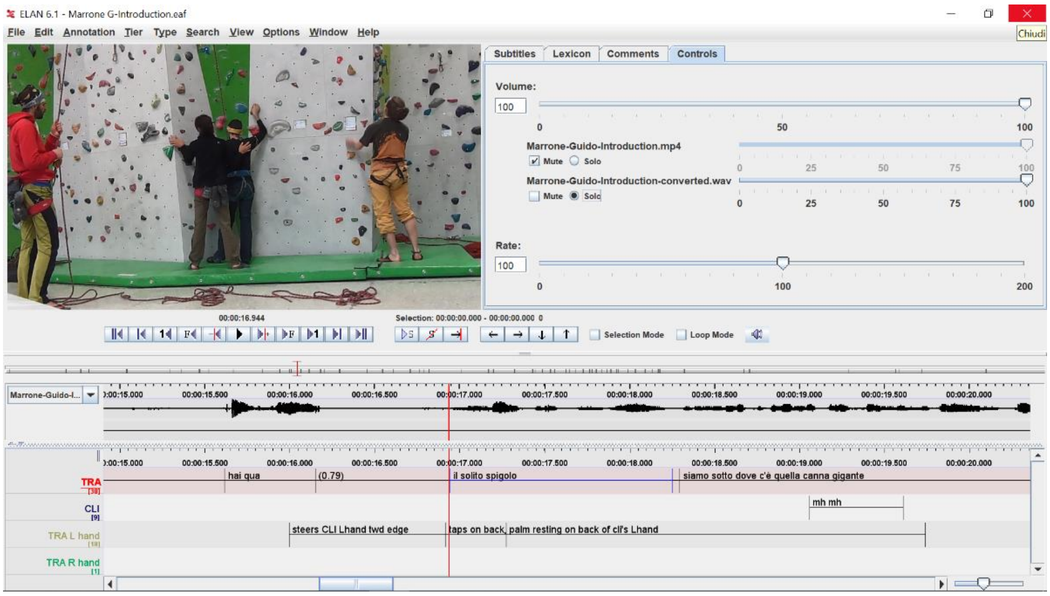


Figure 9. An example of ELAN interface displaying the player and multiple annotation tiers.

The transcripts of the data that I will analyse in the following sections of the thesis are therefore the result of a very complex transcription work and are realized in such a way as to make the phenomenon analysed on each occasion visible. In line with numerous works on multimodality in CA, the transcripts implement a combination of conventions originally elaborated by Jefferson (2004) for talk and Mondada (2019b) for embodied actions.

III.
Climbing preparation: route preview as cooperative perception

3.1. Introduction

This chapter analyses interactions between trainers and climbers during route preview, a pre-climbing activity characterizing both mainstream competitive climbing and paraclimbing, which involves inspecting the route from the ground. Inspection of the route is essential to climbing preparation because it enables climbers to realize how the route has been configured and envision possible sequences of movements in advance of engaging in the ascent.

In mainstream competitive climbing, such inspection exploits environmental resources, such as the colour and spatial arrangement of the holds, and inscriptions, which are primarily suitable for visual scrutiny. In paraclimbing, the accessibility of these resources to climbers with visual impairments is achieved thanks to the systematic support provided by sighted participants, usually trainers, who act as guides during route preview. As a result, in paraclimbing route preview is systematically carried out in pairs and revolves around the cooperation between trainer and climber. The analyses proposed in this chapter seek to reconstruct how the interactional practices employed by trainers and climbers during route preview make environmental features originally designed to be subject to visual scrutiny (the color, the arrangement, and the shape of the holds) perceptually available and shared through other sensory modalities, primarily touch.

The analysis will illustrate that route preview in paraclimbing builds on *cooperative perception.* This term is meant to characterize perception in route preview in two important respects. First, it characterizes perception as a *collaborative practical accomplishment* through which the visually impaired climbers are provided with the resources they need to perceive the route in relevant ways. Second, drawing on Goodwin's notion of *co-operative action* (Goodwin, 2013, 2018), the term 'cooperative perception' points to the lamination and mutual elaboration between multimodal resources, such as embodied spatial formations, touching procedures, gestures, enactments, and various types of verbal practices, such as verbal descriptions, which contribute to the accomplishment of perception-related work.

3.2. Analysis

3.2.1. Positioning in space for sensing the route jointly

Route preview in paraclimbing revolves around sensing the route through touch. Unlike visual observation, which can be done remotely, tactile inspection requires physical contact with the target of perception. This puts constraints on the way participants must arrange for perception. Moreover, touching entails a certain degree of motor activity, as it requires navigating the materiality of things through the movements of the hands and body (Klatzky & Lederman, 2003). Hence, to accomplish route preview jointly and tactilely, trainer and climber must preliminarily arrange their bodies in a way that enables their coordination both while they move towards the wall and, once in contact with it, while they navigate its surface through touch to map the location of holds.

This arrangement consists in a *front-to-back haptic formation*[16] in which the trainer is positioned behind the climber and both participants are positioned facing the wall in close corporeal contact with each other. This formation is *haptic* rather than simply tactile (Gibson, 1966:97-115; Guo, Katila & Streeck, 2020) because, in addition to entail skin-to-skin contact, it also entails actions, such as grabbing the climber's wrists, which are needed to orient the climber's bodily movements. Another relevant aspect of this formation is that it allows the participants' bodies to 'merge' to one, enabling a very fine-

[16] Cekaite's works on front-to-back *control formations* (*C-formation*) and *haptic formations* in parent-child interactions are key references here. However, these works emphasize the controlling (Cekaite, 2010) or the comforting (Cekaite & Kvist Holm, 2017) function of inter-body spatial formations and corporeal contact. The following analyses seek to show two different functions. More specifically, the front-to-back arrangement of the participants is essential to project a common tactile perceptual field; the corporeal contact between them facilitates and amplifies shared perception of the targeted features of the route.

tuned coordination while moving, while the trainer is continually able to “see for two” (Macpherson, 2012), for the benefit of shared navigation.

Consider Extract 1. The extract depicts a transition period between the completion of a prior climbing round and the next one. At the beginning of the extract, trainer (TRA) and climber (CLI) stand facing the wall at some distance from one another. The trainer inspects silently the wall, while the climber waits.

Extract 1 [Rossa_Ga_the red one]

```
          $#     (1.2)
1    tra: $gazes at the wall -->
     Fig.  #1
```

Fig.1

```
2    TRA: allora ci facciamo un giro per la rossa?$
          so do we take a round on the red one
3    tra:                                    -->$
4         (1.0)
5    CLI: sì (va bene)
          yes (that’s fine)
6         ^+    (0.9)   #^+       (1.0)        #+
7    cli: ^steps twd wall^stops
8    tra:  +approaches----+encircles cli f behind+
     Fig.                #2                     #3
```

Fig.2

Fig.3a

Fig.3b (detail)

```
9    TRA:  che parte così.
           which starts like this.
10         +^(0.8)#(0.8)+^      (0.4)#            +
11   tra:  +walks fwd---+
12   cli:   ^walks fwd---^
13   tra:               +places cli's hands on hold+
     Fig.          #4                #5
```

Fig.4

Fig.5

```
14   TRA:  que::sta
           this one
```

After monitoring the wall (l. 2, Fig. 1), the trainer proposes to the climber to take a round on a 'red' route (l. 2: *so do we take a round on the red one?*)[17]. The climber agrees

[17] On an intersubjective level, the function of the expression 'la rossa' (*the red one*) in l. 2 is not to highlight the perceptual relevance of the route (i.e., the red coloured route as opposed to routes of other colours). Since the climber is visually impaired, colour would not provide a meaningful sensory cue in this respect. In fact, the colour name is used as a semiotic resource to recall the route, which, as the definite article 'la' (*the*) suggests, is part of the participants' shared knowledge (ie, the climber has already climbed on it in the past).

(l. 5: *yes (that's fine)*), steps towards the wall and stops (l. 7, Fig. 2), allowing the trainer to join her. While approaching to the climber, the trainer opens her arms and encircles the climber from behind (l. 8, Fig.3a). As a result, trainer and climber are eventually positioned front-to-back (the climber ahead of the trainer), in an arrangement which enables the trainer to share the same orientational positioning with the climber and continually monitor the route (see Fig. 3b).

At this point, the trainer progresses the activity by projecting the demonstration of the starting hold of the route (l. 9: *which starts like this*). The modal deictic 'così', *like this* (l. 9) in turn-final position projects an embodied 'next' (the demonstration mentioned above; Cf. Stukenbrock, 2014), but also requests the climber's collaboration in producing it. It would indeed be impossible to the trainer to show to the visually impaired climber how the route starts without enabling her to reach out to, and touch, the starting hold. So, immediately following this turn, trainer and climber start walking forward (l. 11-12). Despite the lack of precise instructions concerning the direction and path of ongoing displacement in space, the climber proceed smoothly and in a synchronized way with the trainer, progressively reaching out to the starting hold (Fig. 4: as they approach the wall, the trainer extends the climbers' arms toward the starting hold). Here the trainer places both the climber's hands (l. 13, Fig. 5) and says 'que::sta' *this one* (l. 14) to make it intelligible to the climber as constituting the target of the previously initiated instructive demonstration (l. 9).

Some highlights can be made based on the above analysis. First, *by arranging their bodies front-to-back, trainer and climber are able to share the same directional orientation* toward the target of perception. Second, *physical contact enhances the participants' coordination* while navigating in space and positioning at the bottom of the

---

In the paraclimbing corpus, colour names are frequently employed by both trainers and climbers to encode and recall routes. Although, as far as we know from experimental studies in cognitive psychology, colours are differently perceived and conceptualized by sighted and visually impaired persons on an individual level (e.g., Saysani, Corballis & Corballis, 2018), in the paraclimbing data they are nonetheless part of a landscape of experiences which are shared by the participants. This ultimately confirms that, also in the case of interactions between sighted and visually impaired participants, the condition for intersubjectivity is not possessing similar cognitive categories (such as colour categories) but being immersed in a shared community of practices (Goodwin, 1997). See Extract 3 for an illustration of these practices.

route. Finally, *touch is pivotal to configure a common domain of perception,* within which relevant phenomena (in this case, the starting hold of the route) can be subjected to shared sensory access. The trainer's use of proximal demonstrative expressions such as 'questa', *this one* in l. 14 is indeed routinely associated with placing the climber's hand(s) on the referent of such expressions in order to enable her/him to feel it, as shown in the following extract.

Extract 2 is taken from the initial stage of a route preview. The participants are already positioned at the bottom of the route and must locate the starting hold.

Extract 2 [Verde_Go_bright green]

```
1  TRA:  Allora. (.)
         So.
2  TRA:  +presa di partenza, #(.)+ è questa= # +
          starting hold,      (.)   is this one
3  tra:  +positions behind cli---+places cli's hands on hold+
   Fig.                        #6             #7
```

Fig. 6

Fig. 7

The trainer projects the beginning of route preview using the discursive marker 'allora', *so* (l. 1); then she formulates the starting hold (l. 2: *starting hold*) and, following a micro-pause, she increments her turn with a demonstrative description (l. 2: *is this one*). Each stretch of the trainer's talk is timed with a corresponding stretch in her ongoing positioning behind the climber to grasp his wrists and place his hands on top of the starting hold (l. 3, Figg. 6-7). The trainer's talk and embodied action are finely tuned to ensure that the referent of her demonstrative expression (l. 2: *is this one*) is simultaneously available to the climber's tactile access, which is achieved as the trainer places the climber's hands on top of it (Fig. 7).

3.2.2. Framing the start of the route within a multisensory domain of perception

The starting point of the route is framed in a common perceptual domain not only by tactilely locating the starting hold, but also by highlighting perceptual characteristics such as its colour.

In Extract 3, which is the continuation of Extract 2, the trainer employs verbal description and sustained touch to enable the climber to realize the colour of the starting hold. The importance given to colour might seem at odds with the fact that the climber cannot see it. However, as already mentioned previously (Cf. Chapter II), in indoor climbing routes are distinguished and often named by colours (as in Extract 1, l. 2; see note 17). Colour is therefore relevant information within this community, enabling members to identify and recall the routes. At the same time, since the climbers have visual impairments, shared understanding about colours must be grounded in multisensory, rather than solely visual, perception.

Extract 3 (continuation of Extract 2)

4 cli: ((keeps hands on the starting hold))

5 TRA: +**=è un verde molto::** # **eh-**
=it's a green very:: er-

6 tra: +**keeps hands on cli's forearms -->**

Fig. #8

Fig. 8

7 **(0.5)**

8 TRA: **brillan+[te.**
bright.

9 tra: -->+

10 CLI: **[verde, verde verde, sì?** ((tenendo le mani sulla presa))
green, very green, right? ((keeping his hands on the handhold))

While the climber touches the starting hold (l. 4), the trainer initiates the description of its colour (l. 5: *it's a green*), as she simultaneously keeps her hands on the climber's forearms (l. 6, Fig. 8), securing that the climber's hands remain firmly in place. This enables the achievement of a common perceptual orientation toward the focal object, despite the participants have asymmetrical sensory access to it – the climber touches it, while the trainer gazes at it.

This sensory asymmetry is bridged as the participants' sensing bodies are 'fused' together via the link of touch. In this context, *the trainer touches the target-hold through the climber's hands, and the climber 'sees' its color through the trainer's verbal description.*

As far as the colour description is concerned, in addition to stating what colour the hold is (l. 5: *it's a green*), the trainer expands by providing detailed characterization of its brightness. This characterization is articulated incrementally, by carefully choosing the appropriate words. It is first projected (l. 5: *very::*), then it is momentarily suspended (see the cut-off in l. 4, *er-*). Afterwards, there is a pause of 0.5 length (l. 7), during which the trainer possibly searches the appropriate word to characterize the previously mentioned green. Finally, the word qualifying the colour (l. 8: *bright*) is delivered and the description is completed.

The trainer's verbal description enhances and amplifies the climber's perception, enabling him to eventually experience colour in relevant ways. This is observable in the climber's subsequent turn (l. 10: 'verde, verde verde, sì?', *green, very green, right?*), which he delivers slightly before the trainer's prior turn (l. 9) is brought to a point of possible completion while still keeping his hands anchored to the handhold.

The climber's turn (l. 10) is designed as a request for confirmation (notice the question tag and turn-final rising intonation 'sì?', *right?*). It displays the climber's alignment with the trainer's previous description particularly because the climber reuses the lexical item previously provided by the trainer ('verde', *green*) and repeats it twice in immediate succession (l. 10: 'verde verde', lit.: 'green green'). This *syntactic reduplication* (Keevallik, 2010) is heard not only as an intensified version of the prior 'verde', *green,* meaning *very green,* but crucially, as a version of the trainer's previous description (l. 5-8). The sense of intense green which the climber conveys through the reduplicated form resonates with the 'very bright' green previously described by the trainer between lines 5-8, displaying the climber's perceptual attunement to it.

3.2.3. Combining tactile mapping and listing to sequentially locate footholds in the lower part of the route.

The lamination of multimodal resources analysed with reference to the initial stage of route preview also characterizes the continuation of the activity, which consists in mapping the location of the holds placed at reaching distance, particularly of the footholds that the climber will be required to use at the beginning of the ascent. This mapping proceeds through tactile navigation and practices for naming and referencing the holds. More specifically, the trainer lists the holds and concurrently enables the climber to touch them one by one as the list unfolds.

In the following extract, trainer and climber approach a route which they know as the route 'of pinches' from the particular shape of most of its holds, allowing a pinch-like grip. After the initial recognition-check sequence (l. 1-6), during which the trainer makes sure that the climber has tactilely recognized the route, the activity is pushed forward to the following step, that is, locating the footholds nearby.

Extract 4 [MAH00451_List structure/1]

```
 1   TRA:  >te la< ricordi? ((portando le mani di cli
           sulle prese di partenza))
           do you remember it? ((placing cli's hands on
           top of the starting holds))
 2         (0.2)
 3   CLI:  ah quell[a::
           oh the one=
 4   TRA:           [quella delle< pinza:te
                     that of the pinches
 5         (0.6)
 6   CLI:  okay.
           okay.
 7         (1.0)((tra momentarily releases cli's hands))
 8   TRA:  hai.
           you have.
 9         +     (0.5)    +(0.9)
10   tra:  +grabs cli's LH+moves onto 1st foothold -->
11    TRA  piedino; (0.7)#+
           small foothold
12   tra:               -->+places cli's LH on it
     Fig:                 #9
```

Fig. 9

```
13         +     (1.0)    +
14    tra  +grabs cli's RH+
15    TRA  +piedi:no,        (0.3) #+
            small foothold
16    tra  +moves onto 2nd foothold+places cli's RH on it
     Fig.                          #10
```

Fig. 10

```
17        +    (0.5)     +
18   tra  +grabs cli's LH+
19   TRA  +e piedino.#+
           and small foothold
20   tra  +moves onto foothold+places cli's LH on it
    Fig.                #11
```

Fig. 11

The mapping of the footholds is initiated by the trainer in l. 8 by saying 'hai' *(you) have*, which projects the incipient start of a list. Immediately following her utterance, the trainer grabs the climber's left hand and starts moving it downwards (l. 10). At this point, the trainer formulates the first foothold (l. 11: 'piedino', *small foothold*, literally 'small foot'), and concurrently places the climber's left hand onto a small foothold at the bottom of the route (l. 10-12, Fig. 9), allowing the climber to touch it. This pattern is replicated immediately afterwards, as the trainer grabs the climber's right hand (l. 14), then formulates a new foothold (l. 15: 'piedino', *small foothold*), and simultaneously moves the climber's right hand onto a second small foothold placed a little higher than the previous one (l. 16, Fig. 10). And then again, the pattern is repeated one more time, as the trainer moves back to grab the climber's left hand (l. 18), formulates a new foothold (l. 19: 'e piedino.', *and small foothold.*), which is constructed as the last item in the list (see the conjunction 'e', *and* and the turn-final intonation), and concurrently moves the climber's left hand onto another small foothold, placed even higher, before the climber's chest (l. 20, Fig. 11).

As far as the structuring of the activity in Extract 4 is concerned, the tactile guidance exhibits a recurrent and cyclic patterning, which is achieved as the trainer (1) grasps the climber's left and right hand alternately and (2) moves each of them onto the next foothold. Similarly, the footholds are formulated by the trainer by reusing the same lexical form ('piedino', *small foothold*), which also contributes to give to the activity a repetitive structure. At the same time, the activity exhibits a *sequential* structure because the trainer articulates the delivery of the footholds as a list.

The list structure gives to the repetitive patterning previously described (i.e.: cyclic repetition of the same embodied acts and of the same linguistic formula) a *linear*, tripartite sequential structure, whereby the footholds are presented (and made perceivable to the climber) as constituting three distinct focal objects and their succession in time (and space) is made relevant. Thus, listing functions as a structuring device, providing order and progressivity to the punctual delivery of the footholds. Within the list structure, each delivered item figures as a component in a closed set of items that features a precise order in time and space. Not only are the footholds delivered one-by-one and sequentially, but they are physically located by following the same bottom-up direction in which the climber will subsequently find them while climbing.

As previously observed in CA literature, one of the features of lists is that they project a multi-unit talk, whose emergent structure is mutually intelligible to the participants (Jefferson, 1990; Selting, 2007). Within the embodied ecology of route preview, this has a practical consequence, enhancing the participants' embodied coordination. More specifically, in the data, the projection of a multi-unit list structure corresponds to the projection of the multi-step embodied work needed to map the location of each listed item. The accomplishment of such embodied work entails that the trainer physically directs the climber, and that the latter lends her/himself being physically guided by the trainer for an extended period of time. In this context, the projected structure of the list functions as a resource for making the progression of tactile navigation mutually intelligible, ensuring that the climber let her/himself be physically 'moved by' the trainer, and hence that the trainer maintains a prolonged control over the climber's body.

The emergent structure of the list is indeed monitored by the climber, as shown in the following extract, which also provides evidence that the momentary suspension of the list makes the tactile control on the climber's body no longer relevant. To prolong this control, the trainer must therefore make a specific request.

Extract 5 [MAH00449_List structure/2]

```
1    TRA:  e hai.
           and you have.
2          +                 (1.4)                 +
3    tra:  +grabs cli's wrist, steers twd 1st foothold+
4    TRA:  +un piedino,#+
            a small foothold,
5    tra:  +places cli's hand on foothold+
     Fig.               #12
```

Fig. 12

```
6    CLI:  sì,
           yes,
7          +               (0.4)               +
8    tra:  +moves cli's hand twd 2nd foothold+
9    TRA:  +un altro piedi∞::no?#+
            another small foothold,
10   tra:  +places cli's hand on foothold+holds -->
11   tra:                  ∞looks around -->
     Fig.                             # 13
```

Fig. 13

```
12   CLI:  sì?
           yes?
13   TRA:  'spetta?
            wait?
14         #(1.6)#∞
15   tra:      -->∞
     Fig.  #14   #15
```

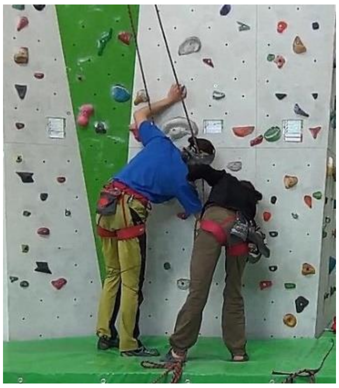


Fig. 14

Fig. 15

```
16   TRA:     +e bon.
               and that's it.
17   tra:  -->+moves cli's hand back to start hold -->
18         (0.9)
19   CLI:  okay.+
           okay.
20   tra:    -->+releases grip on cli's hand
```

At the beginning of the extract, the trainer projects the incipient list by using the same verbal expression as in Extract 4 (l. 9: 'hai', *(you) have*), here paired with a conjunction (l. 1: 'e hai.', *and (you) have*)[18]. In this case as well, the list-projecting expression is followed by the trainer grabbing the climber's wrist and steering his hand toward the first foothold, at the bottom of the wall (l. 3). Then, similarly to the prior

[18] I will elaborate on the analysis of this expression in the following section.

extract, the trainer formulates the first foothold (l. 4: ‘un piedino,’, *a small foothold*) while placing the climber’s right hand on it (l. 5, Fig. 12). Following the delivery of the first item of the list, the climber produces a continuer (l. 6: ‘sì’, *yes*), displaying his monitoring of the ongoing list.

Afterwards, the pattern is repeated in an almost identical way, as the trainer:

1) moves the climber’s hand toward the next foothold (l. 8), then
2) formulates the foothold, this time using a more elaborate version of the prior lexical form to mark the progressivity of the list previously initiated (l. 9: ‘un altro piedino’, *another small foothold*) and
3) simultaneously places the climber’s hand on it (l. 10, Fig. 13).

The second foothold is delivered with a marked rising intonation toward the end (l. 9: *another small foothold?*), which is heard as a display that the list is going to continue, as proved by the fact that the climber produces another acknowledgment token (l. 12: ‘sì?’, *yes?*).

However, the trainer subsequently suspends the activity, requesting the climber to wait (l. 13: ‘spetta?’, *wait?*) while she concurrently looks around (l. 11-14), arguably in search of a further foothold. The trainer’s request orients to the accountability of suspending the current activity, as well as of prolonging current physical control over the climber’s body. Notice that the trainer keeps her hand on the climber’s hand while visually searching for the potentially next foothold, while the climber remains in the same position, with his right hand firmly anchored to the foothold listed last (l. 13-15, Figg. 14-15). Afterwards, by saying ‘e bon’, *and that’s it* (l. 16), the trainer projects the closing of the activity. Such closing concerns both the prior listing of the footholds and the physical work needed to map their location in space. This is evident since the trainer simultaneously moves the climber’s hand back to the start hold and then releases her grip on it (l. 20).

3.2.3.1. The '(E) hai' formula: a window into the distribution of action, and the normativity and accountability of touching.

As the analysis of Extracts 4 and 5 has illustrated, the elliptical verbal construction 'hai', (*you) have* (as in Extract 4, l. 8) or, more often, 'e hai', *and you have* (as in Extract 5, l. 1), recurrently precedes both the initiation of a list of items and the tactile mapping which accompanies the listing. The expression is heard as an incomplete TCU by virtue of its being semantically and syntactically incomplete. At the same time, it is in most cases uttered with a falling intonation (transcribed with a full stop, in both Extracts 4, l. 8, and 5, l. 1), which makes it hearable as a complete TCU. Also, it is routinely followed by a silent pause, during which the trainer grabs one of the climber's hands or wrists, preparing to subsequently guide her/him toward the first foothold in the list.

As I will illustrate in the following analysis, '(e) hai', *(and) you have* is a *routine formula* for projecting the forthcoming beginning of tactile mapping and achieving the climber's cooperation. As such, the '(e) hai'-formula appears to be related primarily to the embodied contingencies and practical requirements connected to jointly mapping holds that are placed in the lower part of the climbing wall. The trainer uses this verbal formula to:

a) signalling that a tactile mapping action (locating a hold) is about to start which entails not only moving the arms and hands, but also crouching down, or otherwise bending over to reach the lower part of the wall.

b) Requesting the climber to join the projected trajectory of tactile mapping by letting her/himself be physically guided.

From point (b) it follows that the '(e) hai'-formula is a resource for the systematic distribution and coordination of embodied action between trainer and climber. This is illustrated in both Extracts 6 and 7 below.

In Extract 6, after uttering 'e hai', *and you have*, the trainer moves the climber's right hand toward a foothold, which is placed far down the climbing wall. Reaching that hold jointly entails that both trainer and climber bend over in a synchronized way.

Extract 6 [MAH00450_Bianca_Ga]

```
1   TRA:   e ha:i.
           and you have
2          #(0.6)+     (0.4)      #+
3   tra:         +grabs cli's Rwrist+moves downwards -->
    Fig.   #16                    #17
```


Fig. 16 **Fig. 17**

```
4   TRA:   (quindi) se sali di destro ^qua ci metti (.) il si^+#ni::stro
           (so) if you go up with the right here you put (.) the left
5   tra:    > moves downwards, bending-----------------------+((makes cli
                                                         touch foothold))
6   cli:                          ^bends knees ----------^
    Fig.                                                  #18
```

Fig. 18

((Tactile mapping of the footholds continues))

At the beginning of the extract, the trainer says 'e ha:i', *and (you) have* (l. 1), then, similarly to Extracts 4 and 5, she grabs the climber's right wrist (l. 3, Fig. 17) to move her hand downwards. Afterwards, instead of initiating a list of items, the trainer produces an instruction (l. 4: '(quindi) se sali di destro qua ci metti (.) il sinistro', *(so) if you go up with the right here you put (.) the left*), while simultaneously moving the climber's hand toward a foothold placed far down the wall, and bending (l. 5). Besides letting her right hand be guided by the trainer's hand, the climber also bends her knees and crouches down (l. 6, Fig. 18), adjusting to the trainer's ongoing embodied action.

The efficacy of the '(e) hai'-formula as a resource for the distribution of action lies in the fact that it foreshadows and constraints the next action of the climber projecting the relevance that the climber cooperates in the projected tactile mapping. This is evident in the way the climber responds to it in Extract 7 by lowering his hand so as to join the trainer's hand and jointly reach the projected foothold.

Extract 7 [MAH00457_Viola_Ma]

((CLI has autonomously located the starting holds, TRA joins him))

1 TRA: #**e hai,***# ((raggiungendo cli da destra))
and you have ((reaching cli from the right))
2 CLI: ***lowers RH offering it to TRA -->**
#19 #20
3 **(1.3)***+#
4 CLI: -->*
5 tra: **+grabs cli's RH, moves it downwards bending-->**
#21


Fig. 19


Fig. 20


Fig. 21

6 TRA: **io parto incrociando basso là.**
I use to start by crossing [the feet] down there.
7 **(1.2)**+#
8 tra: -->+((places cli's RH on foothold))
9 CLI: **sì.**
yes.

#22


Fig. 22

((Tactile mapping of the footholds continues))

The trainer utters the ‘e hai’-formula (l. 1) while approaching the climber from the right (Fig. 19). Following the trainer’s ‘e hai’, *and you have,* the climber promptly displaces his right hand, lowering it to the trainer’s height (l. 2, Fig. 20). This enables the trainer to grab the climber’s wrist and move his hand toward the target foothold (l. 5, Fig. 21). Similarly to Extract 6, in this case as well the ‘e hai’-formula projects the accomplishment of a complex embodied action, which entails bending to reach a very low placed foothold with the hand (Fig. 22). Another similarity between this one and the preceding extract concerns the fact that the ‘e hai’-formula does not initiate a list of items. Rather, after bringing the climber’s right hand toward the intended foothold, the trainer produces a telling (l. 6: ‘io parto incrociando basso là’, *I use to start by crossing [the feet] down there*), describing the starting move (a *crossing*) she usually does ‘down there’, that is, on the foothold which the climber is currently touching.

To sum, as illustrated in the preceding extract, ‘e hai’, *and you have,* is recognized by the climber as projecting an embodied ‘next’ which needs to be co-accomplished, hence the relevance that his hand is available to the trainer to proceed in the tactile mapping.

This pragmatic dimension in which touch is used as a means to accomplish social action is intertwined with other dimensions, particularly with the trainer’s legitimacy and accountability when touching the climber's body[19]. In the following, I will illustrate this point by analyzing Extracts 8 and 9.

Extract 8 shows that the legitimacy of touching the climber's body is locally negotiated by the participants. In the extract, following the 'hai'-formula, the absence of the expected embodied response from the climber leads the trainer to check whether her tactile guidance is still needed.

Extract 8 [Marrone_Ga_secondogiro]

```
((cli is already anchored with both her hands to the starting hold))
1   TRA:  Allora, hai.((posizionandosi a sinistra di cli))
          So, you have. ((positioning on cli's left))

2         (0.3) ((cli remains anchored with both hands to the starting hold))

3   TRA:  #te li faccio rivedere? ((posando la mano sinistra sul polso sinistro
                                  di cli, la destra sulla schiena di cli))
          shall I make you see them again? ((placing her LH on cli's left wrist,
                                            her RH on cli's back))

    Fig.  #23
```

Fig. 23

```
4         (0.4)
5   CLI:  no=no mi rico[rdo.
          no=no I remember.
6   TRA:               [okay.# ((ritirando entrambe le mani))
                       [okay. ((withdrawing both hands))
    Fig.                     #24
```

[19] As discussed in previous literature, touching practices in professional settings are employed in a targeted manner to produce specific outcomes but can at the same time constitute potentially delicate interactional moments, bringing issues of normativity and accountability to the surface (see for instance Mondada & Tekin, 2020 and other contributions to the special issue edited by Routarinne, Tainio & Burdelski, 2020).


Fig. 24

In line 1, the trainer utters the 'hai'-formula (here preceded by the activity-shift marker 'allora', *so*) while simultaneously positioning on the climber's left. In so doing, she prepares to subsequently guide the climber in the tactile mapping of the footholds. However, unlike Extract 7, in this case, the climber does not provide any embody display which could be interpreted as complying with the projected trajectory of action, that is, with the tactile mapping of the footholds. In fact, the climber remains firmly anchored to the starting hold with both her hands (l. 2). The trainer registers this lack of embodied response and pursues the tactile mapping trajectory by formulating an offer (l. 3: 'te li faccio rivedere?', *shall I make you see them again?*)[20].

By offering to show the footholds to the climber, the trainer foregrounds her commitment to provide sensory assistance, which indeed shapes all the interactional episodes analyzed so far. At the same time, by formulating the offer as an interrogative (because of the terminal rise in intonation: 'te li faccio rivedere?', *shall I make you see them again?*), the trainer provides the climber with an opportunity to (not) accept assistance. In doing so, the trainer orients to the normativity of (not) pursuing the tactile mapping project if sensory assistance is not needed. She would indeed be accountable for providing a guidance without this being necessary based on the practical contingencies of the interaction, especially because guidance entails touching the climber's body.

[20] Notice that the offer in l. 3 is rather indexical. The pronoun 'li', *them,* indexically refers to the footholds, and builds on the shared assumption that, after the 'hai'-formula it routinely follows mapping the footholds.

In l. 5, the climber declines the offer (‘no=no’, *no=no*) and claims that she recalls the route (‘mi ricordo’, *I remember*). In so doing, she displays that she has ‘independent’ cognitive resources that are relevant to the task (the memory of where the footholds are placed) and therefore does not need sensory assistance. Hence, the trainer promptly acknowledges the climber’s response, partly in overlap with it (l. 6) and simultaneously releases the climber’s body (Fig. 24), withdrawing both her hands.

In addition to monitoring the legitimacy of touching the climber’s body, the trainer is also observably oriented toward minimizing the discomfort which touch may cause to the climber. Extract 9 shows how, after initiating a tactile mapping action, the trainer deals with potentially unpleasant sensations that she may cause to the climber through the grip of his wrist.

Extract 9 [Marrone_Ma]

```
1   TRA:  #e ha:*i, ((keeping her hand on cli’s arm from previous mapping
          action))
           and you have,
2   cli:       *lowers arm -->
    Fig.  #25
```

Fig. 25

```
3         (0.5)#*+*
4   cli:     -->*
5   tra:         +grabs cli’s wrist, moves downwards -->
6   cli:          *bends -->
    Fig.        #26
```

Fig. 26

7 TRA: **scusa ho le mani fredde lo [so.**
sorry I have cold hands I know.
8 CLI: **[no: vai tranquilla.**
no: it's okay.
9 TRA: **un piede qua**+*
a foot here
10 tra: -->+((places cli's LH on foothold))
11 cli: -->*
((Tactile mapping continues))

In line 1, the trainer initiates the mapping of a foothold using the formula 'e hai', *and you have* while keeping her hand on the climber's left arm (Fig. 25) from the previous mapping action (not included in the transcript). The climber promptly offers his wrist to the trainer by lowering his left arm (l. 2-4, Fig. 26). After grabbing the climber's wrist (l. 5), as is usual at this stage of the route preview, the trainer starts moving his hand downwards to reach a foothold placed in the lower part of the wall, followed by the climber who bends to reach that location (l. 6).

However, differently from the cases analysed previously (Cf. Extracts 4-7), immediately after grabbing the climber's wrist, and while continuing to guide his hand, the trainer apologizes for having cold hands (l. 7: 'scusa ho le mani fredde lo so', *sorry I have cold hands I know*). The climber's response (l. 8: 'no vai tranquilla', *no it's okay*) comes in the *preferred* format (Cf. Robinson, 2004). The climber responds immediately, partly in overlap with the trainer's apology. The negation *no* (l. 8), orienting to the trainer's prior assessment *I have cold hands* (l. 7), denies the need to apologize; then, the following 'vai tranquilla', *that's okay* (l. 8) encourages the trainer to carry on current action.

Overall, this apology sequence occurs incidentally, while the participants remain oriented to fulfil the ongoing tactile mapping action, which is then completed by locating the target-foothold both verbally (l. 9: 'un piede qua', *a foot here*) and tactilely (l. 10: the trainer places the climber's hand on the foothold). Despite it does not interrupt the course of the main activity, the apology unit described above (l. 7-8) is nonetheless interesting because it displays the participants' orientation towards the accountability of (some aspects of) touching.

Although touching is pervasively present in trainer-climber interactions during route preview, and despite the trainer has already touched the climber *before* (see Fig. 25), touch is put 'on the record' only after the wrist-grip is established (l. 5). In this context, the trainer's apology (l. 7) displays the urge to repair the possibly unpleasant sensation (i.e., a cold sensation) that the newly established bodily contact (the wrist-grip) may cause to the climber. Therefore, the apology addresses the sensory dimension of touching and its *intercorporeality* – the feeling and being felt by the other, in the sense proposed by Merleau-Ponty (1969). It is as if, through feeling the climber's wrist, the trainer has caught herself feeling her own hands cold. She indeed claims *her* feeling (l. 7: 'ho le mani fredde lo so', *I have cold hands I know*). However, since this feeling is built in intercorporeality, she also formulates the feeling that the climber may have at the very same time. By apologizing for this sensation (l. 7: 'scusa', *sorry*), the trainer treats the sensory and intercorporeal dimension of touching as an additional (and collateral) dimension with respect to the 'baseline' of touching for guiding. While the latter is routine and necessary (tactile guidance is indeed continued), the sensory dimension of touching is instead perceived as unexpected and made accountable.

3.2.4. Depicting and enacting: embodied resources for enabling the climber to realize the affordances of remote handholds

One of the most challenging aspects of route preview in paraclimbing with visually impaired climbers concerns realizing how the upper part of the route is configured. Unlike the holds placed in the lower section of the route, those located in the upper sections are outside of the participants' current reach while they stand at the bottom of the climbing wall. These 'remote' holds are only visually available to the trainer but cannot be perceived by the climber. To bridge this sensory gap, the trainer must therefore convey the location, shape, and grip of these holds by resorting to a range of resources, which include verbal formulations, gestural depiction, and embodied enactments. All these resources are meant to enable the climber to realize the *affordances* (Gibson, 1979) of the holds and prepare to use them while climbing.

The following extract provides an initial illustration of the practices employed by the trainer to convey to the climber the relevant features of a handhold which cannot be reached from the participants' current position. When the extract begins, trainer and climber are positioned at the bottom of the route. They have just completed the mapping of the starting handhold and of the footholds placed in the lower part of the route. At this point, the trainer progresses the activity, focusing on the upper section of the route.

Extract 10 [MAH00461_Mezza luna]

1 TRA: +**e vai su di sinistro,**+
and you go up with the left
2 tra: +**raises cli's LH**------+#
Fig. #27

3 TRA: +**arrivi- >è proprio< a: una: un'arcua**#**ta, una mezza**# **luna,**#+
you get- >it's just< to: a: an arched one, a half moon
4 tra: +**gestural depiction**--------------------------------------+
Fig. #28 #29 #30a/b

Fig.28a

Fig.29

Fig.30

Fig. 28b (detail)

5 CLI: **sì,**
yes,
6 TRA: +**dove poi c'accoppi.**+
where then you pair (your hands).
7 tra: +**lowers cli's LH---**+

The trainer firstly describes how to reach the next handhold (l. 1: 'e vai su di sinistro', *and you go up with the left*) as she simultaneously raises the climber's left hand, reaching out to a location above his head (l. 2). This bodily movement is seen as simulating the described action, but also as a pointing gesture, since the climber's raised hand eventually points towards the handhold which will be described in the following (Fig. 27: the handhold is indicated by the red circle). In this way, a relevant space for perception is projected and made available kinesthetically, as the climber can feel where his hand is pointing.

At this point, the trainer goes on with describing the target handhold (l. 3). She carefully searches the appropriate words for conveying its shape to the climber, as can be induced based on the self-initiated repair ('arrivi- >è proprio<', *you get- >it's just<*), on the hesitation preceding the delivery of the first descriptive formulation ('a: una: un'arcuata', *to: a: an arched one*) as well as on the delivery of a second descriptive formulation immediately afterwards ('una mezza luna', *a half-moon*). The emergent construction of this turn is accompanied by a gestural depiction of the shape of the handhold (l. 4) which the trainer produces by moving the climber's left hand sideways like a wiper arm to draw an arc trajectory in the air (Figg. 28-30). The arched pattern of the gesture conveys the arched shape of the handhold (magnified in Fig. 28b) which is topicalized in the trainer's verbal description (l. 3) making it experienceable to the climber through his own bodily movement.

Following the climber's acknowledgment (l. 5: 'sì', *yes*), the trainer describes the action which the climber will perform once the handhold is attained (l. 6: 'dove poi c'accoppi', *where then you pair your hands*) and lowers the climber's left hand to bring it to a neutral position (l. 7), which projects the completion of the sequence.

As the analysis of Extract 10 has illustrated, a blend of various kinds of resources is made available to the climber for realizing the relevant features of the remote handhold. Visual information concerning the location and shape of the handhold, which the climber would not otherwise have access to from his current position, is provided to him through the aural-vocal, kinaesthetic (gestural) and haptic modalities. This sensory information is sequentially structured and delivered by the trainer. More specifically, the initial description of the reaching out movement (l. 1: *you go up with the left*) provides the sequential context in which the climber will encounter the handhold. Then the handhold is presented as a landmark, a 'place' where the climber's left hand will arrive (Cf. l. 3: *you get*) and which needs to be recognized. This gives prominence to the characteristics of the handhold that can be tactilely caught and occasions the following description (l. 3) as well as the gestural depiction of the outline of the handhold (l. 4). The peculiarity of this gestural depiction is that it is produced by the participants' co-bodies rather than displayed by one party (the trainer) to the other (the climber). It is as if the participants engaged in a dance, with the trainer in the role of lead and the climber in a follow role, moving smoothly and in a timed manner with the trainer.

To be sure, bodily movements are integral part of the process of route preview irrespective of whether it is conducted collaboratively, as is routinely the case for climbers with visual impairments and their trainers, or individually, as shown in Fig. 29.

Fig. 29. *The trainer (standing) visually inspects the route and moves her hands to simulate grabbing the observed holds. The picture was taken during a training interval. In the picture, we also see the climbers taking a rest (i.e., the climber sitting in the foreground) and chatting (i.e., the couple in the background).*

Indeed, as observed in previous literature (Jenkings, 2017; Sánchez-García, Fele & Liberman; 2019), during route preview, expert climbers routinely simulate the progression on the climb with their body while observing the route from the ground. As can be seen in Fig. 29, this simulation consists in moving the arms as if for reaching the observed holds and in shaping the hands in a way which reflects the type of grip afforded by the holds that are observed.

What is striking in route preview with visually impaired climbers is that such enactments are built in the intercorporeal dimension between trainer and climber, as illustrated in the following extract.

Extract 11 [MAH00453_Hai una rovescia]

1 TRA: **a undici, dove spiat[te-**
at eleven o'clock, where it flat-
2 CLI: **[sì?**
yes?
3 TRA: **dove non hai più lo spigolo perché spi[ana,**
where you no longer have the edge for it flattens
4 CLI: **[okay,**
okay

5 TRA: +#**hai una rovescia**#+
you have an undercling
6 +gestural enactment+
7 Fig. #30 #31
8 CLI: **sì,**
yes

Fig.30

Fig.31

Following the description of the direction (l. 1: ‘a undici’, *to eleven ‘clock*) and of the location of the next handhold (l. 1: ‘dove spiatte-‘, *where it flat-*; l. 3: ‘dove non hai più lo spigolo perché spiana’, *where you no longer have the edge for it flattens*)[21], the trainer formulates the handhold (l. 5: ‘hai una rovescia’, *you have an undercling*). She uses a technical term (*undercling*) which in climbing indicates a handhold affording a grip from below, and concurrently simulates the prehensile posture typically adopted to grab onto this type of handholds. She does so by rotating her (and the climber’s) wrist until the palm of the hand faces upwards (l. 6) and holding the climber’s hand shaped in a hollow gesture to simulate the grasping (Fig. 31).

Differently from Extract 10, in this extract, the hand movement is not meant to depict a physical property of the hold (its shape), but rather ‘acts out’ its use, configuring what Streeck (2009) terms a *handling,* a depiction of the object through the action that is typically associated with it[22].

[21] Notice that such description is recipient-designed in two ways. First, the direction of the handhold is conveyed through a clock position, according to the system commonly used to guide visually impaired climbers (see Chapter IV). Second, the location of the handhold is described by reference to a tactile feature of the bearing surface (its flatness) that is assumed to be already known to the recipient (as also confirmed by the climber at lines 2 and 4).

[22] *Handlings* disclose the participants’ “knowledge in the hands” (Merleau-Ponty, 1962:144, cited in Lewis, 2000:73; see also Streeck, 2013), which is a skilled bodily knowledge resulting from prior interactions with the depicted object.

Another difference with Extract 10 concerns the way the trainer uses her hands to engage in the intercorporeal enactment with the climber. While in Extract 10, the trainer adopted a similar wrist grip as the one used to guide the climber in the tactile mapping of the lower holds (Cf. § 3.2.3); in Extract 11, the trainer's hand is on top of the the back of the climber's hand. This position secures a fine-grained mutual perception between the participants, so as the climber can feel the shape of the trainer's hand and shape his hand accordingly. As a result, the *undercling* is intercorporeally enacted by the participants.

The following extract shows a different practice in which the trainer shapes her hands in such a way as to momentarily constitute a *simulacrum* of the target handhold which the climber can subsequently feel and grab.

Extract 12 [MAH00462_Rovescia di falangetta]

1 TRA **c'è una rovescia di- mh mh:: di- di-**
there's an undercling of- erm erm of- of-
2 **hhh.**
3 **di falangetta proprio.**
only allowing a fingertip grip.
4 **(0.9)**
5 TRA **con la sinistra,**
with the left hand,
6 ***(1.0)***
7 cli *draws hand closer to the trainer*
8 TRA **proprio (.) così.**
just (.) like this.
9 +***la tieni** +* **così.#(1.3)**+*
you hold it in this way.
10 tra +.............+simulates undercling+
11 CLI *..............*hooks hand to the trainer's--*
#32

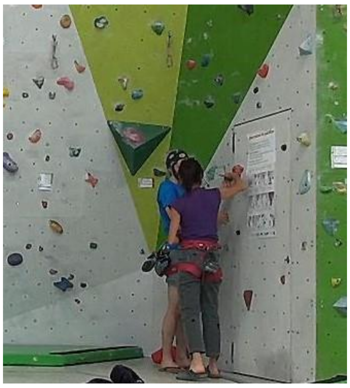


Fig.32

Fig.32b (detail)

In Extract 12, the embodied enactment of the handhold being currently described (again, an *undercling*) is split into two complementary sub-actions which are distributed between trainer and climber: while the trainer simulates the mentioned hold with her right hand (l. 10), the climber enacts grasping the hold with his left hand by hooking his fingers to the trainer's (l. 11).

The embodied enactment just described follows several preparatory steps. The description of the target-handhold is initiated with an informing (l. 1: *there's an undercling*) and is then expanded by adding a detail about the type of grip which that specific handhold allows (l. 3: 'di falangetta proprio', *only allowing a fingertip grip*). After a pause (0.9), the trainer says 'con la sinistra', *with the left* (l. 5), indexically referring to the climber's left hand. This utterance projects the initiation of a demonstration, making relevant that the climber draws his left hand closer to the trainer to enable her to take it. The utterance functions in a similar way as the 'e hai'-formula analysed in the previous section (Cf. §3.2.3.1.) insofar as it projects a joint and multimodal 'next' action. Following the trainer's turn, the climber joins the projected action by drawing his hand closer to the trainer (l. 7). At this point, the trainer goes on with the demonstration (l. 8-9: 'proprio (.) così', *just (.) like this;* 'la tieni così', *you hold it in this way*). Simultaneously with this last utterance, shifts her right hand into a different position, orienting it downwards (wrist up) and curving the phalanges to configure a "C" shape (l. 10, Fig. 32). This gesture is meant to simulate the previously mentioned *undercling* and provide the climber with the opportunity to try the described fingertip grip. The climber promptly adjusts his left hand adopting a complementary position to that of the trainer's right hand. He orients his hand upwards (wrist down), with the palm facing the opposite direction to that of the trainer's hand, and then hooks his fingertips to the trainer's fingers, enacting a fingertip grip (l. 11, Fig. 32). As a result, the demonstration previously initiated by the trainer (l. 9: *you hold it in this way*) is eventually co-constructed by trainer and climber.

3.3. Discussion

In this chapter, I have illustrated the practices through which relevant perceptions of the material layout of climbing routes are co-constructed by trainer and climbers with vision impairments during pre-climbing route preview. By adopting the *praxeological* approach typical of EM/CA (Coulter & Parsons, 1991), I have analysed the practical actions through which the participants make climbing routes and their components the object of shared multisensory perception.

As we know from the pioneering works of the Goodwins (Goodwin, C., 1994, 1997, 2000; Goodwin & Goodwin, 1996), members of professional communities develop specific ways of seeing (*professional vision*) or otherwise perceiving (e.g. through touch, as illustrated by Nishizaka, 2007, 2020), which are informed by their professional culture and practical purposes. Among the professional communities toward which EM/CA scholars have focused their analytic interest, sporting communities have been long overlooked. Yet, perception is crucial to many sporting activities, included climbing (Jenkings, 2017; Lewis, 2000), in which the ability to tune the body to environmental features is decisive to ensure the success of the performance. As previous ethnographic literature on sports suggests, this perception is not restricted to the visual modality, but relies on the auditory (e.g., Powis, 2018) and the haptic modalities as well (Cf. Sparkes, 2009). In this chapter, I have provided evidence that this is certainly the case for route preview in paraclimbing, which rests on multisensory practices of perceiving.

I have defined these practices as 'cooperative' with reference to two fundamental aspects. First, they involve the participants' co-engagement in sensing the route and constructing multisensory perceptions of its material features. In this regard, the practices analysed in the chapter are seen as implementing the IFSC accessibility guidelines (Cf. Chapter II) as regards the accompaniment of the climbers with vision impairment. Second, the analysed practices are accomplished thanks to the *co-operation* (in the sense suggested by Goodwin, 2017) of diverse resources, that is, by systematically assembling sensory and semiotic materials.

Among these resources, language makes a crucial contribution to the overall embodied activity. Linguistic devices such as listing are used to manage the progressivity of the tactile mapping of the route, as is the case for listing the footholds to be touched (§ 3.2.3). Lexical resources are employed to enhance and amplify the climber's tactile perception, as is the case for the descriptions provided by the trainer concerning the colour of the route (e.g., Extract 2) and the shape of holds (e.g., Extract 10). Also, recurrent verbal formulations such as the 'e hai'-formula (Cf. § 3.2.3.1.) are found to systematically deal with the distribution of action between trainer and climber as well as with the accountability and normativity of touching the climber's body to carry out the tactile mapping of the route.

In my analysis, bodily movements and touching practices stand out as the main resources available to the participants to constitute shared moments of perception. As illustrated in the analysis, perception-related work revolves essentially on arranging the bodies and moving in appropriate ways to scrutinize the route through touch. These practices are essential components of the participants' *positioning for perception* (Goodwin, 2007:61). Overwhelmingly, the participants' bodies are, as it were, 'fused' in one single body. The front-to-back haptic arrangement allows the participants to share the same orientational positioning with respect to the target of perception and to move in space and sense the route in unison. Within such an arrangement the trainer 'sees for two', as her visual orientation and visual access to the details of the route are made available to the climber's navigation and haptic actions, enabling the climber to position her/himself correctly and reach out to the relevant features of the route. Also, the participants' arrangement enables the trainer to manoeuvre the climber's arms and hands to guide them toward specific targets of perception which are identified from time to time.

As Goodwin (2007) observes, positioning for shared scrutiny involves that the participants are placed in relevant ways to perceive "both consequential structure in the environment that is the focus of their attention, and each other" (p. 61). What appears clearly from my analysis is that for the participants perceiving the environment and perceiving each other are not simply interconnected, but mutually interdependent. This is particularly true for *the visually impaired climbers whose perception of the route is often built through, with and in the bodily movements and haptic actions of the trainer*, as is the case when the participants *intercorporeally* enact the shape and grip of handholds which are placed outside of their current reach (in § 3.2.4). In this regard, the analysis of Extract 12 has provided a unique example of how the trainer makes her own body a sensory resource for the climber. In that case, the hand of the trainer acts as a material substrate for the climber's sequential action and perception.

To sum, the chapter has illustrated that perception in route preview is not limited only to individual sensory possibilities but is based on resources that are produced and distributed in the interaction with the trainer.

IV.
Auditorily guided climbing: how verbal instructions structure embodied action and perception.

4.1. Introduction

This chapter investigates the core activity of paraclimbing training, namely the ascent on the route. As already mentioned in Chapter II, the IFSC (*International Federation for Sport Climbing*) regulation provides that visually impaired climbers can be accompanied by their trainers in the competition and receive instructions from the latter "concerning the direction of moves, shape of holds, and also distance between them" (IFSC, 2018:86) whilst climbing. This provision concerns not only the competitions, but also the training for competition, which follows the same procedures and is therefore carried out in the form of *guided climbing* rounds.

Given the central role it plays in paraclimbing, the notion of *instruction* will be central to the analysis presented in the remainder of this chapter. However, before proceeding with the analysis, it is useful to define the term, since it may refer to diverse meanings, namely:

1. In the singular form, *instruction* is commonly understood as an instrument to the task of "socialization to competence" (Macbeth, 2004), thus referring to the process or act of imparting knowledge, teaching, and educating.

2. In the plural, *instructions* refer to directions, either written or spoken, on how to do something (usually practical, such as cooking, assembling furniture, etc.).

3. Either in the plural or singular form, *instruction(s)* refers to the action of telling somebody to do something, through directives, orders, requests, etc.[23]

Definition 1 (instruction as education) is not relevant for the purposes of this chapter. Although training may be conceived of as pedagogical in nature, there are two aspects that take the training activities documented in my data away from being eminently educational, which I have already mentioned previously, but I shall recall here for the sake of clarity.

First, climbing practiced by visually impaired athletes is *always* instructed, regardless of the athletes' skill level. Second, as I already pointed out in Chapter II, the recordings on which the following analysis is based were made over a period when the participants were preparing to taking part in an international championship. Thus, performing guided climbing rounds was aimed at exercising in view of the competition (which would have equally consisted of guided climbing rounds), rather than at teaching/learning the skills needed to perform climbing[24].

On the contrary, both Definitions 2 (instructions as directions) and 3 (instructions as directives) capture relevant dimensions characterizing the performance of guided climbing. In the setting under study, instructions are indeed meant to provide *directions* for the visually impaired climbers to be able to follow the route. Such directions are delivered one-at-a-time over a series of sequentially placed turns (Goldberg, 1975), whereby the route is parsed into smaller sections and the location of the holds is conveyed stepwise, hold after hold. Within the EM/CA literature on direction-giving, the sequential achievement of route directions has been mostly investigated with reference to settings in which displacement (i.e., journey) is not currently performed, but only projected (e.g.:

[23] See Lindwall, Lymer & Greiffenhagen (2015) for an extended discussion concerning the uses of the term instruction(s) in EM/CA literature.

[24] Within EM/CA literature on sport and physical activities, instructions have been mainly studied in contexts of teaching (se Definition 1 above) (e.g.: Keevallik, 2013; 2015; Muntanyola-Saura & Sánchez-García, 2018; Okada, 2018), and much less within the achievement of routine sport performance, such as the case analysed here. Rather than to instructional sports settings, the case of paraclimbing training with visually impaired athletes is closer to settings characterized by a collective and collaboratively distributed work, such as surgery, where instructions are crucial for the coordination within the team as well as for the progressivity of the work (Mondada, 2014).

Psathas, 1986, 1991; but see De Stefani, 2019 for an exception). By contrast, in guided climbing, route directions are delivered whilst the climbing is going on, thus their sequential organization is tied to the temporality of the climber's current displacement along the route.

Prior literature has pointed out that instructions are among interactional resources used by participants for *distributing* action (Enfield & Sidnell, 2017) by *recruiting* others to co-accomplish practical tasks (Floyd, Rossi & Enfield, 2020). This is certainly the case also of the interactions that I will show later in this chapter, where the trainer's instructions have the effect of mobilising a consequential embodied action on the part of the climber. Beyond that, the data also show a peculiar phenomenon: in addition to being the agent of the action that is instructed, the climber is at the same time the beneficiary of that action (Cf. Clayman & Heritage, 2014). Put in other words, following the instructions is beneficial to the climber's performance. Although in competition as well as in training the performance is done in pairs (trainer-climber), it is indeed the climber who is eventually evaluated and achieves a score. In this context, the trainer's instructions are employed as means to enable the climber to pursue their own athletic purposes.

The aim of the analysis presented in this chapter is to provide a systematic description of the organization of instructions in guided climbing, and to uncover specific aspects pertaining the instructions' design and timing that reveal the supportive role instructions play with regard to the climbers' performance.

The chapter is structured as follows. Section 4.2, describes the ecology of instructions in paraclimbing, specifically in relation to a) the mechanics of climbing, which involves using both the lower and the upper limbs for propulsion on the vertical plane, and b) the participants' asymmetrical sensory access to the route layout. The analysis of these aspects is central in identifying the basic organizational pattern of guided climbing, that is the instruction sequence (§ 4.2.1). Section 4.3, shows that, in addition to sequentiality, synchronicity is also relevant to explain the functioning of instructions in this setting. The analysis of the simultaneous organization of instructions and bodily movements is then developed in Section 4.4 by considering a distinctive instruction practice which is achieved through the linguistic device of repetition.

4.2. The ecology of instructions in guided climbing

Guided climbing can be conceived of as a *situated activity system* (Goffman, 1961), in which patterns of "action and socially organized perception" (Goodwin, 1997:115) are observably reliant on a range of aspects as diverse as physical *inscriptions* in the material environment (i.e., the climbing routes, Cf. Chapter III); forms of participation identifying different *roles* (i.e.: the guid*ing* and the guid*ed* participants, respectively); shared *rules* determining which actions are locally categorized into legitimate and illegitimate (e.g., only holds included in the planned route can be used to progress upwards); activity-relevant *tasks* of seeing and moving (i.e., tasks of locating and reaching the next hold); and systematic instruction practices for directing perception and action.

To begin with, climbing, understood as a motor process, develops through successive stages. Just as a walk proceeds step by step, climbing also has its own internal stepwise logic, which takes into account specific constraints posed by the force of gravity and the work that the body must do to overcome this force and move up.

One basic technique in climbing (and certainly the most frequently used in the data) is the so called "triangle" (Caruso, 1998). In the triangle progression-technique, the hand that is projected upwards corresponds to the vertex of the triangle; the feet, to the base. As illustrated in Extract 13 below, to maintain stability, the climber proceeds by moving one foot and one hand at a time, forming a new triangle at each step.

Extract 13 [Bianca_Ga_Unpacked climbing flow]


1/1


2/1

The vertical progression unfolds as a sequence of moves which are internally divided into *two subsequent steps*, the first being reaching the next foothold (as in shots 1/1, 1/2 and 1/3); the second, reaching the next handhold (as in shots 2/1, 2/2 and 2/3).

The progression unfolds orderly, as the climber proceeds by raising one limb at a time, alternating the left and the right sides of the body, as she moves the left foot (1/1) and the left hand (2/1), then the right foot (1/2) and the right hand (2/2), and again the left foot (1/3) and the right hand (2/3), and so on.

While the technique described above characterizes climbing in general, other aspects are instead peculiar to guided climbing with visually impaired athletes.

Guided climbing revolves around a unique distribution of resources between trainer and climber, which is illustrated in Fig. 1.

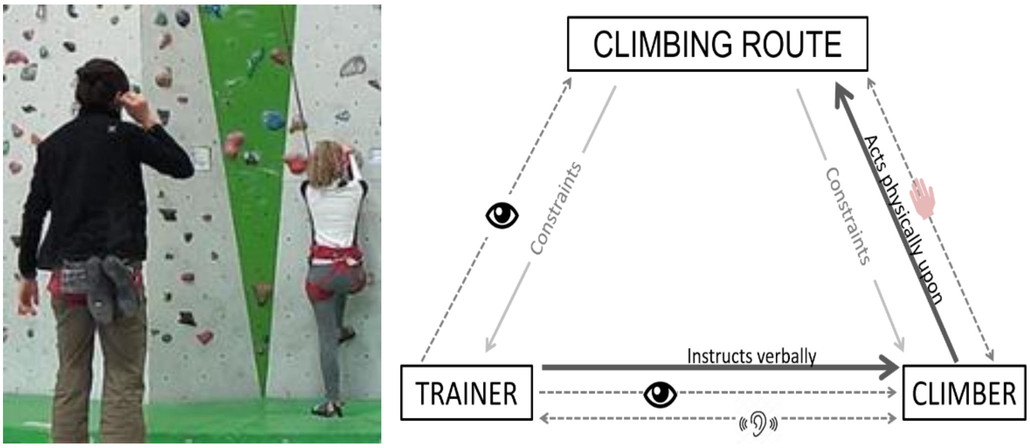


Figure 3. The schema illustrates the distribution of resources between the trainer, the climber, and the climbing route. Notice that the arrangement of the climbing route constraints both the trainer's instruction-giving activity and the climber's body movements.

As we can see in Fig. 1, standing behind the climber and facing the wall, the trainer is in a position to visually monitor the trajectory of the climber's ongoing movements and the route layout. In this context, the trainer can only vocally guide the climber, formulating instructions to convey the location and direction of the next hold. On the other hand, the climber has primary embodied access to the wall and its affordances, as well as the prerogative to implement the practical actions (i.e.: specific hand and foot postures and body movements) that together contribute to accomplishing the climbing.

4.2.1. Basic instruction sequence

Overall, the stepwise organization of climbing described previously (see Extract 13) and the distribution of resources discussed above (see Fig. 1) figure into the sequential organization of guided climbing. As shown in Extract 14, for each subsequent move along the route, the trainer verbally instructs the climber about the position of the foothold and the handhold at distinct and sequentially ordered moments and routinely *before* the climber begins to move. Moreover, after the climber reaches the target hold, the trainer routinely confirms its achievement.

Extract 14 [Bianca_Ga_Basic instruction sequence]

1	TRA:	**piede destro esterno ginocchio** foot right external knee *right foot outside knee*	Instruction
2		**(0.5)** ((CLI lifts right foot opening the leg and reaches foothold))	Following instruction
3	TRA:	**quello, (.)** that *that one*	Assessment
4	TRA:	**undici,** eleven *eleven o'clock*	Instruction
5		**(1.6)** ((CLI opens left hand to eleven o'clock and reaches handhold))	Following instruction
6	TRA:	**quella** that *that one*	Assessment

Extract 14 illustrates the most basic organizational pattern in guided climbing, which consists in a *three-part sequence* similar to *initiation-response-evaluation* (IRE) sequences (Mehan, 1979) typically observed in learning contexts. This sequential pattern unfolds as (1) the trainer produces an instruction (lines 1 and 4); (2) the climber follows the instruction (lines 2 and 5); (3) the trainer assesses the climber's fulfilment and closes the sequence (lines 3 and 6).

If we consider the instructions produced by the trainer in Extract 14, one aspect appears immediately evident, which concerns the indeterminacy of the trainer's instructions. More specifically, we notice that the trainer does not formulate the action to be performed, but conveys only certain details, and particularly, in both instructions at l. 1 and 6, those pertaining to the location of the next hold. Moreover, the words 'foothold' and 'handhold' are never mentioned, and yet the projected outcome of the instructions (reaching a foothold and a handhold at a time) is predictable on the ground of the participants' mutual orientation to the sequentiality of current activity (Cf. Extract 13).

As already observed in prior literature, "[t]he instructions themselves do not prescribe any definite way of following them. Instead, they need to be worked out in relation to the practical and material contingencies of the situation" (Lindwall, Lymer & Greiffenhagen, 2015:146). The indeterminacy of the trainer's instructions – and of instructions in general (see Amerine & Bilmes, 1988; Garfinkel, 2002; Mondada, 2014b; Suchman, 1987) – presupposes certain competences and conventional understandings that trainer and climber share based on a *common ground* (Clark & Brennan, 1991), that is, based on their situated grasping of the course of activity, as well as on background knowledge held in common.

On the other hand, the intelligibility of the verbal formulations through which the trainer conveys the location of the holds builds on shared background knowledge, namely on a *conventionalised system* for conveying directions. This system provides that the position of the footholds is routinely described with reference to the climber's body, as in the case of *outside knee* (l. 1); the position of handholds is instead routinely provided using clock positions (Lynnes & Temple, 2008), such as *eleven* (l. 4). Using such a system secures the accessibility of directions to the visually impaired recipient insofar as it does not presuppose an *ocular* viewpoint, but rather it is intelligible to the climber based on proprioception.

A final observation on Extract 14 concerns the trainer's final assessment, which she produces once the target hold has been reached (lines 3 and 6: 'quello/a', *that one*). The assessment figures as a *sequence-closing third* (Schegloff, 2007) that retrospectively treats the climber's just completed embodied action (lines 2 and 5) as the sequentially relevant response to the prior instruction. Besides validating the fulfilment of the preceding instruction, the demonstrative expression used by the trainer ('quello/a', *that one*) has an additional instructive significance, since it helps the climber to identify the hold she is presently touching as being the *correct* one.

4.3. Assisting the unfolding of movement

4.3.1. Expanded instruction sequence.

In addition to sequence-initiating position, instructions in guided climbing are also often produced in subsequent sequential slots, *simultaneously with the climber's instructed body movement*. More specifically, after having provided an initial instruction concerning the next hold to be reached, the trainer also provides follow-up instructions to *assist* the climber in carrying out the action necessary to reach the target hold.

As a result, the basic instruction sequence illustrated previously (see Extract 14) is often expanded with further instructions, as illustrated in the following extract.

Extract 15 [Verde2_Go_Expanded instruction sequence]

1	TRA:	**piede sinistro esterno gin**+**occhio.** foot left external knee *left foot outside knee*	Instruction
2	cli:	+**lifts LF -->**	Following instruction
3	TRA:	#**sali in linea, (0.3)**+# go up.IMP in line *go up linearly*	Instruction (assistance)
4	cli:	>#**keeps moving LF up-------**+#**reaches foothold**	Completion
	Fig.	#2 #3	

Fig.2

Fig.3

5	TRA:	**que:llo lì.** that there *that's it*	Assessment

In Extract 15, the instruction in l. 3 (*go up linearly*) does not initiate a new sequence, but rather, follows up the climber's ongoing fulfilment (l. 2) of the initial instruction (l. 1) orienting to its progression. In this sequential environment, the instruction in l. 3 emerges partly as a responsive feedback to the climber's ongoing action and a simultaneous description of its present upward trajectory (Fig. 2) (Cf. Keevallik, 2018:7-9), but it also has a sequential implicativeness, making the specified action relevant for the advancement and completion of current activity. Moreover, the instruction in l. 3 accomplishes a function of assistance, allowing the climber to integrate his own perception of the current movement trajectory with the trainer's 'outside' visual monitoring, and ultimately to reach the target hold (l. 3, Fig. 3). Once that happens, the trainer produces the routine formula (l. 5: *that's it*) to convey that the movement was successful and closes the sequence.

The timing of the instruction in line 3 (*go up linearly*) is precisely adjusted to the unfolding of the climber's body movement. It refers to a precise stretch of the movement, which becomes part of a shared perceptual domain. Although current activity is differently experienced by the participants (the climber performs it; the trainer only sees it), it is eventually co-constructed thanks to the simultaneous mobilization of different resources, i.e., body movement and verbal directions, and their online reciprocal tuning.

4.3.2. Mutual adjustment of instructions and instructed body movements

Giving and following instructions during the continuous flow of climbing activity requires, on the part of both participants (trainer and climber), the ability to grasp what is happening on the fly and to adapt just as quickly the course of their conduct, whether verbal or embodied. To clarify this point, let us consider the following extract.

Extract 16 [Marrone_Ma_Mutual adjustment/1]

```
1   TRA:  in linea alla mano destra
          in line at hand right
          in line with your right hand
2         di due +buchi.
          of two holes
```

two holes apart.
3 cli: **^moves LH up -->**
4 **(1.6)**+#**(0.3)**+
5 cli: +#**touches hold**+
Fig. #4

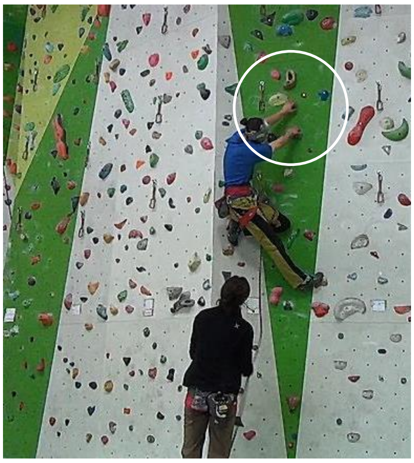


Fig.4

6 TRA: +**sopra**, +#**dest**+**ra**,
above right
up, right,
7 cli: +**moves up**+#**touches hold**+**moves to R -->**
Fig. #5

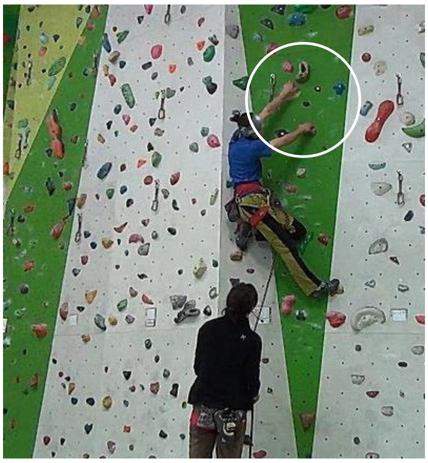


Fig.5

8 **(0.7)**+#
9 cli: **-->**+#**reaches target handhold**
Fig. #6

Fig.6

```
10  TRA:  que:llo,
          that
          that one
```

Extract 16 provides a further illustration of the expanded instruction sequence previously discussed with reference to Extract 15. In this case as well, the trainer produces an initial instruction (lines 1-2: *in line with your right hand two holes apart*) which the climber promptly follows by moving in the indicated direction (l. 3). Then, as we already observed previously, the trainer assists the climber's ongoing action by providing further instructions (l. 6: *up, right*), securing that the climber moves in the appropriate direction to attain the target hold (l. 9). Finally, the climber's fulfilment is validated (l. 10: *that one*) and the sequence is closed.

If we zoom in what happens between lines 5 and 7, we can observe the functioning of the trainer's instructions more closely and better appreciate their efficacy in securing the fulfilment of ongoing climbing move. While raising his left hand in the direction previously formulated by the trainer, the climber initially finds a small hold, feels it with the hand (l. 5, Fig. 4), then moves and finds another hold, which he equally feels with his hand (l. 7, Fig. 5). The instructions in l. 6 (*up, right*)[25] are occasioned by these two transient, tightly ensuing tactile events, and testify of the trainer adjusting ongoing

[25] Here I use the plural *instructions*, because the two directions (*up* and *right*), albeit occurring in immediate succession, are uttered within distinct *intonation contours* (du Bois *et al.* 1993), each of which is characterized by an upward pitch movement, or continuous intonation. As a result, the two segments are heard as constituting two subsequent instructions, rather than one, orienting to precise stretches of the climber's ongoing embodied action.

direction-giving to the emerging contingencies of the climber's bodily conduct. On the other hand, the changes in the climber's motion path (l. 7: he moves his hand up, and shortly thereafter moves it to the right) appear to be consequential to the trainer's instructions, although they are produced almost simultaneously. Hence, the trainer's instructions and the climber's movements are mutually responsive at a micro-sequential level, closely adjusting to one another within a continuous stream of action.

Crucially, the successful accomplishment of the sequence illustrated in Extract 16 rests on distributed perception. None of the two holds the climber touches in lines 5 (Fig. 4) and 7 (Fig. 5) belong to the planned route, which is marked in brown. On the contrary, the two holds are marked in black and in yellow colour, respectively, which means that they belong to different routes and thus are not eligible to be used in the current ascent. The climber cannot visually check for this, but the trainer does. Thus, by uttering the instructions (l. 6: *up, right*) simultaneously with the climber's tactile contacts with the two non-target holds, the trainer helps the climber to correctly interpret ongoing tactile sensation and prevents him from doing a faulty action (i.e., anchoring to non-eligible holds).

In the following extract, the phenomena previously discussed – mutual adaptation between the trainer's instruction and the climber's ongoing embodied action and distributed perception – are even more clearly observable. Furthermore, Extract 17 also offers an illustration of the interdependence of emergent grammar structure and simultaneous body movements.

Extract 17 [Verde_Ma_Mutual adjustment/2]

```
          (1.8)+(0.4)
1  cli:        +moves RF twd next foothold-->
2  TRA:   #a sinis+tra-^
           at left
           on the left
3  cli:        -->+touches hold^
   Fig.   #7
4  TRA:   #+di quella.+#
           of that
           of that one
5  cli:    +shifts to L+#touches target
   Fig.   #8           #9
6  TRA:   quella lì.
          that   there
```

that’s it.

Fig.7

Fig.8

Fig.9

In line 1, the climber moves his right foot toward the foothold previously located by the trainer (instruction not shown in the transcript). As soon as the trajectory of his ongoing movement diverges from the line along which the foothold is located (see the white arrow in Fig.7), the trainer initiates an instruction (l. 2: *on the left*-). By the end of this utterance, the climber touches a hold placed near to the target with his toe (l. 3, Fig. 8). The trainer promptly increments the prior instruction, ‘exploiting’ the hold the climber is presently feeling with his foot as the ground for the deictic reference *of that one* (l. 4). The climber simultaneously adjusts his ongoing movement shifting slightly to the left, in compliance with the instruction to move to the left (l. 5) and eventually finds the foothold (l. 5, Fig. 9). Then, the trainer assesses the fulfilment of the climber’s action (l. 6, *that’s it*).

Extract 17 provides evidence that in embodied interaction, “grammatical elements [...] are chosen in relation to the temporal structure of the ongoing activity” (Keevalik, 2018:8), and that such a choice is made by participants on the spot, adjusting to the moment-by-moment development of the activity. The trainer’s instruction *on the left*- (l. 2) is abruptly (albeit momentarily) stopped following the climber’s contact with the non-target hold, and then it is incremented with the addition of *of that one* (l. 4). This increment is fitted to the previously initiated syntactic construction, with which it forms a complete instruction, as well as to the contingencies of the climber’s ongoing tactile contact.

In this section, I have shown that, in guided climbing, instructions and instructed body movements are organized not only sequentially, but also simultaneously. More specifically, instructions occur both in a sequence-initiating position, before the climbers' embodied response, and in the mid of the sequence, while the climber is already accomplishing the previously instructed action. In this second case, the trainer's instructions emerge in conjunction with specific stretches of the climber's ongoing action. As already discussed previously, such instructions do not initiate a new sequence, but rather assist the climbers in satisfying the goal of the sequentially prior instruction securing that they succeed in reaching the target hold. As a result, although being partly simultaneous, the instruction and the instructed action nevertheless maintain a relationship of consequentiality.

The expression "sequentially ordered simultaneities", coined by Mondada (2017:91), appears particularly fit to describe this organizational pattern. Rather than being merely concomitant, the trainer's and the climber's actions closely respond to one another in a fast succession of initiation-response micro-sequential patterns, involving both the progressive development of the climber's bodily movements and the emergent production of the trainer's instructions.

4.4. Instructive uses of repetition to calibrate the climbers' ongoing body movement

In this section, I expand on the analysis of instructions occurring simultaneously with the climber's embodied actions by considering a peculiar instruction practice which revolves around the linguistic device of repetition.

The following extract provides a preliminary illustration of the phenomenon.

Extract 18 [Grigia_Ga_Sale4]

```
1  TRA:  sa:le    alla coscia.
         go up.3S at   thigh
         up by the thigh.

2  cli:  ((lifts RF to thigh height))
3  TRA:  sa:le    sale     sale     sale,
```

```
          go up.3S go up.3S go up.3S go up.3S
          u:p up up up

4   cli:  ((anchors RF to target foothold))
5   TRA:  quella lì,
          that   there
          that's it,
```

Extract 18 depicts an expanded instruction sequence, whose structure is similar to those analysed previously (Cf. § 4.3). In line 1, the trainer produce a sequence-initiating instruction, followed, in line 2, by the climber's embodied response. In line 3, the trainer provides a further instruction to assist the climber's ongoing accomplishment. In line 4, the climber completes her action by reaching the target foothold. In line 5, the sequence is closed by the trainer with a validation of the climber's just prior action.

My analytical interest focuses on the action in line 3. The trainer's turn is designed as a series of consecutive repeats of the same lexical item 'sale' (lit: *it goes up*) referring to the climber's foot movement. The repeats are uttered within the same *intonation contour* (du Bois et al. 1993), and are therefore heard as a single instruction, rather than the same instruction being uttered multiple times.

In her seminal study, Stivers (2004) investigates instances of a similar linguistic phenomenon (which she terms *multiple sayings*) in conversations occurring in diverse languages. The author finds that speakers routinely produce multiple sayings like 'No no no' in a responsive sequential position, often in overlap with the prior speaker's talk, *to display that the prior course of action has persisted unnecessarily and bring it to a halt*.

Restricting the focus to the grammatical format of *syntactic reduplication,* Keevallik (2010) shows that such linguistic device is overwhelmingly used in response to the prior speaker's turn. In this sequential position, syntactic reduplication may implement a range of actions, among which insisting on previous requests/offers to prompt a response (i.e., imperative reduplication), prefacing a challenging reply to the prior speaker's turn, reinforcing an answer to yes/no question, and affirming the prior speaker's claim.

Both the abovementioned studies (Keevallik, 2010; Stivers, 2004) converge on the point that series of consecutive repeats achieve their function based not primarily on grammar, but rather on their sequential position and prosodic design. However, both studies constrain the analysis of the phenomenon to verbal interaction.

As far as embodied interaction is concerned, series of consecutive repeats like the one shown in Extract 18 (l. 3) have been investigated in contexts of instruction. For instance, the phenomenon is observed in data from driving lessons (Depperman, 2018; Mondada, 2017). In this setting, series of repeated imperatives are used by instructors to *urge* the student to promptly execute the mandated action. In these circumstances, the imperatively formatted request is repeated several times in a pressing way until the student *begins* to perform the requested action.

Mondada (2017) also analyses a different temporal trajectory of the practice, drawing on instances in which imperatives are repeated while the requested action is *already* going on. In this latter case – the author argues – repetition is mobilised to manage the progression of the action that is underway, particularly with reference to *how* and *how long* the action has to be carried out by the recipient[26].

The practice under investigation in this section has the same formal characteristics of the phenomenon previously investigated in CA under the rubric *multiple sayings* (Stivers, 2004). Yet, in the specific setting considered here, the practice assumes a rather opposite function than the one originally observed by Stivers, that is, halting the prior course of action. On the contrary, in guided climbing, series of repeats are recurrently used to *ensure the progression and completion of ongoing climbing actions*. This function is consistent with the one discussed by Mondada (2017), which the author defines *online calibration of action.* However, differently from the cases analysed in Mondada's study – all revolving around the use of repeated imperatives – in my analysis several grammatical categories are involved in repetition and used to calibrate the recipient's ongoing embodied action, among which verbs in the indicative mood (as in Extract 18, l. 3), adjectives and direction terms.

[26] It is worth mentioning also the analysis offered by Baldauf-Quilliatre (2015) and, more recently, Baldauf-Quilliatre & Colón de Carvajal (2019) drawing on data from multiplayer videogaming. In these data, participants uttered repeated 'vague' directives (not addressing a specific action to be undertaken) to *encourage* the recipient to continue current game action.

4.4.1. Formats and sequential environment of repetition in the data

I will now show that, in the data, repetition concerns not only the relationship between items within the same turn, but also between subsequent turns (Cf. the distinction between *intra*- and *inter*-turn repetition in Bazzanella, 1999). The item that is repeated multiple times is indeed *often reused from the sequentially prior instruction*, as in the extract below.

Extract 19 [Grigia_Go_Exact reuse]

```
1   TRA:   sa:le    in linea il  piede sinistro.
           go up.3S in line  the foot  left
           the left foot goes up straight.

2   cli:   ((moves left foot straight upwards))

3   TRA:   sa::le    sa:le     sale;
           go up.3s  go up.3S  go up.3S
           up up up;

4   cli:   ((reaches the target hold))

5   TRA:   lì.
           there
           there it is.
```

The instruction in line 3 (*up up up*) reuses an item from the prior instruction (l. 1: *the left foot goes UP straight*), providing for its “lingering relevance” (Deppermann, 2018:279) at a successive sequential position, i.e., in the context of the climber’s embodied response.

A sense of continued relevance and coherence (Tannen, 1989) is maintained even when the series of repeats elaborates on the prior instruction albeit not reusing linguistic material from it, as in Extract 20.

Extract 20 [Bianca_Ga_Sali_2_Elaboration]

```
1   TRA:   alto alle ginocchia.
           high at    knees
           high by (your) knees.

2   cli:   ((lifts foot at knee height))
```

```
3   TRA:   sali       sa:li,
           go up. IMP go up.IMP
           up u:p
```

In this case, the series of repeats (l. 2: *up up*) occurs in the form of a syntactic reduplication (Keevallik, 2010). The reduplicated item is not reused from prior instruction (l. 1: *high by (your) knees*); nevertheless it elaborates on the prior 'alto', *high*, conveying that the climber should continue lifting her foot up to the required height.

Occasionally, series of repeats may be built with *new* items (not reused from prior instruction), as in the following example.

Extract 21 [Verde2_Go_Giù_6_New instruction]

```
1   TRA:   al ginocchio destro?
           at knee      right
           by your right knee

2   cli:   ((lifts foot))

3   TRA:   a  de:stra-
           at right
           to the right-

4   cli:   ((moves foot to R))

5   TRA:   GIÙ  GIÙ= GIÙ= GIÙ= GIÙ= GIÙ= Guido
           down down down down down down Guido
           DOWN DOWN=DOWN=DOWN=DOWN=DOWN Guido

7   cli:   ((lowers foot and reaches foothold))

8   TRA:   quello.
           that
           that one.
```

Unlike the cases considered above, in this case the series of repeats in line 6 conveys a sense of rupture, rather than continuity, with the preceding course of action, together with a sense of *urgency* (due to latching and increased loudness). As I will show later by taking up this extract and analysing it in detail, this is indeed a case where repetition is used to make a correction relevant.

In the three extracts examined above, it is worth noting the progressive simplification of grammatical construction of turns across the sequence. Several aspects seem to be related to the elliptical formatting of instructions made up of series of repeats, among which their positioning *after* the sequentially prior instruction, pressing time conditions and the recipient's current commitment to performing the mandated action.

First, the ellipticity of the repeats is indicative of their dependency upon the preceding instruction. For instance, in Extracts 19 and 20, the verbs forming the series of repeats are bare, with no argument, because they rely on the prior instruction from which they are reused. Also, conciseness is traceable to the need to adjust the delivery of the instruction to the rapidly changing contingencies of the climber's bodily movements, as illustrated in Extract 21 and already observed in other settings of instructed activity characterized by pressing time conditions, such as driving (Deppermann, 2018; De Stefani and Gazin, 2014; Mondada, 2017). Finally, as pointed out in previous literature, the simplification of the grammatical structure of directives and requests may occur when the recipient is already committed to performing the mandated action (Zinken and Deppermann, 2017), such as in all the examples illustrated above.

4.4.2. Precision timing and prosody of repetition to make continuation relevant

In the data, series of repeats achieve instructive significance not only by virtue of their semantic relationship with the sequentially prior instruction, but, crucially, based on their timing with respect to the climber's current embodied action. More specifically, as already mentioned, the trainer routinely utters series of repeats *while the climber is already fulfilling the previous instruction* by moving toward the planned hold.

If we zoom in the temporal trajectory of the trainer's instruction and the climber's instructed action, we may note that *the repetition lasts up until the moment in which the climber reaches the target hold*, as illustrated in the two following extracts.

Extract 22 [Grigia_Ga_Sale4] (previously analysed as Extract 23)

```
1   TRA:   sa:le    alla coscia.+
           go up.3S at   thigh
           up by the thigh.

2   cli:                        +bends knee -->
3   TRA:    +#sa:le   #sale    #sale    #sale,+#
             go up.3S go up.3S go up.3S go up.3S
             u:p up up up

3   cli:   >+lifts RF-------------------------+reaches foothold

    Fig.     #10      #11      #12      #13     #14
4   TRA:   quella lì,
           that   there
           that's it,
```


Fig.10


Fig.11


Fig.12


Fig.13


Fig.14

Extract 23 [Bianca_Ga_Sali_2] (previously analysed as Extract 20)

```
1   TRA:   alto a+#lle ginocchia.
           high at    knees
           high (up) by (your) knees.

2   cli:         +#lifts RF up -->

    Fig.          #15
3   TRA:   #sali       #sa:li,#+
            go up. IMP go up.IMP
            up u:p

4   cli:                  -->+anchors to foothold
    Fig.   #16         #17    #18
```


Fig.15


Fig.16


Fig.17


Fig.18

In Extract 22, the trainer starts uttering the repeated 'sale sale sale sale', *up up up up* (l. 2) as soon as the climber begins to comply with the initial instruction (l. 1) by bending her knee in order to lift her foot to thigh height. As a result, the series of repeats emerges concurrently with the climber's embodied response, develops in parallel to it, adjusting to the temporality of the body movement, and ends in unison with its completion.

In Extract 23, the trainer's repeated 'sali sali', *up up* (l. 3) closely follows the beginning of the climber's response to the sequentially prior instruction (l. 1) and ends in unison with the climber reaching the target hold (l. 4). Noticeably, in contrast to the cases analysed so far, after the climber completes her action, the trainer does not confirm that the move was successful. In the absence of overt validation on the part of the trainer, the climber treats the end of the reduplicated *up up* (l. 3) as an indication that the hold she is currently feeling with her foot is the target, therefore anchoring her foot to it (l. 4). This detail is important insofar as it suggests that the "precision timing and time embeddedness" (Mondada, 2017) of repetition ensures its effectiveness as a tool to guide the climber's movement to their destination. The timing of the series of repeats itself provides and indication concerning the duration that the climber's bodily movement should have. So, when the trainer stops repeating, the climber assumes that she is presently on the correct hold.

In addition to exhibiting systematic patterns as regards their timing, the series of repeats mobilized by the trainer also present *recurrent prosodic properties* which seem to be equally linked to the function of securing that the climber keeps moving in the same direction until reaching the target. As I will demonstrate in the following analysis, the auditory properties of repetition as they result from prosodic delivery seem to play a crucial role in projecting and making perceptually salient the *continuance* (the extension in time and space) and *consistency* (absence of changes) of the climber's ongoing movement. More specifically, the trainer employs prosody as a resource to *iconically* convey the continuity which is expected to be maintained in the climber's concurrent embodied action. Hence, in the following analysis, the perceptual properties of repetition appear placed in the foreground with respect to the lexico-semantic properties of the repeated items. The duration and the continuous trajectory of the climber's movement are instructed mainly by exploiting the prosodic design of the series of repeats. In line with previous studies highlighting the role of auditory resources for the navigation of people with visual impairments both in everyday (Saerberg, 2010) and in sport contexts (Powis, 2018), the analysis seeks to investigate the *auditory affordances* (Steenson and Rodger, 2015) of repetition that might be crucial for climbers with vision impairments.

I shall explore this issue by drawing on the following extracts, which are taken from two guided climbs performed by the same climber. As in the cases analysed previously, in both Extracts 24 and 25, the instructed move consists of lifting one foot up to the next foothold. In both cases, the onset of the trainer's repetition occurs when maintaining the current direction of movement becomes relevant for the climber to reach the target-hold.

Extract 24 [Marrone_Ma_Sali_3]

```
1  TRA:  hai     un   pie:de alle  co+sce.
         have.2S one  foot   at    thighs
         you have a foothold by your thighs

2  cli:                            +swaps feet -->

3        (0.5)

4  TRA:  qu- eh alle balle praticamen-
         al- eh at   balls practicall-
         al(most)- eh by (your) balls basically-

5        ci+  porti    il   destro=
         PTCL bring.2S the right
         there (you) bring the right (foot)

6  cli:  ->+lifts RF up -->
```

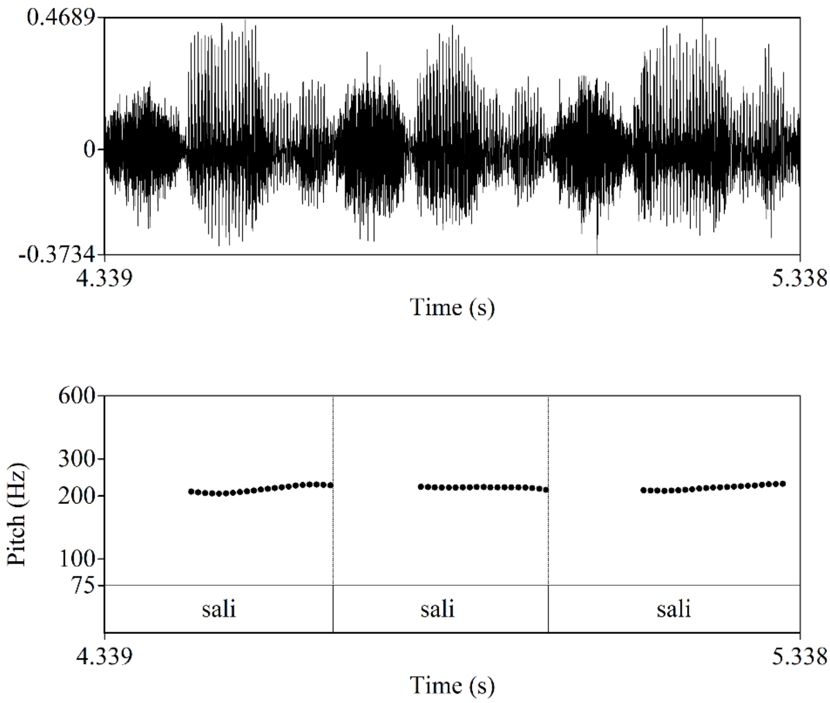
```
7   TRA:  =sali  sali  sa:li,+
           go up go up go up
          up up up,

8   cli:                 -->+anchors RF to foothold

9   TRA:  que:llo,
          that
          that one
```

Extract 25 [Verde_Ma_Alto_4]

```
1   cli:  >> moves RF -->

2   TRA   e:::h sali=
          erm   go up.IMP
          e:::rm go up

3   cli:  > lifts RF up -->

4   TRA:  a:lto=alto=alto=al+to=
          high  high high high
          high (up)=high (up)=high (up)=high (up)=

5   cli:  >-----------------+puts RF on foothold
```

In Extract 24, the climber's action is already prepared while the trainer articulates the instructions concerning the next move: he accomplishes a technique called *foot swap* by lifting the right foot off the foothold and replacing it with the left one (l. 2). After providing an initial description of the location of the next foothold (l. 1: *you have a foothold by your thighs*), followed by a pause (0.5) which orients to the progression of the climber's ongoing action, the trainer initiates a new description (l. 4. *al(most)-*). She then produces a self-initiated repair by reformulating the prior description (l. 4: *eh by your balls basically*), and an instruction (l. 5: *there (you) bring the right (foot)*).

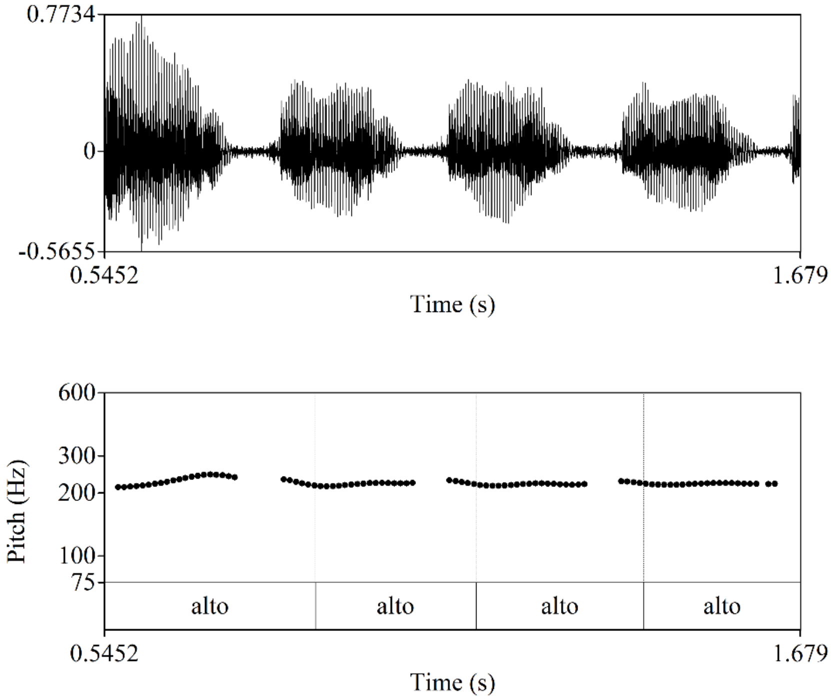
Only after the climber completes the foot swap and begins to lift his right foot upwards does the trainer produce the repeated 'sali sali sali', *up up up* (l. 7), latched with the prior turn. In this context, the series of repeats is clearly mobilized to calibrate the climber's target-reaching movement. The verb 'sali' (literally, *go up*) elaborates on the sequentially prior instruction (l. 5), providing a more granular indication of the movement to be performed to reach the location previously indicated with the particle 'ci', conveying the deictic locative *there* (l. 5: ‘ci porti il destro’, *there (you) bring the right (foot)*). At the same time, the repeated ‘sali’, *up* refers indexically to the current path of the climber’s lifting movement, already initiated at l. 6. The prosody of the series of repeats conveys the relevance that current action is carried out smoothly and continually, as if to say, “what you are presently doing, continue doing”. The series of repeats are indeed uttered within a continued vocal stream, with no gaps, and minimized pitch movements, as shown in Praat plot 1.



Praat plot 1. Waveform and pitch track of Extract 24, l. 7.

A similar pattern is observable in Extract 25. In this case, the climber begins to lift his right foot up (l.3) before the trainer can articulate a full instruction. By doing so, he exhibits his readiness to move toward the next foothold. Again, the trainer evidently monitors the progression of the climber’s ongoing movement, as we can see from her initial hesitation (l. 2: *e:::rm*), by which she exhibits that she is simultaneously examining the climber’s motion path and ‘planning’ a new instruction. The hesitation is followed by the start of a new instruction (l. 2: *go up*) which is then abandoned to produce the repeated 'alto=alto=alto=alto', *high (up)=high (up)=high (up)=high (up)* (l. 4) once the climber's moving foot is found to proceed towards the target-foothold already. Thus, analogously to the previous extract, the series of repeats emerges as soon as the climber's movement takes an upward path (l. 3: he lifts his right foot upwards) and is mobilized to ensure that such path is maintained.

Like in the previous extract, the series of repeats (l. 4) are heard as a continuous vocal stream, with no silent gaps and minimised pitch movements on the stressed syllables, apart from a slight rise at the onset (see Praat plot 2).



Praat plot 2. Waveform and pitch track of Extract 25, l. 4.

The analysis of Extracts 24 and 25 demonstrates that, in addition to timing, the trainer also uses prosody as a resource to calibrate the duration, completion and path of the climber's ongoing bodily movements. More specifically, the analysis demonstrates that repetition is produced and understood as an instruction to continue by virtue of its being heard as a continuous and relatively homogeneous vocal stream.

The participants' orientation to the auditory affordances of repetition as an instruction to continue is particularly observable in the following Extract 26, which is drawn from the very beginning of a climb.

Extract 26 [Marrone_Go_Lungox5]

```
 1  TRA:  lu:::ngo a   undici (.) lungo eh?
          long     at  eleven     long  eh?
          stre:::tched to eleven [o' clock] (.) stretched right?

(lines 2-16 omitted)

17         (0.2)+(0.5)

19  cli:       +opens Larm to eleven o'clock and stretches -->

20  TRA:  lun+go=lungo=+lungo=lungo+=lungo:+
          long   long   long  long   long
          stretched=stretched=stretched=stretched=stretched

21  cli:     +#stretches-+#touches hold+moves up+#anchors to handhold

    Fig.       #19         #20                     #21
```


Fig.19


Fig.20

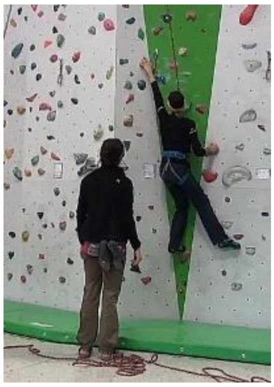
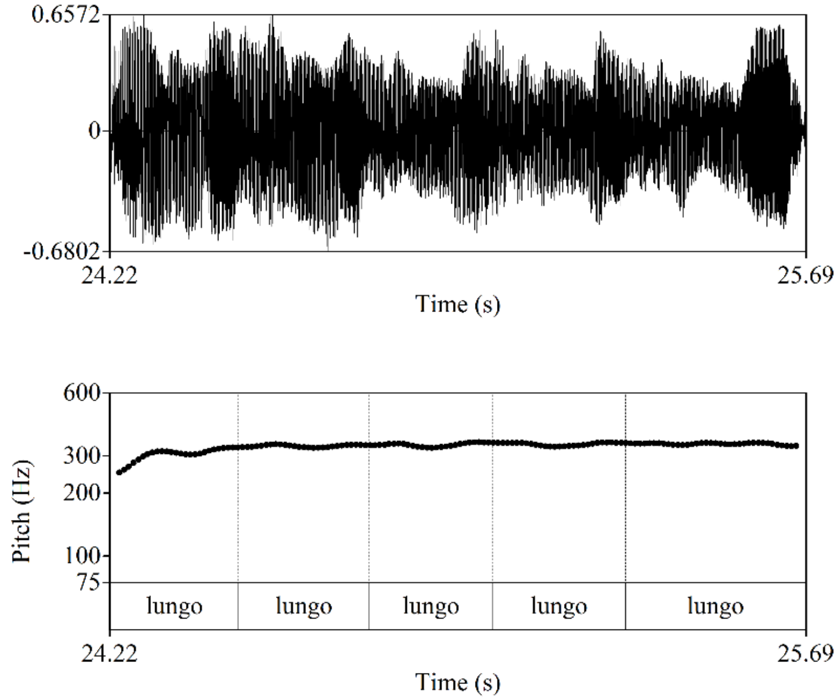


Fig.21

Following the initial instruction (l. 1), the activity is momentarily suspended (lines 2- 16 omitted)[27]. After its resumption, the climber starts performing the previously instructed action by opening his left arm to eleven o' clock and then stretching out vertically (l. 17). As soon as the climber stretches vertically, aiming to the target-hold, the trainer utters the series of repeated *lungo=lungo=lungo=lungo=lungo* 'stretched=stretched=stretched=stretched=stretched' (l. 20). Meanwhile, the climber's hand approaches a hold located right below the target (Fig. 19) and touches it shortly thereafter (Fig. 20, l. 21). Although the location of the non-target hold is consistent with prior instruction (l. 1: *to eleven o'clock*) (recall that the climber cannot see where the planned hold is located), the climber does not anchor his hand to it, but rather continues reaching out vertically as long as the trainer continues uttering the series of repeats, until he finally reaches the planned handhold (Fig. 21). This shows that the climber is more reliant on the instruction to continue moving implemented by the trainer using repetition than he is on the tactile information he might gain while physically interacting with the wall. Furthermore, as already observed with reference to Extract 23, also in this case the ending of the repetition is in itself indicative for the climber that the target hold has been reached, as evidenced by the fact that he anchors his hand to the hold as soon as the trainer stops repeating 'lungo' (*stretched*) and without the trainer confirming that *that* is the right hold.

Similarly to the instances analysed previously (Extracts 24 and 25), in Extract 31 as well the series of repeats (l. 20) is uttered with continuous vocal emission and constant intonation (see Praat plot 3).

[27] The climb is suspended since the trainer goes to the gym staff and asks them to turn down the music as the volume is too loud to communicate with the climber.



Praat plot 3. Waveform and pitch track of Extract 26, l. 20.

A further illustration of the efficacy of both the timing and prosody of repetition as an instruction to neglect irrelevant tactile information and move on is provided in the following Extract 27. In this case, the relevant prosodic feature appears to be the pace of the repetitions in l. 3.

Extract 27 [Viola_Go_Salex4]

```
1   TRA:  sale      +all'anca?
          go up.3S   at  hip
          up by your hip?

2   CLI:            +lifts LF up -->

3   TRA:  sale      +>sale     sale    <+sa:le:↑+
          go up.3S   go up.3S go up.3S   go up.3S
          up >up up< ↑u:p

4   CLI:        -->+#feels hold--------+moves on+#anchors foot to
          foothold
```

Fig. #22 #23

Fig.22

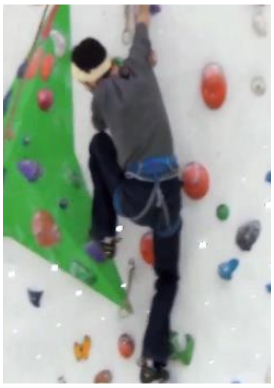


Fig.23

In Extract 27, the onset of the trainer's repeated 'sale >sale sale< sale', *up >up up< up* (l. 3) slightly anticipates the climber's contact with a non-target hold (l. 4, Fig. 22), occurring while he is aiming to the next foothold with his left foot. On closer inspection, we can see that, following the first repeat as well as the climber's contact with the non-target hold, the delivery of the second and third repeats, which are uttered while the climber is feeling the hold with his foot (l. 4), is slightly accelerated (see Table 1). Such acceleration conveys a sense of urgency (Mondada, 2017:87), which is added to that of continuity given by the repetition as a whole, as if to further stress the importance that the climber continues in his upwards movement. The climber evidently orients to this detail insofar as, promptly responding to the urgent request to go up conveyed by the two accelerated repeats, he lifts his foot off the hold and moves on, eventually reaching the target foothold (l. 4, Fig. 23). In contrast with the accelerated delivery of the second and third repeats, the last repeat is indeed elongated (see Table 2) and uttered with raising intonation, orienting to the achievement of the expected response.

Table 1. Duration of each repeat in Ex. 27, l. 3.

Repeat	sale (1)	sale (2)	sale (3)	sale (4)
Duration (ms)	0.347486	0.303439	0.303439	0.619821

In this section, I have analysed the functioning of repetition as an instruction to continue ongoing bodily movement. More specifically, I have shown that, by modulating the timing and prosody of repetition, the trainer calibrates both the duration and completion of the climber's bodily movement and its path, conveying that current direction should be maintained in the ensuing action.

Moreover, the analysis of Extracts 26 and 27 has shown that, when produced in advance of the climber's projectably imminent contacts with non-target holds, repetitions *alert* the climber that what they are about to touch is not the planned hold and that current movement should therefore continue. Series of repeats are therefore employed by the trainer as a resource to guide the climber's online interpretation of haptic information coming from the continuous contact with the wall. In this respect, in addition to disclose the trainer's careful analysis of the climber's ongoing movements, instructions implemented using repetition also exhibit (and make interactionally relevant) that the trainer 'participates of' the climber's ongoing embodied experience - particularly of their haptic experience - of climbing. In this regard, it could be said that repetition discloses the *interkinesthetic* dimension (Cf., Behnke, 2008; Meyer & v. Wedelstaedt, 2017) of guided climbing.

4.4.3. Series of repeats as corrective instructions

In the previous section, I have shown examples of the use of repetition to prevent possibly problematic outcomes of the climber's embodied actions, such as anchoring to unplanned holds. As we have seen, in such cases, repetition also accomplishes a slightly corrective function, securing that the climber 'stays on track' and continues current movement until reaching the planned hold. I now consider some examples in which instead the corrective function is evidently put on the record, that is, it is made relevant through a distinctive use of prosody, as well as of other resources, such as lexicon and timing.

I start by considering an extract in which the trainer mobilizes repetition *after* the climber fails to comply with the prior instruction, prompting the climber to redirect his movement appropriately.

Extract 28 [Verde_Go_Undici_3]

```
1   TRA:   +e  lu:::ngo  a  undici+=
           and stretched at eleven
           and stretched to eleven (o' clock)

2   cli:   +extends Rarm to one o'clock+

3   TRA:   =u+ndici=↑undici=↑↑UNdici+
            eleven  eleven eleven
           =eleven=eleven=eleven

4   cli:    #+moves to eleven o'clock+#

    Fig.    #24                        #25
```

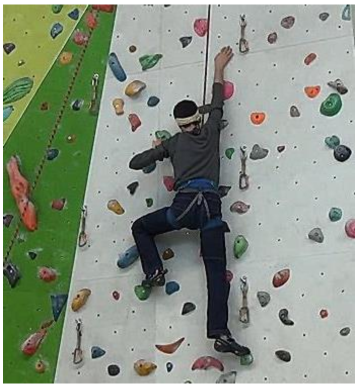


Fig.24

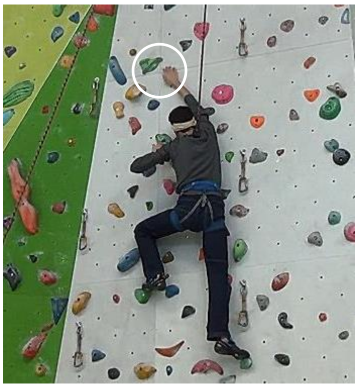


Fig.25

```
5   TRA:   è     quella ↑lassù
           be.3S that    up there
           it's the one up there
```

In Extract 28, the climber stretches out his right arm vertically before the trainer articulates completely the instruction concerning the next move (l. 1: *and stre:::tched to eleven (o' clock)*). As a result, he eventually finds himself in an inconsistent position compared to the one indicated by the trainer as his hand points to one o'clock (Fig. 24) rather than eleven. Thus, immediately following the prior instruction (see the latching between l. 1 and 3), the trainer produces the repeated '<u>un</u>dici=↑<u>un</u>dici=↑↑<u>UN</u>dici', *eleven=eleven=eleven* (l. 3) with increased pitch on the first (stressed) syllable of each repeat. The climber promptly moves his right hand toward eleven o'clock (l. 4, fig. 25) almost simultaneously with the onset of the repetition and continues reaching in the same direction as long as the series of repeats is uttered by the trainer. Once the climber's hand reaches the handhold, the trainer produces an elaborate sequence-closing turn (l. 5: 'it's the one up there'), orienting to the climber's exhibited difficulty in reaching the hold (Fig. 25: in the white circle, the climber cannot reach the handhold).

In this case, the series of repeats (l. 3) accomplishes a twofold function. It prompts a correction (a direction change) and contributes to its ensuing implementation. The corrective function is highlighted by the increasingly heavier stress the trainer puts on each repeat. At the same time, as already observed in previous analysis, a guiding function is achieved, as the series of repeats also calibrates the duration and completion of the climber's action.

In contrast with Extract 28, in which the corrective series of repeats is uttered once the climber has completed the faulty movement, in Extract 29, repetition is mobilised early with respect to the climber's faulty action.

Extract 29 [Grigia_Guido_Destra_5]

```
1   cli:  >>stretches Larm toward next handhold -->

2   TRA:  po:i a-   ↑DE+STRA=DESTRA=↑DESTRA=↑↑DESTRA=↑↑DES+TRA ↓Gui+do.
          then at-   right    right    right     right     right    Guido.
          then to-  ↑RIGH=RIGHT=↑RIGHT=↑↑RIGHT=↑↑RIGHT ↓Guido

3   cli:            -->+#grabs onto quickdraw-------------+moves to R+
    Fig.                #26
```

Fig.26

At the beginning of the extract, the climber is reaching out to the next handhold by stretching his left arm. While he is approaching the handhold (l. 1), the trainer presumably initiates a new instruction (l. 2: *then to-*), which she immediately cuts off as soon as the climber visibly directs his hand toward a quickdraw (which he grabs soon after, see Fig. 26). Immediately following the abandoned instruction, the trainer produces the repeated '↑DESTRA=DESTRA=↑DESTRA=↑↑DESTRA=↑↑DESTRA', *RIGH=RIGHT=↑RIGHT=↑↑RIGHT=↑↑RIGHT* (l. 2) as the climber grabs onto the quickdraw (l. 4), arguably in an attempt to maintain balance and not to detach from the wall.

The series of repeated directions in l. 2 forms part of a *corrective instruction* (Deppermann, 2015b) which is produced as soon as the climber's projectably faulty action emerges as he ostensibly directs his hand toward the quickdraw. The corrective instruction formulates the direction to be undertaken next (*right*). This direction is repeated multiple times until the climber releases the quickdraw and *begins* to move in the required direction (l. 3). Hence, the series of repeats displays the trainer's stance that the climber's incorrect action (anchoring to the quickdraw) should be halted (Cf. Stivers, 2004), while at the same time urging the climber's compliance with the requested direction-change. The imperativeness of executing the mandated action is embodied in the delivery of the repetition, which is uttered with a loud voice and raised pitch on the initial syllable of each repeat (Cf. Mondada, 2017; Depperman 2018). Lastly, the address term (the recipient's first name) in turn-final position (l. 2, *Guido*), occurring immediately after the climber releases his grip on the quickdraw, orients to the recipient's accountability for the previous faulty action.

A similar case is observable in Extract 30. Before getting into detailed analysis, it is worth noting that this extract is taken from the climber's third consecutive attempt to climb the same section of the route. At this stage, the climber is indeed expected to follow the trainer's instructions smoothly and accurately.

Extract 30 [Verde2_Go_Giù_6] (previously analysed as Extract 26)

```
1  TRA:  al ginocchio destro?
         at knee      right
         by your right knee

2        (1.5) + (0.7)
```

```
3   CLI:        +lifts RF up -->

4   TRA:   a ↑de:+stra-
           at right
           to the ↑right-

5   CLI:        +moves RF to R -->

6   TRA:   #GIÙ  GIÙ+=GIÙ= GIÙ= GIÙ= GIÙ= ↓Gui+do
            down down down down down down  Guido
            DOWN DOWN=DOWN=DOWN=DOWN=DOWN ↓Guido

7   CLI:        -->+lowers RF----------------+anchors foot to foothold

    Fig.   #27
```

Fig.27

```
8   TRA:   ↑quello.
            that
            that one.
```

At the beginning of the sequence, the trainer instructs the climber about the location of the next foothold (l. 1: *by (your) right knee*). The climber's response is immediate as he promptly begins to lift his right foot up (l. 3). In line 4, the trainer produces a further instruction (l. 4: *to the right-*), which projects a correction, prompting a direction change. The climber immediately directs his foot to the right (l. 5). However, he heads too high and fails to reach the target foothold, which is placed in a lower position (Fig. 27, the target foothold is in the white circle). The trainer orients to the climber's failure to reach the target by producing the series of repeats 'giù giù=giù=giù=giù=giù', *down down=down=down=down=down* (l. 6), promptly followed by the climber who lowers his foot until reaching the foothold (l. 7).

As in Extract 29, also in this case the trainer formulates a new direction and repeats it multiple times in immediate succession (l. 6) with comparably louder voice, high intonation and a rapid pace, all aspects conveying a sense of urgency. Moreover, similarly to Extract 29, the series of repeats is followed by the address term in final position (l. 6: *Guido*), which reinforces its corrective character.

However, in contrast with Extract 29, in this case the trainer does not stop uttering the series of repeats once the climber's complying action is initiated, but rather she keeps repeating until the climber reaches the planned foothold. Hence, similarly to Extract 28 (l. 3: *eleven=eleven=eleven*), in this case as well the practice accomplishes a twofold function, that is (a) prompting a direction change and (b) calibrating the duration of the climber's ensuing movement to ensure that he attains the target-hold.

4.5. Discussion

This chapter has investigated the interactional accomplishment of guided climbing as a distributed activity. *Distribution* is a key word since it explains both the asymmetrical availability of sensory resources between trainer and climber, and the accomplishment of guided climbing through distributed multimodal actions. Within the situated activity system of guided climbing, access to the material arrangement of the route for planning and executing each subsequent step of the ascent is distributed between the trainer, who has visual access to the overall route layout, and the climber, who has tactile access to locally available components of the route as the climb progresses. The distribution of sensory resources underlies the distribution of action between the participants: during the climb, the trainer verbally formulates the location of footholds and handholds, making it available to the climber who moves accordingly. As a result, the activity is accomplished through sequences of instructions and instructed body movements.

The analysis has shown that the most basic sequential structure in guided climbing is a sequence composed of an initiating verbal instruction and an embodied response, eventually followed by a verbal validation in sequence-closing position (§ 4.2.1). This basic instruction sequence is often expanded by the insertion of further instruction turns, that are produced while the climber's movement is underway. Such instructions are meant to provide *assistance*, helping the climber to fulfil the climbing action previously initiated, by reaching the planned hold (§ 4.3).

The analysis has focused particularly on this latter type of instructions, showing how they adjust to the embodied circumstances of ongoing climbing actions. Assistance instructions follow up the priorly formulated instruction, providing updated spatial directions that are fit to the presently evolving contingencies of the climber's embodied action. These instructions are precisely timed with stretches of the climber's ongoing embodied action emerging over very short time frames, displaying the trainer's analysis of ongoing motion trajectory as well as of the climber's physical experience of the wall. More specifically, the analysis has shown that the trainer seizes details of the climber's current embodied action and 'exploits' them as the referential ground for anchoring the instructions.

The analysis has shown that, rather than unilaterally determining the subsequent instructed action, instructions are in turn shaped by the contingencies of the latter. It is indeed possible to observe a process of *reciprocal calibration* (Stukenbrock, 2014:98) occurring as the emergent structure of the trainer's instructions and the development of the climber's bodily movement closely respond to one another at a micro-sequential level. Hence, despite often occurring simultaneously, instructions and body movements nevertheless configure initiation-response patterns, which are not achieved turn-after-turn, but rather within continuous streams of action.

Also, the analysis confirms that sensoriality is an interactionally relevant phenomenon in this setting. By means of instructions, the trainer on the one hand puts her visual monitoring at the service of the climber's action; on the other, she displays her orientation to the haptic resources available to the climber. This is particularly the case for the practice of *online calibration of action* (Mondada, 2017). The practice takes the form of series of repeats of lexical items conveying motion path, uttered in immediate succession within a single intonation contour, and amounting to a single instruction. Unlike previous studies that explored the use of a similar practice in instructed activities by only considering the case of series of imperatives, the analysis presented in this chapter has demonstrated that a range of lexical items, including verbs in declarative form (i.e., *sale,* lit. '(it) goes up'), adjectives (i.e., *lungo,* 'stretched' and *alto,* 'high up') and direction terms (i.e., *destra,* 'right' and *giù*, 'down') may contribute to the situated achievement of the practice. Hence, the instructive (directive) function of series of repeats is evidently more the result of their indexical relation to the embodied and material ecology of the ongoing activity, than is the result of their grammatical category.

The analysis has shown that the instructive significance of series of repeats is achieved both sequentially and simultaneously. Instructions built with series of repeated directions are indeed sequentially bounded to prior instructions, either because they reuse lexical material or because they semantically elaborate on the preceding instruction. The instructive function of multiple repeats is also achieved based on their indexical relation to the current development of the climber's body movement, whose direction and duration is simultaneously made relevant and calibrated.

Timing and prosody of multiple repeats also play a relevant role. As far as timing is concerned, in most of the occurrences of the practice, the temporal trajectory of the series of repeats is perfectly timed to end in unison with the completion of the addressed climbing movement. This precision timing demonstrates that the purpose of repetition is that of vocally conveying the expected duration of the climber's ongoing bodily movement, making the trainer's commitment to ensuring the successful outcome of the climber's performance specifically observable.

As far as prosody is concerned, intonation, loudness and pace result to be crucial in implementing (and differentiating between) the two functions of a) instructing the climber to continue moving in the current way, and b) correcting the climber's current movement. By delivering the series of repeats with a continuous, relatively 'flat' intonation, the trainer makes sure that the climber continues moving maintaining current motion path. In this case, *sameness* in the segmental as well as suprasegmental shape of the repetition conveys that the *same* motion flow is to be maintained. Conversely, by delivering the series of repeats with increased loudness, pressing tempo and heavier pitch movements on each repeat, the trainer conveys the sense that something in the current movement (i.e., its direction) is to be changed. This result suggests that, in addition to the perceptual dimensions of sight and touch, the auditory dimension is also fundamental in the ecology of this activity.

The efficacy of repetition in providing auditory guidance is confirmed by the observation that the climber routinely follows the instruction to continue moving in the current direction, even when already touching a hold that could be confused with the target. In these cases, the climber is reliant more on the auditory information provided by the trainer, than is on sensory information directly picked up through haptic contact with the climbing wall. This is a demonstration that the auditory properties of instructions strongly contribute to enhance the climber's sensory experience, enabling the climber to correctly interpret the haptic affordances of the route.

To sum, my results show that a range of features of verbal instructions contribute to shaping the climbers' embodied actions, which include sequential organization, fine temporal tuning to ongoing embodied actions, and the capability to incorporate aspects of the material ecology of action (e.g., motion flow) through lexicon and prosody. Prosodic details, in addition to be central to paraclimbing with visually impaired participants, might be particularly important in settings where voice is used to accompany the moment-by-moment progression of embodied actions, such as, for instance, in physical rehabilitation, and in distributed work arrangements based on remote control.

To conclude, my analysis encourages greater attention to the embodied aspects of instructions, including aspects relating to their auditory dimension. While it is widely demonstrated that some linguistic practices can locally contribute to orienting the participants' perception towards specific features in the material world (as is the case for deictics), we still know little about how language itself can constitute a sensory resource, thanks to the auditory properties of speech.

Conclusion

This thesis has investigated the organization of language, embodied action, and sensoriality in interactions in paraclimbing training with athletes with visual impairments.

The major contribution which this study makes to embodied cognitive science lies in having proposed a qualitative analysis based on 'naturally occurring', instead of experimentally designed, social interactions, with a focus on situated action, rather than on behavioural or neural outputs. In the past, some leading authors in the field of cognitive science have argued that our understanding of human cognitive functioning should not be separated from the observation of goal-directed behaviour in the 'real world' situations of human activity. The rationale for this is that, since higher cognitive capacities such as language evolved to support increasingly complex forms of social interaction and division of labour, to understand the human cognitive system, "it will therefore be necessary to study cognition in its social contexts, not just when processing non-social information, such as isolated words and sentences" (Barsalou, Breazeal & Smith, 2007:82). Related to this is the argument that the 'worlds' which human beings share are made up of socially and culturally constituted material settings. Cognitive activity cannot therefore be assumed to be disconnected from the specific social, cultural and material ecologies in which it is incorporated (Hutchins, 1995; 2010). Nevertheless, most of the research carried out in the cognitive sciences continues to be marked by *methodological individualism* (Froese & Gallagher, 2012; Gallagher, 2018), that is, by the assumption that we can understand phenomena pertaining to language, perception, and embodiment without including in the unit of analysis the material and social ecologies of everyday activities. This thesis has adopted an alternative perspective, in which cognition is conceived as a process of sense-making and action-construction deeply rooted in the practical interaction with a specific environment and with Others.

Adopting a situated and multimodal approach inspired to Ethnomethodology and Conversation Analysis, this thesis has shown how perception and action emerge from the embodied interaction between multiple participants (i.e., the trainer and the climber) in close connection with the practical and material constraints of situated activity, as well as from the interplay between diverse sensory modalities (seeing, touching, hearing) and resources for meaning-making, such as linguistic material (grammar, lexicon, and prosody), gestures, bodily orientation and movements, and materially configured semiotic fields (i.e., the arrangement of climbing routes). Although the small size of the population involved and of the data collected for this study do not allow to formulate claims at a broader level than the setting and activity that are considered, this thesis can nonetheless offer an empirical basis to observe how ecological constraints and the functioning of social interaction, rather than just individual mechanisms, shape perception and action.

This thesis offers a fresh contribution as well to research in Conversation Analysis. It has explored a setting – paraclimbing – which had never received attention previously within the field (if we exclude earlier publications of this work in Simone 2018; Simone & Galatolo, 2020). Recent developments in CA research have led to widen the range of the embodied phenomena included in the analysis of social interactions. Moving beyond the analysis of co-speech bodily displays such as gestures, gaze movements and nods, research in this field is increasingly paying attention to what participants do with their whole bodies in relevant settings of activity (Mondada, 2019a). In this context, sport settings have attracted growing attention (e.g., Meyer & v. Wedelstaedt; 2020; Okada, 2013, 2018; Råman, 2019). However, most studies have so far neglected sports that are designed for (or adapted to) participants with a disability, that would allow a more nuanced understanding of the multiple, fluctuating articulations of the resources and constraints of the body. Also, these settings allow to observe how the limits of the body may become matter for rehabilitation, training, assistance and other socially organized ways of *enabling Others' action*. This thesis is – to the best of my knowledge – the first in the field to deal with the organization of training activities in adapted sport with athletes with impaired vision. This represents a novelty also in relation to the existing literature on the social inclusion of persons with visual impairments in everyday activities. Previous studies have investigated settings such as museums visits (Kreplak & Mondémé, 2016; Ursi, 2020), guided walking (Due, 2020), navigational instruction (Psathas, 1992), and haptic techniques for mathematics teaching (Abrahamson *et al*., 2019), but none of them has dealt with sports practiced by visually impaired participants. Yet, CA-informed scientific inquiry in this domain would improve our understanding of the dynamics of inclusion from the participants' perspective, allowing a detailed reconstruction of the practical means through which members face the challenges of inclusion. In this thesis, I have provided an example of the powerfulness of multimodal CA as a methodology for exploring inclusive sport by analysing a set of practices that are effectively employed by members to secure the accessibility and inclusiveness of every phase of paraclimbing training, from preparation to actual climbing.

The major findings of this thesis can be summarized as follows.

Intercorporeality is a crucial dimension of interactivity. Following the phenomenological tradition, and particularly Merleau-Ponty's philosophy of the body (Merleau-Ponty, 1962, 1964, 1968), scholars in embodied cognition and social interaction are increasingly convinced that intercorporeality is the primary and most fundamental mode of human sociality (Crossley, 1995; Guo, Katila & Streeck, 2020; Katila & Philipsen, 2021; Meyer, Streeck & Jordan, 2017). The analysis presented in Chapter III has offered an exploration into the intercorporeal dimension of pre-climbing route preview showing that the participants co-constructed shared perceptions of the climbing route by 'fusing' their bodies to form an embodied 'We' (Merleau-Ponty 1964:168). The analysis of route preview has shown in detail how intercorporeality is established, maintained and reconfigured through touch and bodily spatial arrangement, and also monitored and accounted for by trainer and climber. Intercorporeal connection enabled the participants not only to smoothly co-engage in the accomplishment of tasks such as jointly displacing in space, mapping the location of holds through touch, depicting the shape of handholds and anticipating their use through co-gestures and co-enactments, but crucially also to *inhabit each other's actions* (see Goodwin, 2017:446) and co-experience the material environment.

Intercorporeality has been shown to play a role also in the accomplishment of the auditorily guided climbing sessions analyzed in Chapter IV, although in this case trainer and climber were located at some distance from one another and were differently engaged in the activity (the climber progressing upwards along the route, the trainer vocally guiding her/him through verbal instructions). The way the trainer's instructions were coordinated and finely fit to the physical contingencies of the climber's actions displayed the trainer's attunement with the climber's current embodied experience. This was particularly relevant with regard to the practice of *online calibration* (Mondada, 2017) achieved through linguistic self-repetition, in which case, as shown in the analysis, the trainer joined the climber's progressing bodily movements with her voice and contributed to their fulfillment.

Language is a resource of interacting bodies. From the prior point it follows that language participates of the moment-by-moment coordination and attunement between situated embodied agents and is therefore an inherently embodied and ecological resource. In this thesis, a set of linguistic patterns were analyzed that form integral part of the embodied activities in which they are embedded. This is particularly the case with the linguistic construction of lists and the 'e hai'-formula analyzed in Chapter III and with the practice of repetition analyzed in Chapter IV. What unites these linguistic patterns, albeit differing in both their design and sequential environments, is their being symbiotic with the body movements to which they are temporally coordinated and in the absence of which such linguistic patterns would not convey any sense either to the participants and to analysts. This evidence encourages a view in which, rather than resulting solely from abstract cognitive mechanisms that are based in the speakers' mind, language structure is also seen as "a series of local solutions to participants' current actions" (Keevallik, 2018:9). Being one among the resources that participants used to accomplish and coordinate actions, linguistic patterns emerging in and through the paraclimbing activities were organized in ways relevant to respond to local contingencies. I made a case in point by showing that verbal instructions and their responses, besides being organized within adjacency pair-like sequential patterns (Schegloff, 2007), with the instruction in first position and the instructed action in second position, may also unfold in parallel, responding (and adjusting) to one another on a moment-by-moment basis.

Another aspect which has been considered in the analysis concerns the *auditory affordances* (Steenson and Rodger, 2015) provided by linguistic resources. I have shown this by analyzing how the prosodic design of repetitions contributed to enhance the climbers' proprioception (i.e. perception of own movement) as well as their haptic experience of the climbing wall. Besides confirming prior ethnographic observations concerning the relevance of the 'soundscape' in visually impaired navigation (see discussions in Powis, 2018; Saerberg, 2010), my analysis has illuminated features of the vocal design of instructions that may be relevant also to other settings of instructed bodily activities.

Social interaction extends individual capabilities. As I already mentioned throughout this thesis, my work was deeply inspired by Goodwin's (2017) notion of *co-operative action.* The core of this notion is that participants build actions using various types of materials that are provided by (in Goodwin's words, *inherited from*) previous action by other participants. This implies that the resources and constraints for action that individuals have are in a fundamental way constituted in and through the interaction with Others within situated activity rather than defined *a priori* by the organs and functions of individual's body and mind. In fact, social interaction may redraw the limits of individual's body and extend its capabilities. In this thesis I have shown how climbers with visual impairments build their actions using sensory resources that are provided by trainers. Interactional practices were shown to enhance the climbers' perception of space and materiality and enable their sporting performance.

Future developments of this study will include systematizing the analysis of the forms and modalities of touching conceived both as an interactional resource and as a sensory practice, in order to identify recurring patterns. Another development of this research will concern the improvement and dissemination of knowledge related to inclusive practices in sport instruction. In this regard, I plan to establish a dialogue with experts in inclusive sports education, aimed at identifying possible applications of the video database and of the multimodal analysis techniques used in this study in the training of sport technicians.

Transcription Conventions

Original talk is in Italian. An idiomatic translation (in italics) is always provided following each transcribed turn. Moreover, when relevant, a word-by-word translation is also provided for each line.

Abbreviations:

TRA / tra	Trainer
CLI / cli	Climber
RH / LH	Right hand / Left hand

Conventions used for transcribing talk (adapted from Jefferson, 2004):

(1.0)	pause in tenth of a second
(.)	short gap of less than 0.2 seconds
.	falling intonation
?	rising intonation
;	slightly falling intonation
,	slightly rising intonation
:	elongation of the immediately prior sound
:::	the more the colons, the longer the sound
↑↓	marked rise/fall in pitch
=	latching utterances
word	speaker's emphasis
word-	abrupt cut-off
WORD	sound markedly louder than surrounding talk

Symbols used for transcribing embodied conduct (adapted from Mondada, 2019b):

+ + * *	Descriptions of embodied actions are provided in grey and delimited between two identical symbols (one symbol per participant) that are synchronized with correspondent stretches of talk or time indications.
+-->	The described action continues across subsequent lines...

`-->+`	... Until the same symbol is reached.
`+-->>`	The described action continues beyond the extract.
`>>`	The described action has started before the beginning of the extract.
`#Fig.`	Indicates the exact moment at which a snapshot has been taken.

Bibliography

Abrahamson, D., Flood, V. J., Miele, J. A., & Siu, Y. T. (2019). Enactivism and ethnomethodological conversation analysis as tools for expanding Universal Design for Learning: The case of visually impaired mathematics students. *ZDM*, *51*(2), 291-303.

Amerine, R., & Bilmes, J. (1988). Following instructions. *Human Studies*, 327-339.

Arbib, M. A. (2008). "Mirror neurons and language". In: B. Stemmer, & H. A. Whitaker (eds.), *Handbook of the Neuroscience of Language*. Elsevier Academic Press, pp. 237-246.

Auer, P. (2005). Projection in interaction and projection in grammar. *Text & Talk*, *25*(1), 7-36.

Austin, J. L. (1962). *How to Do Things with Words.* Oxford: Oxford University Press

Ayaß, R. (2015). Doing data: The status of transcripts in Conversation Analysis. *Discourse Studies*, *17*(5), 505-528.

Baldauf-Quilliatre, H. (2015). Multiple sayings : répétition et encouragement. *Semen*, *38*. Published on line on 05/04/2015, http://journals.openedition.org/semen/10329.

Baldauf-Quilliatre, H., & de Carvajal, I. C. (2020). Encouragement in videogame interactions. *Social Interaction. Video-Based Studies of Human Sociality*, *2*(2).

Barslaou, L. W. (1993). “Flexibility, structure, and linguistic vagary in concepts: Manifestations of a compositional system of perceptual symbols”. In: A.C. Collins, S.E. Gathercole, and M.A. Conway (eds.), *Theories of memory*, Hillsdale, NJ: Erlbaum, pp. 29–101.

Barsalou, L. W. (2008). Grounded cognition. *Annual Review of Psychology 59*:617–645.

Barsalou, L. W., Breazeal, C., & Smith, L. B. (2007). Cognition as coordinated non-cognition. *Cognitive Processing*, *8*(2), 79-91.

Bateson, G. (1972). *Steps to an ecology of mind.* New York: Balentine Books.

Bazzanella, C. (1999). “Forme di ripetizione e processi di comprensione nella conversazione”. In: R. Galatolo & G. Pallotti (eds.), *La conversazione: un’introduzione allo studio dell’interazione verbale*. Milano: Raffaello Cortina, pp. 205-225.

Behnke, E. A. (2008). Interkinaesthetic affectivity: A phenomenological approach. *Continental Philosophy Review*, *41*(2), 143-161.

Boden, M. (2006). Mind as machine: A history of cognitive sciences. Oxford University Press.

Boersma, P., & Van Heuven, V. (2001). Speak and unSpeak with PRAAT. *Glot International*, *5*(9/10), 341-347.

Bögels, S., & Levinson, S. C. (2017). The brain behind the response: Insights into turn-taking in conversation from neuroimaging. *Research on Language and Social Interaction*, *50*(1), 71-89.

Borghi, A. M., Barca, L., Binkofski, F., & Tummolini, L. (2018). Abstract concepts, language and sociality: from acquisition to inner speech. Philosophical Transactions of the Royal Society B: Biological Sciences, 373(1752), 20170134.

Borghi, A. M., & Binkofski, F. (2014). Words as social tools: An embodied view on abstract concepts. New York: Springer.

Borghi, A.M., Binkofski, F., Castelfranchi, C., Cimatti, F., Scorolli, C. & Tumm olini, L. (2017). The challenge of abstract concepts. Psychological Bulletin 143(3), 263–292.

Borghi, A. M., & Cimatti, F. (2009). Words as tools and the problem of abstract word meanings. In Proceedings of the annual meeting of the cognitive sciences society (Vol. 31, No. 31).

Borghi, A. M., Glenberg, A. M., & Kaschak, M. P. (2004). Putting words in perspective. Memory & Cognition, 32(6), 863-873.

Borghi, A. M., & Riggio, L. (2009). Sentence comprehension and simulation of object temporary, canonical and stable affordances. Brain Research, 1253, 117–128.

Borghi, A. M., & Riggio, L. (2015). Stable and variable affordances are both automatic and flexible. Frontiers in human neuroscience, 9, 351.

Brown, J. S., Collins, A., Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Research, 18*, 32-42.

Brown, J. S., Heath, C., & Pea, R. (1999). *Perspectives on activity theory*. Cambridge university press.

Brugman, H., & Russel, A. (2004). Annotating multimedia/ multimodal resources with ELAN. *Proceedings of the Fourth International Conference on Language Resources and Evaluation (LREC 2004)*. Paris: European Language Resources Association, 2065-2068.

Bub, D. N. & Masson, M. E. J. (2012). On the dynamics of action representations evoked by names of manipulable objects. *Journal of Experimental Psychology: General 141*, 502–517.

Buccino, G., Binkofski, F., Fink, G. R., Fadiga, L., Fogassi, L., Gallese, V., Seitz, R. J., Zilles, K., Rizzolatti, G., & Freund, H. J. (2001). Action observation activates premotor and parietal areas in a somatotopic manner: an fMRI study. *European journal of neuroscience, 13*(2), 400-404.

Burdelski, M., Tainio, L. & Routarinne, S. (eds.) (2020). Human-to-human touch in institutional settings [Special issue]. *Social Interaction. Video-Based Studies of Human Sociality*, *3*(1).

Caniglia, E. (2007). "Presentazione". In: E. Caniglia (ed.), *Harvey Sacks: L'analisi della conversazione.* Roma: Armando, pp. 7-25.

Cappuccio, M. L. (ed.) (2019). *The handbook of embodied cognition and sport psychology.* The MIT Press.

Carpenter, M., Nagell, K., Tomasello, M., Butterworth, G., & Moore, C. (1998). Social cognition, joint attention, and communicative competence from 9 to 15 months of age. *Monographs of the society for research in child development, i*-174.

Caruana, F., & Borghi, A. M. (2013). Embodied cognition, una nuova psicologia. *Giornale Italiano di Psicologia 1/2013*: 23–48.

Caruso, P. (1998). *Progressione su roccia*. Torino: Vivalda Editori.

Cekaite, A. (2010). Shepherding the child: Embodied directive sequences in parent–child interactions. *Text & Talk*, *30*(1), 1-25.

Cekaite, A. (2016). Touch as social control: Haptic organization of attention in adult–child interactions. *Journal of Pragmatics*, *92*, 30–42.

Cekaite, A., & Kvist Holm, M. (2017). The comforting touch: Tactile intimacy and talk in managing children's distress. *Research on Language and Social Interaction*, *50*(2), 109-127.

Cekaite, A. & Mondada, L. (eds.) (2020). T*ouch in social interaction: Touch, language, and body*. London: Routledge.

Chartrand, T. L., & Van Baaren, R. (2009). Human mimicry. *Advances in experimental social psychology*, *41*, 219-274.

Chomsky, N. (1959). A review of BF Skinner's Verbal Behavior. *Language*, *35*(1), pp. 26-58.

Clancey, W. J. (1997). *Situated cognition: On human knowledge and computer representations.* Cambridge University Press.

Clark, A. (1997). *Being there: Putting mind, body, and world together again*. Cambridge, MA: MIT Press.

Clark, A. & Chalmers, D. (1998). The extended mind. *Analysis, 58,* 7-19.

Clark, H. H. (1992). *Arenas of language use*. University of Chicago Press.

Clark, H. H. (1996). *Using language*. Cambridge university press.

Clark, H. H. & Brennan, S. E. (1991). "Grounding in communication". In: L. B. Resnick, J. M. Levine, & J. S. D. Teasley, *Perspectives on socially shared cognition*. American Psychological Association, pp. 127-149.

Clark, H. H. & Clark, E. V. (1977). *Psychology and language: an introduction to psycholinguistics.* Harcourt Brace Jovanovich.

Clayman, S. E. (2013). "Turn-constructional units and the transition-relevant place". In: J. Sidnell & T. Stivers (eds.), *The handbook of conversation analysis*. United Kingdom: Wiley-Blackwell, pp. 150-166.

Clayman, S. E. & Heritage, J. (2014). "Benefactors and beneficiaries: Benefactive status and stance in the management of offers and requests". In: P. Drew & E. Couper-Kuhlen (eds.), *Requesting in Social Interaction*, Amsterdam: John Benjamins, pp. 55–86.

Cole, M. & Engeström, Y. (1993). “A cultural-historical approach to distributed cognition”. In: G. Salomon (ed.), *Distributed cognitions. Psychological and educational considerations.* Cambridge University Press, pp. 1-46.

Coulter, J., & Parsons, E. D. (1990). The praxiology of perception: Visual orientations and practical action. Inquiry, 33(3), 251-272.

Crossley, N. (1995). Merleau-Ponty, the elusive body and carnal sociology. *Body & Society*, 1(1), 43–63.

Damasio, A. (1994). *Descartes' Error*. New York: Putnam Books.

De Stefani, E. (2011), *'Ah petta ecco, io prendo questi che mi piacciono': agire come coppia al supermercato. Un approcio conversazionale e multimodale allo studio dei processi decisionali*. Roma: Aracne.

De Stefani, E. (2018). Formulating direction: Navigational instructions in driving lessons. *International Journal of Applied Linguistics*, *28*(2), 283-303.

De Stefani, E., & Gazin, A. D. (2014). Instructional sequences in driving lessons: Mobile participants and the temporal and sequential organization of actions. *Journal of Pragmatics*, *65*, 63–79.

Deppermann, A. (2013). Introduction: Multimodal interaction from a conversation analytic perspective. *Journal of Pragmatics*, *46*(1), 1-7.

Deppermann, A. (2015a). “Retrospection and understanding in interaction”. In: A. Deppermann & S. Günthner (eds.), *Temporality in Interaction.* Amsterdam/Philadelphia: John Benjamins, pp. 57-94.

Deppermann, A. (2015b). When recipient design fails: Egocentric turn-design of instructions in driving school lessons leading to breakdowns of intersubjectivity. *Gesprächsforschung 16*:63-101.

Deppermann, A. (2018). Instruction practices in German driving lessons: Differential uses of declaratives and imperatives. *International Journal of Applied Linguistics, 28*(2):265–282.

Deppermann, A., & Günthner, S. (eds.) (2015). “Temporality in interaction”. In: A. Deppermann, S. Günthner, *Temporality in Interaction* Amsterdam/Philadelphia: John Benjamins, 1-24.

Deppermann, A., & Streeck, J. (eds.) (2018). *Time in Embodied Interaction: Synchronicity and Sequentiality of Multimodal Resources.* Amsterdam / Philadelphia: John Benjamins.

Dewey, J. (1896). The reflex arc concept in psychology. *Psychological Review, 3*:357–370.

Domke, C., & Holly, W. (2011). “Foundations: Ethnomethodology and Erving Goffman”. In: W. Bublitz & N. R. Norrick (eds.), *Foundations of pragmatics*. Berlin/Boston: De Gruyter, pp. 261-287.

Dove, G. (2018). Language as a disruptive technology: abstract concepts, embodiment and the flexible mind. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences* 373(1752).

Drew, P. (1995). “Interaction sequences and anticipatory interactive planning”. In: E. Goody (ed.), *Social intelligence and interaction: Expressions and implications of the social bias in human intelligence.* Cambridge: Cambridge University Press, pp. 111-139.

Drew, P. (2009). “‘Quit talking while I'm interrupting’: A comparison between positions of overlap onset in conversation”. In: M. Haakana, Laakso, M., & Lindström, J. (eds.), *Talk in Interaction: Comparative Dimensions*. Helsinki, Finnish Literature Society, 70–93.

du Bois J.W., Schuetze-Coburn, S., Cumming, S., & Paolino, D. (1993). “Outline of Discourse Transcription”. In: J. A. Edwards & M. D. Lampter (eds.), *Talking Data. Trascription and Coding in Discourse Research.* Hillsdale: Lawrence Erlbaum, pp. 45-89.

Due, B. L. (2021). Distributed perception: Co-Operation between sense-able, actionable, and accountable semiotic sgents. *Symbolic Interaction, 44*(1), 134-162.

Duranti, A. (2006). Transcripts, like shadows on the wall. *Mind, Culture, and Activity 13*(4), 301-310.

Edwards, D., & Potter, J. (1992). *Discursive psychology*. London, UK: Sage.

Emirbayer, M. & Maynard, D. W. (2011). Pragmatism and ethnomethodology. *Qualitative sociology*, *34*(1), 221-261.

Enfield, N. J., & Sidnell, J. (2017). *The concept of action*. Cambridge University Press.

Engel, A. K., Maye, A., Kurthen, M., & König, P. (2013). Where's the action? The pragmatic turn in cognitive sciences. *Trends in cognitive sciences*, *17*(5), 202-209.

Evans, B., & Fitzgerald, R. (2017). The categorial and sequential work of ‘embodied mapping' in basketball coaching. *Journal of Pragmatics, 118*:81-98.

Evans, B., & Reynolds, E. (2016). The organization of corrective demonstrations using embodied action in sports coaching feedback. *Symbolic Interaction, 39*(4):525-556.

Fabbri-Destro, M., & Rizzolatti, G. (2008). Mirror neurons and mirror systems in monkeys and humans. *Physiology*, *23*(3), 171-179.

Fatigante, M. (2006). “Teoria e pratica della trascrizione in analisi conversazionale. L'irriducibilità interpretativa del sistema notazionale”. In: Bürki, Y., & De Stefani, E. (a cura di): *Trascrivere la lingua. Dalla filologia all'analisi conversazionale*. Bern: Peter Lang, 219-256.

Fele, G. (2002). *Etnometodologia. Introduzione allo studio delle attività ordinarie*. Roma: Carocci.

Ferrero Camoletto, R., & Marcelli, D. (2020). Keeping it natural? challenging indoorization in Italian rock climbing. *Annals of Leisure Research*, *23*(1), 34-51.

Fisher, M., & Zwaan, R. (2008). Embodied language: A review of the role of the motor system in language comprehension. *Quarterly Journal of Experimental Psychology, 61*, 825-850.

Floyd, S., Rossi, G., & Enfield, N. J. (eds.). (2020). *Getting others to do things: A pragmatic typology of recruitments* (Vol. 31). Language Science Press.

Fodor, J. A. (1983). Modularity of mind: an essay on faculty psychology. Cambridge, MA: MIT Press.

Fodor, J.A. (1975). *The Language of thought*. Harvard University Press.

Froese, T., & Gallagher, S. (2012). Getting interaction theory (IT) together: integrating developmental, phenomenological, enactive, and dynamical approaches to social interaction. *Interaction Studies*, *13*(3), 436-468.

Fuchs, T., & De Jaegher, H. (2009). Enactive intersubjectivity: Participatory sense-making and mutual incorporation. *Phenomenology and the cognitive sciences, 8*(4), 465-486.

Fusaroli, R., Demuru, P., & Borghi, A. M. (2009). The intersubjectivity of embodiment. *Journal of Cognitive Semiotics, 4*(1), 1-5.

Fusaroli, R., Rączaszek-Leonardi, J., & Tylén, K. (2014). Dialog as interpersonal synergy. *New Ideas in Psychology*, *32*, 147-157.

Fusaroli, R., & Tylén, K. (2016). Investigating conversational dynamics: interactive alignment, interpersonal synergy, and collective task performance. *Cognitive sciences*, *40*, 145-171.

Gallagher, S. (2009). "Philosophical antecendents to situated cognition". In P. Robbins and M. Aydede (Eds.), *The Cambridge Handbook of Situated Cognition*. United States: Cambridge University Press, 35-51.

Gallagher, S. (2011). “Interpretations of embodied cognition”. In W. Tschacher and C. Bergomi (Eds.), *The Implications of Embodiment: Cognition and Communication*. United Kingdom: Imprint Academic, pp. 59-70.

Gallagher, S. (2014). “Phenomenology and embodied cognition”. In: L. Shapiro (ed.), *The Routledge Handbook of Embodied Cognition*. New York, NY: Oxford University Press, pp. 9–18.

Gallese, V. (2008). Mirror neurons and the social nature of language: The neural exploitation hypothesis. *Social neuroscience*, *3*(3-4), 317-333.

Gallese, V., Fadiga, L., Fogassi, L., & Rizzolatti, G. (1996). Action recognition in the premotor cortex. *Brain*, *119*(2), 593-609.

Gardner, H. (1987). The mind's new science: A history of the cognitive revolution. Basic Books.

Garfinkel, H. (1967). *Studies in Ethnomethodology.* Englewood, NJ: Prentice-Hall.

Garfinkel, H. (2002). “Instructions and instructed actions”. In: A. Warfield Rawls (Ed.), *Ethnomethodology’s program. Working out Durkheim’s aphorism.* Oxford, Rowman & Littlefield, 197-218.

Garfinkel, H. (2002). *Ethnomethodology's program: Working out Durkheim's aphorism*. Rowman & Littlefield Publishers.

Garfinkel, H., & Sacks, H. (1970). “On formal structures of practical actions”. In: J C. McKinney & E. A. Tiryakian (eds.), *Theoretical sociology: Perspectives and developments.* New York: Appleton-Century-Crofts, pp. 337-366.

Gibbs, R. (2006). *Embodiment and cognitive sciences*. Cambridge, UK: Cambridge Univ. Press.

Gibson, J. J. (1966). *The senses considered as perceptual systems*. Houghton Mifflin.

Gibson, J. J. (1979). *The ecological approach to visual perception.* Boston, Houghton Mifflin.

Glenberg, A.M., & Kaschak, M.P. (2002). Grounding language in action. *Psychonomic Bulletin & Review 9,* 558–565.

Glenberg, A. M., Witt, J. K., & Metcalfe, J. (2013). From the revolution to embodiment: 25 years of cognitive psychology. *Perspectives on psychological science*, *8*(5), 573-585.

Glover, S., Rosenbaum, D. A., Graham, J., and Dixon, P. (2004). Grasping the meaning of words. *Experimental Brain Research 154,* 103–108.

Goffman, E. (1959). *The presentation of self in everyday life.* Garden City, NY: Doubleday.

Goffman, E. (1961). *Encounters: two studies in the sociology of interactions.* Indianapolis, Bobbs-Merrill.

Goffman, E. (1963). *Behavior in public places: Notes on the social organization of gathering*. New York: Free Press.

Goffman, E. (1967). *Interaction ritual: Essays on face-to-face behavior*. Chicago: Aldine Publishing Company.

Goffman, E. (1989). On fieldwork. *Journal of contemporary ethnography*, *18*(2), 123-132.

Goldberg, J. A. (1975). A system for the transfer of instructions in natural settings. *Semiotica*, *14(3)*, 269-296.

Goodwin, C. (1979). “The interactive construction of a sentence in natural conversation”. In: G. Psathas (ed.), *Everyday language: Studies in ethnomethodology*. New York: Irvington, pp. 77-121.

Goodwin, C. (1980). Restarts, pauses, and the achievement of a state of mutual gaze at turn-beginning, *Sociological Inquiry 50*(3):272–302.

Goodwin, C. (1981). *Conversational organization: Interaction between speakers and hearers*. London: Academic Press.

Goodwin, C. (1994). Professional vision. *American Anthropologist*, *96*(3), 606.

Goodwin, C. (1995). Co-Constructing Meaning in Conversations with an Aphasic Man. *Research on Language and Social Interaction 28* (3), 233-260.

Goodwin, C. (1997). "The blackness of black: Color categories as situated practice". In: L.B. Resnick, R. Säljö, C. Pontecorvo & B. Burge (eds) *Discourse, Tools and Reasoning: Essays on Situated Cognition*. Berlin/Heidelberg/New York: Springer, pp. 111–40.

Goodwin, C. (2000a). Action and embodiment within situated human interaction. *Journal of pragmatics*, *32*(10), 1489-1522.

Goodwin, C. (2000b). Practices of color classification. *Mind, culture, and activity*, *7*(1-2), 19-36.

Goodwin, C. (2003). "The Body in Action". In: J. Coupland & R. Gwyn (eds), *Discourse, the Body and Identity*. New York: Palgrave/Macmillan, pp. 19–42.

Goodwin, C. (2004). A competent speaker who can't speak: The social life of aphasia. *Journal of Linguistic Anthropology*, *14*(2), 151-170.

Goodwin, C. (2007). Participation, stance and affect in the organization of activities. *Discourse & Society*, *18*(1), 53-73.

Goodwin, C. (2013). The co-operative, transformative organization of human action and knowledge. *Journal of pragmatics*, *46*(1), 8-23.

Goodwin, C. (2017). *Co-Operative Action*. Cambridge: Cambridge University Press.

Goodwin, C., & Goodwin, M. H. (1996). Seeing as a situated activity: Formulating planes. *Cognition and communication at work*, *61*, 95.

Goodwin. M. H. (1980). Processes of mutual monitoring implicated in the production of description sequences, *Sociological Inquiry*, *50*(3): 303–317.

Gratier, M., Devouche, E., Guellai, B., Infanti, R., Yilmaz, E., & Parlato-Oliveira, E. (2015). Early development of turn-taking in vocal interaction between mothers and infants. *Frontiers in psychology*, *6*, 1167.

Greco, L., Galatolo, R., Piccoli, V., Ticca A. C., Ursi, B., & Horlacher, A. S. (2019). Some theoretical and methodological challenges of transcribing touch in talk-in-interaction. *Social Interaction: Video-Based Studies of Human Sociality*, *2*(1).

Greeno, J. G., & Moore, J. L. (1993). Situativity and symbols: reply to Vera and Simon. *Cognitive sciences 17*, 49-59.

Guett, M., Thomas, N., Hovemann, G., O'Rourke, B., Digennaro, S., Camy, J., Fodimdi, M., & Carscadden, C. (2011). *All for sport for all: perspectives of sport for people with a disability in Europe.* Lyon: European Observatoire of Sport and Employment.

Guo, E., Katila, J., & Streeck, J. (2020). Touch and the Fluctuation of Agency and Motor Control in Pediatric Dentistry. *Social Interaction. Video-based studies of human sociality*, *3*(1).

Haddington, P., Keisanen, T., Mondada, L., & Nevile, M. (eds.) (2014). *Multiactivity in social interaction: Beyond multitasking*. Amsterdam / Philadelphia: John Benjamins.

Haddington, P., Mondada, L., & Nevile, M. (eds.) (2013). *Interaction and mobility: Language and the body in motion*. Berlin: De Gruyter.

Hausendorf, H. (2013). "On the interactive achievement of space e and its possible meanings". In: P. Auer, M. Hilpert & A. Stuckenbrock (eds.), *Space in language and linguistics: Geographical, interactional and cognitive perspectives*. Berlin: De Gruyter, pp. 276-303.

Heath, C. (1986). *Body movement and speech in medical interaction*. Cambridge: Cambridge University Press.

Heath, C., & Luff, P. (1992). Collaboration and control: Crisis management and multimedia technology in London Underground Line Control Rooms. *Computer Supported Cooperative Work (CSCW)*, *1*(1-2), 69-94.

Heath, C., & Luff, P. (2000). *Technology in action*. Cambridge, Cambridge University Press.

Heft, H. (2007). The social constitution of perceiver-environment reciprocity. *Ecological psychology*, *19*(2), 85-105.

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The WEIRDest people in the world?. *Behavioral and brain sciences*, *33*(2-3), 61-83.

Hepburn, A., & Bolden, G. B. (2017), *Transcribing for Social Research*. London: Sage.

Heritage, J. (1984). *Garfinkel and Ethnomethodology*. Cambridge, Polity Press.

Hilbrink, E. E., Gattis, M., & Levinson, S. C. (2015). Early developmental changes in the timing of turn-taking: a longitudinal study of mother-infant interaction. *Frontiers in psychology*, *6*, 1492.

Hoey, E. M. & Kendrick, K. H. (2017). "Conversation Analysis". In: A. M. B. de Groot & P. Hagoort (eds.), *Research Methods in Psycholinguistics: A Practical Guide*. Wiley Blackwell, pp. 151-173.

Holler, J., Kendrick, K, H., Casillas, M., & Levinson, S. C. (eds.) (2016). *Turn-taking in human communicative interaction*. Lausanne: Frontiers Media. doi: 10.3389/978-2-88919-825-2.

Holtgraves, T. M. (2013). *Language as social action: Social psychology and language use*. Mahwah, NJ: Lawrence Erlbaum Associates.

Husserl, E. (2002*). Idee per una fenomenologia pura e per una filosofia fenomenologica.* [Trad. Ita.]. Torino: Einaudi (Original work published in 1913).

Hutchins, E. (1991). *The social organization of distributed cognition.* In L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Perspectives on socially shared cognition*. Washington, DC: American Psychological Association, pp. 283–307.

Hutchins, E. (1995a). *Cognition in the wild.* The MIT Press.

Hutchins, E. (1995b). How a cockpit remembers its speeds. *Cognitive sciences*, *19*(3), 265-288.

Hutchins, E. (2005). Material anchors for conceptual blends. *Journal of Pragmatics 37*, 1555-1577.

Hutchins, E (2006a). "The Distributed Cognition perspective on human interaction". In: N. Enfield, & S. C. Levinson, (eds.), *Roots of human sociality. Culture, cognition and human interaction.* Oxford : Berg Publishers, 375 - 398.

Hutchins, E. (2006b). Imagining the cognitive life of things. Paper presented at the symposium: The Cognitive Life of Things: Recasting the boundaries of Mind, organized by Colin Renfrew and Lambros Malafouris at the McDonald Institute for Archaeological Research, Cambridge University, UK 7-9 April, 2006.

Hutchins, E. (2010). Cognitive ecology. *Topics in cognitive sciences 2*, 705-715.

Hutchins, E., & Hinton, G. E. (1984). Why the islands move. *Perception*, *13*(5), 629-632.

IFSC (2018). *Rules 2018* [Version No 1.5]. Retrieved from: https://cdn.ifsc-climbing.org/images/World_Competitions/IFSC-Rules_2018_V15.pdf (Last consultation on 25/11/2020)

Iwasaki, S., Bartlett, M., Manns, H., & Willoughby, L. (2019). The challenges of multimodality and multi-sensoriality: Methodological issues in analyzing tactile signed interaction. *Journal of Pragmatics*, *143*, 215–227.

James, W. (1984). *La volontà di credere*. [Trad. Ita.] Milano: Rizzoli. (Original work published in 1956).

Jarvilehto, T. (1998a). The theory of the organism-environment system: I. Description of the theory. *Integrative physiological and behavioral science*, *33*(4), 321-334.

Jarvilehto, T. (1998b). The theory of the organism-environment system: II. Significance of nervous activity in the organism-environment system. *Integrative Physiological and Behavioral Science*, *33*(4), 335-342.

Jefferson, G. (1983). On exposed and embedded correction in conversation. *Studium Linguistik*, *14*, pp. 58-68.

Jefferson, G. (1990). "List-construction as a task and resource". In: G. Psathas (Ed.), *Interaction competence*. Boston: University Press of America, pp. 63-92.

Jefferson, G. (2004). "Glossary of transcript symbols with an introduction". In: Lerner, G. H. (ed.), *Conversation Analysis. Studies from the First Generation*. Amsterdam: John Benjamins Publishing Company, 13-31.

Jefferson, G., Sacks, H., & Schegloff, E. A. (1977). The preference for self-correction in the organization of repair in conversation. *Language*, *53*(2), 361–382.

Jenkings, K. N. (2017). “Rock climbers’ communicative and sensory practices”. In: C. Meyer & U. v. Wedelstaedt (eds.), *Moving Bodies in Interaction– Interacting Bodies in Motion. Intercorporeality, Interkinesthesia, and Enaction in Sports*. Amsterdam: John Benjamins, pp. 149-171.

Katila, J., & Philipsen, J. S. (2019). The intercorporeality of closing a curtain: Sharing similar past experiences in interaction. *Pragmatics & Cognition*, *26*(2-3), 167-196.

Keevallik, L. (2010). Social action of syntactic reduplication. *Journal of Pragmatics*, *42*(3):800-824.

Keevallik, L. (2013a). “*Here* in time and space: decomposing movement in dance instruction”. In: P. Haddington, L. Mondada & M. Nevile (Eds.), *Interaction and mobility. Language and the body in motion.* Berlin, De Gruyter, 345-370.

Keevallik, L. (2013b). The interdependence of bodily demonstrations and clausal syntax. *Research on Language and Social Interaction*, *46*(1), 1–21.

Keevallik, L. (2014). Turn organization and bodily-vocal demonstrations. *Journal of Pragmatics*, *65*, 103–120.

Keevallik, L. (2015). “Coordinating the temporalities of talk and dance”. In: A. Deppermann & S. Günthner, (Eds.), *Temporality in interaction*. Amsterdam/Philadelphia, John Benjamins Publishing Company, 309-336.

Keevallik, L. (2018). What does embodied interaction tell us about grammar?. *Research on Language and Social Interaction*, *51*(1), 1-21.

Kemmerer, D., Castillo, J. G., Talavage, T., Patterson, S., & Wiley, C. (2008). Neuroanatomical distribution of five semantic components of verbs: Evidence from fMRI. *Brain and language*, *107*(1), 16-43.

Kendon, A. (1990). *Conducting interaction: Patterns of behavior in focused encounters.* Cambridge: Cambridge University Press.

Kendrick, K. H. (2017). Using conversation analysis in the lab. *Research on Language and Social Interaction, 50*:1, 1-11.

Kirsh, D. (2004). “Metacognition, distributed cognition and visual design”. In: P. Gärdinfors & P. Johansson (eds.), *Cognition, education and communication technology*. Mahwah, NJ: Lawrence Erlbaum, pp. 147-180.

Kirsh, D. (2006). Distributed cognition: A methodological note. *Pragmatics & Cognition*, *14*(2), 249-262.

Kirsh, D., & Maglio, P. (1994). On distinguishing epistemic from pragmatic action. *Cognitive sciences*, *18*(4), 513-549.

Kirshner, D., & Whitson, J. A. (Eds.). (1997). Situated cognition: Social, semiotic, and psychological perspectives. Psychology Press.

Klatzky, R. L., & Lederman, S. J. (2003). “Touch”. In: A. Healy & R. Proctor (eds.) *Handbook of Psychology, Volume 4: Experimental Psychology*, John Wiley and Sons, pp.147-176.

Kreplak, Y., & Mondémé, C. (2014). Artworks as touchable objects. *Interacting with objects: Language, materiality, and social activity*, *295*, 318.

Kulczycki, C., & Hinch, T. (2014). “It’sa place to climb”: place meanings of indoor rock climbing facilities. *Leisure/loisir*, *38*(3-4), 271-293.

Lakoff, G., & Johnson, M. (1999). Philosophy in the flesh: The embodied mind and its challenge to western thought (Vol. 640). New York: Basic books.

Laurence, S., & Margolis, E. (eds.) (1999). *Concepts-Core readings.*Cambridge, MA: The MIT Press.

Lave, J. (1988). *Cognition in practice: Mind, mathematics and culture in everyday life.* Cambridge University Press.

Lemke, J. L. (1997). “Cognition, context, and learning: A social semiotic perspective”. In: D. Kirshner & A. Whitson (eds.), *Situated cognition theory: Social, neurological, and semiotic perspectives*. Hillsdale, NJ: Lawrence Erlbaum Associates, pp. 37–55.

Levinson, S. C. (1983). *Pragmatics*. Cambridge: Cambridge University Press.

Levinson, S. C. (2003). *Space in language and cognition: Explorations in cognitive diversity* (Vol. 5). Cambridge University Press.

Levinson, S. C. (2006). “On the human interactional engine”. In: N. Enfield, & S. C. Levinson, (eds.), *Roots of human sociality. Culture, cognition and human interaction*. Oxford : Berg Publishers, pp. 39-69.

Lewis, N. (2000). The climbing body, nature and the experience of modernity. *Body & society*, *6*(3-4), 58-80.

Lindwall, O., Lymer, G., & Greiffenhagen, C. (2015). “The sequential analysis of instruction”. In: N. Markee (ed.), *The Handbook of Classroom Discourse and Interaction*. London: Wiley Blackwell, pp. 142–157.

Lupyan, G., & Ward, E. J. (2013). Language can boost otherwise unseen objects into visual awareness. *Proceedings of the National Academy of Sciences*, *110*(35), 14196-14201.

Lynnes, M. D., & Temple, V. A. (2008). Inclusive Artificial Wall Climbing. *Physical & Health Education Journal*, *74*(2), 6-11.

Macbeth, D. (2004). The relevance of repair for classroom correction. *Language in Society, 33*: 703–736.

Macpherson, H. (2012). “Guiding visually impaired walking groups: intercorporeal experience and ethical sensibilities”. In: M. Paterson, & M. Dodge (eds.), *Touching space, Placing touch*. Routledge: London, pp. 131-150.

Madzia, R., & Jung, M. (2016). “Introduction: What a pragmatist cognitive sciences is and what it should be”. In: R. Madzia & M. Jung (eds.), *Pragmatism and embodied cognitive sciences*. Berlin/Boston: De Gruyter, pp. 1-13.

Majid, A., Bowerman, M., Kita, S., Haun, D. B. M. & Levinson, S. C. (2004) Can language restructure cognition? The case for space. *Trends in Cognitive sciences 8*(3):108–14.

Marino, B. F., Sirianni, M., Volta, R. D., Magliocco, F., Silipo, F., Quattrone, A., & Buccino, G. (2014). Viewing photos and reading nouns of natural graspable objects similarly modulate motor responses. *Frontiers in human neuroscience 8*, 968.

Maturana, H. R., & Varela, F. J. (1991). *Autopoiesis and cognition: The realization of the living*. Springer Science & Business Media.

Mazzuca, C., Lugli, L., Benassi, M., Nicoletti, R., & Borghi, A. M. (2018). Abstract, emotional and concrete concepts and the activation of mouth-hand effectors. *PeerJ, 6,* e5987.

Mehan, H. (1979). *Learning lessons: Social organization in the classroom*. Cambridge , MA : Harvard University Press.

Menary, R. (2015). “Pragmatism and the pragmatic turn in cognitive sciences”. In: A. K. Engel, K. J. Friston, & D. Kragic (Eds.), *The pragmatic turn: Toward action-oriented views in cognitive sciences* (Vol. 18). MIT Press, pp. 215-233.

Merleau-Ponty, M. (1962). *Phenomenology of perception.* London and New York: Routledge and Kegan Paul.

Merleau-Ponty, M. (1964). *Signs*. Evanston: Northwestern University Press.

Merleau-Ponty, M. (1968). *The visible and the invisible.* Evanston: Northwestern University Press.

Meteyard, L., Bahrami, B., & Vigliocco, G. (2007). Motion detection and motion verbs: Language affects low-level visual perception. *Psychological Science*, *18*(11), 1007-1013.

Meyer, C. & v. Wedelstaedt, U. (eds.) (2017). *Moving bodies in interaction – Interacting bodies in motion: Intercorporeality, interkinesthesia and enaction in sports.* Amsterdam / Philadelphia: John Benjamins.

Meyer, C., & v. Wedelstaedt, U. (2020). Achieving competitive hardness: The preference for hard touch as practical accomplishment in professional handball. *Social Interaction: Video-Based Studies of Human Sociality*, *3*(1).

Meyer, C., Streeck, J, & Scott Jordan, J. (eds.) (2017). *Intercorporeality: Emerging socialities in interaction*. Oxford: Oxford University Press.

Miller, G. A. (2003). The cognitive revolution: a historical perspective. *Trends in cognitive sciences*, *7*(3), 141-144.

Mittelstaedt, R. (1997). Indoor climbing walls: The sport of the nineties. *Journal of Physical Education, Recreation & Dance*, *68*(9), 26-29.

Moll, H., & Tomasello, M. (2007). Cooperation and human cognition: the Vygotskian intelligence hypothesis. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *362*(1480), 639-648.

Mondada, L. (1996). How space structures discourse. In: Pütz, M. & R. Dirven (eds.), *The construal of space in language and thought* (571-597). Berlin: Mouton.

Mondada, L. (2006). Participants' online analysis and multimodal practices: projecting the end of the turn and the closing of the sequence. *Discourse studies*, *8*(1), 117-129.

Mondada, L. (2011). The interactional production of multiple spatialities within a participatory democracy meeting. *Social Semiotics*, *21*(2), 289-316.

Mondada, L. (2013a). “The conversation analytic approach to data collection”. In: J. Sidnell & T. Stivers (eds.), *The handbook of conversation analysis*. United Kingdom: Wiley-Blackwell, pp. 32-56.

Mondada, L. (2013b). Interactional space and the study of embodied talk-in-interaction. In P. Auer, M. Hilpert, A. Stukenbrock, & B. Szmrecsanyi (Eds.), Space in language and linguistics. Berlin, Germany: De Gruyter, pp. 247–275.

Mondada, L. (2014a). The local constitution of multimodal resources for social interaction. *Journal of Pragmatics, 65,* 137-156.

Mondada, L. (2014b). Instructions in the operating room: how the surgeon directs their assistant’s hands. *Discourse Studies, 16(2),* 131-161.

Mondada, L. (2016). Challenges of multimodality: Language and the body in social interaction. *Journal of sociolinguistics*, *20*(3), 336-366.

Mondada, L. (2017). “Precision timing and timed embeddedness of imperatives in embodied courses of action”. In: M. L. Sorjonen, L. Raevaara, & E. Couper-Kuhlen (eds.), *Imperative turns at talk*. Amsterdam: John Benjamins, pp. 65-101.

Mondada, L. (2018a). Multiple temporalities of language and body in interaction: Challenges for transcribing multimodality. *Research on Language and Social Interaction*, *51*(1), 85-106.

Mondada, L. (2018b). The multimodal interactional organization of tasting: Practices of tasting cheese in gourmet shops. *Discourse Studies*, *20*(6), 743-769.

Mondada, L. (2019a). Contemporary issues in conversation analysis: Embodiment and materiality, multimodality and multisensoriality in social interaction. *Journal of Pragmatics, 145*, 47-62.

Mondada, L. (2019b). Conventions for multimodal transcription. [Version 5.0.1]. Available online at: https://franz.unibas.ch/fileadmin/franz/user_upload/redaktion/Mondada_conv_multimodality.pdf (last consultation on 08/19/2020).

Mondada, L. (2020). Audible sniffs: Smelling-in-interaction. *Research on Language and Social Interaction*, *53*(1), 140-163.

Mondada, L., & Tekin, B. S. (2020). Arranging bodies for photographs: Professional touch in the photography studio. *Social Interaction. Video-Based Studies of Human Sociality*, *3*(1).

Muntanyola-Saura, D. (2015). Distributed marking in sport corrections: A conversation analysis of synchronized swimming. *Journal of Cognitive Science*, *16*(3), 338-354.

Muntanyola-Saura, D., & Sánchez-García, R. (2018). Distributed Attention: A Cognitive Ethnography of Instruction in Sport Settings. *Journal for the Theory of Social Behaviour*, *48*(4), 433-454.

Nevile, M. (2015). The embodied turn in research on language and social interaction. *Research on Language and Social Interaction*, *48*(2), 121–151.

Nevile, M., Haddington, P., Heinemann, T., & Rauniomaa, M. (2014). *Interacting with objects: Language, materiality, and social activity*. Amsterdam / Philadelphia: John Benjamins.

Nishizaka, A. (2007). Hand touching hand: referential practice at a Japanese midwife house. *Human Studies*, *30*(3), 199-217.

Nishizaka, A. (2020). Multi-Sensory Perception during Palpation in Japanese Midwifery Practice. Social Interaction. Video-Based Studies of Human Sociality, 3(1).

Noë, A. (2005). *Action in Perception* (Vol. 102). Cambridge MA: MIT Press.

Norman, D. A. (1993). Cognition in the head and in the world: an introduction to the special issue on situated action. *Cognitive sciences 17*, 1-6.

Núñez, R., Allen, M., Gao, R., Rigoli, C. M., & Relaford-Doyle, J. (2019). What happened to cognitive sciences?. *Nature Human Behaviour 3*, 782-791.

Okada, M. (2013). Embodied interactional competence in boxing practice: Coparticipants' joint accomplishment of a teaching and learning activity. *Language & communication, 33*(4), 390-403.

Okada, M. (2018). Imperative Actions in Boxing Sparring Sessions. *Research on Language and Social Interaction, 51*(1), 67-84.

Palmer, B. (2007). "Pointing at the lagoon: directional terms in Oceanic atoll-based languages". In J. Siegel, J. Lynch, & D. Eades (eds.), *Language description, history and development*. London: Benjamins, 101-117.

Peräkylä, A. (2004). "Reliability and validity in research based on naturally occurring social interaction". In: D. Silvermann (ed.), *Qualitative research: Theory, method and practice* (2nd Edition), London: SAGE, pp. 283-304.

Pezzulo, G., Barca, L., Bocconi, A. L., & Borghi, A. M. (2010). When affordances climb into your mind: advantages of motor simulation in a memory task performed by novice and expert rock climbers. *Brain and Cognition*, *73*(1), 68-73.

Pinker, S. (1994). *The language instinct: How the mind creates language*. New York: Morrow.

Posner, M.I. (ed.) (1993). *Foundations of cognitive sciences*. MIT Press.

Powis, B. (2018). Visual impairment, sport and somatic work: the auditory experiences of blind and partially sighted cricket players. *The Senses and Society*, *13*(2), 147-162

Psathas, G. (1968). Ethnomethods and phenomenology. *Social Research*, 500-520.

Psathas, G. (1986). Some sequential structures in direction-giving. *Human Studies*, *9*(2-3), 231-246.

Psathas, G. (1991). “The structure of direction-giving in interaction”. In: D. Boden & D. H. Zimmerman (eds.), *Talk and social structure: Studies in Ethnomethodology and Conversation Analysis.* Oxford: Polity Press, pp. 195-216.

Psathas, G. (1992). “The study of extended sequences: the case of the garden lesson”. In: Watson, G., Seiler, R.M. (Eds.), *Text in Context: Contributions to Ethnomethodology*. Sage, Newbury Park, pp. 99-122.

Pylyshyn, Z.W. (1984). *Computation and Cognition*. Cambridge, Mass.: MIT Press.

Råman, J. (2019). Budo demonstrations as shared accomplishments: the modalities of guiding in the joint teaching of physical skills. *Journal of Pragmatics*, *150:*17-38.

Rasmussen, G., Hazel, S., & Mortensen, K. (eds.) (2014). A body of resources: CA studies of social conduct. *Journal of Pragmatics, 65* [Special Issue]

Reed, E. (1991). “James Gibson’s ecological approach to cognition”. In: A. Still, & A. Costall (eds.), Against Cognitivism. Alternative foundations for cognitive psychology. Harvester Wheatsheaf, 171-197.

Resnick, L. B., Levine, J. M. & Teasley, S. D. (eds.) (1991). *Perspectives on socially shared cognition.* Washington DC: American Psychological Association.

Resnick, L. B., Pontecorvo, C., & Säljö, R. (1997). *Discourse, tools, and reasoning: Essays on situated cognition*. Berlin, Heidelberg: Spring.

Richardson, M. J., Marsh, K. L., Isenhower, R. W., Goodman, J. R., & Schmidt, R. C. (2007). Rocking together: Dynamics of intentional and unintentional interpersonal coordination. *Human movement science*, *26*(6), 867-891.

Rizzolatti, G., & Craighero, L. (2004). The mirror-neuron system. *Annual Review of Neuroscience*, *27*, 169-192.

Robbins, P. & Aydede, M. (2008). "A short primer on situated cognition". In: P. Robbins & M. Aydede (eds), *The Cambridge handbook of situated cognition*. Cambridge University Press, 3-10.

Robinson, J. D. (2004). The sequential organization of "explicit" apologies in naturally occurring English. *Research on language and social Interaction*, *37*(3), 291-330.

Rogoff, B., & Lave, J. (eds.). (1984). *Cognition in everyday life.* Cambridge, MA: Harvard University Press.

Roth, W. M., & Jornet, A. (2013). Situated cognition. *WIREs Cognitive Science, 4*: 463-478.

Routarinne, S., Tainio, L. E., & Burdelski, M. (eds.) (2020). Special issue: Human-to-human touch in institutional settings. *Social Interaction: Video-Based Studies of Human Sociality, 3*(1).

Sacks, H. (1992). *Lectures on Conversation* (Vol. 1 & 2). Oxford, Basil Blackwell.

Sacks, H., Schegloff, E. A., & Jefferson, G. (1974). A simplest systematics for the organization of turn-taking in conversation. *Language*, *50*, 696-735.

Saerberg, S. (2010) "Just go straight ahead" How blind and sighted pedestrians negotiate space. *The Senses and Society*, *5*(3):364-381.

Salomon, G. (1993a). "No distribution without individuals' cognition: a dynamic interactional view". In: G. Salomon (ed.), *Distributed cognitions.*

Psychological and educational considerations. Cambridge University Press, 111-138.

Salomon, G. (1993b). “Editor’s introduction”. In: G. Salomon (ed.), *Distributed cognitions. Psychological and educational considerations.* Cambridge University Press, x-xxi.

Sánchez-García, Fele, & Liberman (2019). “Ethnomethodological respecifications of cognition in sport”. In: M. L. Cappuccio (ed.), *Handbook of embodied cognition and sport psychology*. The MIT Press, pp. 511-534.

Saysani, A., Corballis, M. C., & Corballis, P. M. (2018). Colour envisioned: Concepts of colour in the blind and sighted. *Visual Cognition*, *26*(5), 382-392.

Schegloff, E. A. (1991). “Conversation analysis and socially shared cognition”. In: L. B. Resnick, J. M. Levine, & S. D. Teasley (eds.), *Perspectives on socially shared cognition.* Washington DC: American Psychological Association, pp. 150-171.

Schegloff, E. A. (1992). Repair after next turn: the last structurally provided for place for the defense of intersubjectivity in conversation. *American Journal of Sociology*, *95*(5), 1295-1345.

Schegloff, E. A. (1996). “Turn organization: one intersection of grammar and interaction”. In: E. Ochs, E. A. Schegloff & S. A. Thompson (eds.), *Grammar and interaction*. Cambridge: Cambridge University Press, pp. 52-133.

Schegloff, E. A. (2007). *Sequence Organization in Interaction: A Primer in Conversation Analysis.* Cambridge: Cambridge University Press.

Schenkein, J. (ed.) (1978). *Studies in the organization of conversational interaction.* New York: Academic Press.

Schmidt, R. C., Richardson, M. J., Arsenault, C., & Galantucci, B. (2007). Visual tracking and entrainment to an environmental rhythm. *Journal of Experimental Psychology: Human Perception and Performance*, *33*(4), 860.

Schutz, A. (2018). *La fenomenologia del mondo sociale.* [Trad. Ita.] Milano: Meltemi (Original work published in 1960).

Scorolli, C., & Borghi, A.M. (2007). Sentence comprehension and action: Effector specific modulation of the motor system. *Brain research, 1130,* 119-124.

Searle, J. (1969). *Speech Acts: An Essay in the Philosophy of Language.* Cambridge: Cambridge University Press.

Sebanz, N., & Knoblich, G. (2009). Prediction in joint action: What, when, and where. *Topics in Cognitive Science*, *1*(2), 353-367.

Selting, M. (2000). The construction of units in conversational talk. *Language in society*, *29*(4), 477-517.

Selting, M. (2007). Lists as embedded structures and the prosody of list construction as an interactional resource. *Journal of Pragmatics, 39,* 483-526.

Shapiro, L. (2007). The embodied cognition research programme. *Philosophy Compass, 2*:338-346.

Shapiro, L. (2011). *Embodied cognition*. New York: Routledge.

Sidnell, J. (2013). “Basic conversation analytic methods”. In: J. Sidnell & T. Stivers (eds.), *The handbook of conversation analysis*. United Kingdom: Wiley-Blackwell, 77-99.

Solomon, K.O., & L.W. Barsalou (2001). Representing properties locally. *Cognitive Psychology, 43*: 129–169.

Sparkes, A. C. (2009). Ethnography and the senses: Challenges and possibilities. *Qualitative research in sport and exercise*, *1*(1), 21-35.

Steenson, C. J. & Rodger, M. W. (2015). Bringing sounds into use: thinking of sounds as materials and a sketch of auditory affordances. *The Open Psychology Journal*, *8*(1):174-182.

Still, A. & Costall, A. (1991). "The mutual elimination of dualism in Vygotskij and Gibson". In: A. Still & A. Costall (eds.), *Against Cognitivism. Alternative foundations for cognitive psychology.* Harvester Wheatsheaf, 225-236.

Stivers, T. (2004). "No no no" and other types of multiple sayings in social interaction. *Human Communication Research, 30*(2):260-293.

Streeck, J. (1995). "On projection". In: E. Goody (ed.), *Social intelligence and interaction: Expressions and implications of the social bias in human intelligence.* Cambridge: Cambridge University Press, pp. 87-110.

Streeck, J. (2009). *Gesturecraft. The manu-facture of meaning.* Amsterdam/Philadelphia: John Benjamins.

Streeck, J. (2013). Interaction and the living body. *Journal of Pragmatics*, *46*(1), 69-90.

Streeck, J. (2015). Embodiment in human communication. *Annual Review of Anthropology*, *44*, 419-438.

Streeck, J., Goodwin, C., & LeBaron, C. (2011). *Embodied interaction: Language and body in the material world*. Cambridge: Cambridge University Press.

Stukenbrock, A. (2014). Take the words out of my mouth: Verbal instructions as embodied practices. *Journal of Pragmatics, 65*, 80-102.

Suchman, L. A. (1987). *Plans and situated actions: The problem of human-machine communication.* Cambridge University Press.

Tannen, D. (1989). *Repetition, dialogue, and imagery in conversational discourse.* Cambridge: Cambridge University Press.

te Molder, H. (2015). “Discursive Psychology”. In: K. Tracey, C. Ilie & T. Sandel (eds.), *The International Encyclopedia of Language and Social Interaction* [First Edition]. John Wiley & Sons.

te Molder, H., & Potter, J. (Eds.). (2005). *Conversation and cognition*. Cambridge, UK: Cambridge University Press.

ten Have, P. (2007). “Data sessions”. In: P. ten Have, *Doing Conversation Analysis. A practical guide.* London: SAGE, pp. 140-142.

Tenbrink, T., & Dylla, F. (2017). Sailing: Cognition, action, communication. *Journal of Spatial Information Science*, *2017*(15), 3-33.

Tomasello, M. (1999). The human adaptation for culture. *Annual review of anthropology*, *28*(1), 509-529.

Tomasello M., Carpenter M, Call J, Behne T, & Moll H. (2005). Understanding and sharing intentions: the origins of cultural cognition. *Behavioural and Brain Sciences 28*(5), 675-735.

Tucker, M., & Ellis, R. (2001). The potentiation of grasp types during visual object categorization. *Visual cognition*, *8*(6), 769-800.

Tucker, M., & Ellis, R. (2004). Action priming by briefly presented objects. *Acta Psychologica 116*, 185–203.

Tversky, B., & Hard, B. M. (2009). Embodied and disembodied cognition: Spatial perspective-taking. *Cognition*, *110*(1), 124-129.

Tylén, K., Weed, E., Wallentin, M., Roepstorff, A., & Frith, C. D. (2010). Language as a tool for interacting minds. *Mind & Language*, *25*(1), 3-29.

Ursi, B (2020). “Please do touch. An exploration of tactile practices at museums through the lens of multimodality and multisensoriality”. Contribution presented at the conference *Inclusiveness in and through Museum Discourse*, 20-22 February 2020 Turin, Italy.

Valet, A. (2018). About inclusive participation in sport: cultural desirability and technical obstacles. *Sport in Society*, *21*(1): 137-151.

Varela, F. J., E. Thompson, and E. Rosch. (1991). *The embodied mind: Cognitive sciences and human experience.* Cambridge, MA: MIT Press.

Violi, P. (2009). How our bodies become us: Embodiment, semiosis and intersubjectivity. *Cognitive Semiotics*, *4*(1), 57-75.

Vygotskij, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Vygotskij, L. S. (1992). *Pensiero e linguaggio* [Trad. Ita.]. Roma-Bari: Laterza (Original work published in 1934).

Wang, H., Yan, X., & Guo, H. (2019). Visualizing the knowledge domain of embodied language cognition: A bibliometric review. *Digital Scholarship in the Humanities*, *34*(1), 21-31.

Wertsch, J. V. (1991). "A sociocultural approach to socially shared cognition. In: L. B. Resnick, J. M. Levine & S. D. Teasley (eds.), *Perspectives on socially shared cognition*. Berlin, Heidelberg: Spring, 85-100.

White, J. (2013). *The indoor climbing manual*. London: Bloomsbury Publishing.

Whorf, B. L. (1956). *Language, thought and reality.* Cambridge, MA: The MIT Press.

Wilson, M. (2002). Six views of embodied cognition. *Psychonomic Bulletin & Review 9*:625.

Wittgenstein, L. (1974). *Ricerche filosofiche.* [Trad. Ita.] Torino: Einaudi (Original work published in 1953).

Zhang, Z., Sun, Y. & Humphreys, G. (2016). Perceiving object affordances through visual and linguistic pathways: A comparative study. *Scientific Reports 6***,** 26806.

Zinken, J. & Deppermann, A. (2017). A cline of visible commitment in the situated design of imperative turns. Evidence from German and Polish. In: M. L. Sorjonen, L. Raevaara & E. Couper-Kuhlen (eds.), *Imperative turns at talk*. Amsterdam: John Benjamins, pp. 27-63.

Zwaan, R. A., & Madden, C. (2005). "Embodied sentence comprehension". In D. Pecher & R. Zwaan (Eds.), *Grounding cognition: The role of perception and action in memory, language, and thinking*. Cambridge: Cambridge University Press, pp. 224-245.

Zwaan, R. A., & Taylor, L. J. (2006). Seeing, acting, understanding: Motor resonance in language comprehension. *Journal of Experimental Psychology: General*, *135*(1), 1.