"It lets you use your feet more like you use your hands on the rock":

A HAPTIC GEOGRAPHY OF BOULDERING

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By R. J. S. Foster

This dissertation presents the results of an exploratory study of the ways boulderers have developed unique haptic skills during the practice of bouldering at Castle Hill/Kura Tawhiti, 100 km west of Christchurch, New Zealand. The research is grounded in phenomenology and ecological perception and takes as its starting points the importance of movement to perception, and that the whole body is necessarily involved in haptic perception. The research highlights the ways that boulderers cultivate particular skills of haptic perception that are related to the whole body, the hands and the feet, and elaborates the role of technology as a mediator between the feet and the rock. The study concludes that feet are as important as hands for haptic perception while climbing at Castle Hill/ Kura Tawhiti.

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1) INTRODUCTION

Bouldering – climbing on small rock formations without the use of a rope – has dramatically increased in popularity in the last decade, not only because of limited requirements of both gear and rock, but also because it allows the most difficult moves to be attempted in relative safety, because of the low heights of the boulders and protection provided by crash mats (Access Fund 2004, and see Figures 1-26). This type of climbing involves intimate contact between the climber's body, particularly the feet and hands, and the rock. Boulderers develop many specific skills and body competencies including, I would suggest, an increased awareness of the sense of touch, or what I term 'haptic skills'.

Bouldering has also become a passionate focus for devotees of the sport, and this has helped to dramatically increase the standards of difficulty attained in both bouldering and climbing more generally. One site that has recently become internationally famous for the difficulty of its problem and its extent is the Castle Hill Basin area, 100km inland of Christchurch, New Zealand (Speed 2005). The eroded limestone boulders and small cliff lines are distinctive because of their smoothness and the unusual shapes they have eroded into. The uniqueness of these rock formations has meant that a distinctly original climbing style is required to climb there successfully. This research set out to explore how this unique environment affected the haptic skills of intermediate to advanced level bouldering participants.

The dissertation has four sections in addition to an introduction and conclusion. Section two focuses on theoretical literature and is divided into three subsections: i) Literature related to embodied performance and how technology affects that performance; ii) Literature on ecological perception, especially how it relates to the haptic sense; iii) Academic climbing literature that highlights work that has dealt with the body. Section three outlines the methods used in this study, emphasising some of the difficulties of embodied research. The fourth section introduces the Castle Hill Basin and provides a basic introduction to bouldering, as well as describing two

prominent overseas bouldering areas: Hueco Tanks in Texas and Fontainebleau just south of Paris. The concluding part of this section includes respondents describing what is distinctive about climbing at Castle Hill. The results of my research are reported in section five entitled 'haptic skills'. This section is divided into discussion of skills of the whole body, which includes discussions of muscles, flexibility and body position; skills of the hands, which looks at how the fingers are used to navigate over the rock; how texture is related to memory; how sensitive hands are to the energy in the rock and the role that skin care plays in climbing. The final sub-section explores the skills of the feet, highlighting the role that technology plays in footwork and how sensitivity develops through the sole of the shoe. The study concludes that the feet are just as important for bouldering successfully at Castle Hill/ Kura Tawhiti[1] as the hands.

[1] Kura Tawhiti is the Maori name for the Conservation Area. Most climbers continue to call it Castle Hill.

2) THEORETICAL LITERATURE

There has been increasing interest in the body as a matter of geographical and sociological investigation in the last two decades, and different philosophical and sociological traditions have shaped contemporary approaches to the body (Turner 2006). One of the most prominent of these traditions is associated with the work of French philosopher Michel Foucault who was concerned with how the "body enters into political discourse as a representation of power, and how power is exercised over the body" (Turner 2006:42), most notably in institutions such as prisons, schools and mental asylums. As Turner (2006:42) notes, however, "the Foucauldian perspective is not concerned with understanding our experiences of embodiment; it is not concerned with grasping the lived experience of the body in terms of a phenomenology of the body". This dissertation takes the phenomenological approach as a starting point for understanding the haptic perceptual experience of boulderers, and in particular Merleau-Ponty's (1962) insight that the perception of reality always occurs from the particular location of our body, and before all else a perceiver is a being-in-the-world.

This section is divided into three sub-sections, the first focuses on embodied performance and highlights the way bodies develop through the practical acquisition of skills and argues that comportment is developed by the body in the process of performing particular tasks within the relational context of a particular environment, and not from some form of innate capacity. This sub-section also discusses the use of the 'mundane technology' of footwear and argues that it temporarily produces a new organism that is a hybrid object-subject. The second sub-section examines conventional understandings of perception from cognitive science and contrasts them with Gibson's (1983[1966]) 'ecological perception', which emphasises the proposition that perceptual activity involves the movement of the whole being in its environment, and that to perceive an object or event is to perceive what it affords, that is, what it may be useful for. Under these circumstances the sense of touch, or the 'haptic system' as Gibson (1983 [1966]) calls it,

must be seen as fully embodied rather than just the sensuous experiences of the fingers. The third sub-section briefly surveys theoretical literature on climbing and in particular the climbing body and notes that when there has been a focus on the body, that focus has primarily been on the hands, as if they were unconnected to a body.

a) Embodied Performance and Technology

There has been a broad turn in geographic research towards the performative and practical aspects of everyday life and leisure, and away from a concentration on the ocular, representations and texts (Thrift 1996, Nash 2000, Lorimer and Lund 2003). Landscape and place are no longer considered solely from the static perspective of representation, but there is recognition of peoples' active participation in the landscape, and a consequent focus on the embodiment of those participants (Ingold 2000). This increased interest is "recognition of the constitutive roles of embodiment, practice and performance in the shaping of subjectivity [and] is increasingly coming to the forefront of theoretical agendas" (Wylie 2002: 441). While the sense of the visual has held sway in both popular and theoretical discussions of landscape and place, Urry suggests that "there are an exceptional array of spaces that characterise the post modern world which militate against any direct and unmediated connections between a particular visual experience and a particular slice of the environment" (2000: 103).

The boulders of Castle Hill are just one such slice of the environment. Multiple senses are operating together as part of the whole body to create a particular spatiality in the process of bouldering (Massey 2002). Seeing the next ***holds***[2] and where a '***line***' goes are integral to sighted boulderers, but they are not essential. The rocks are capable of being explored by the unsighted. Likewise the ear is essential to the sense of balance, but touch is also a crucial component of the sensory experience of boulderers (Ingold 2004: 331).

[2] See glossary on pages 70 to 80 for definitions of climbing terms in bold italic throughout the dissertation.

It is important to remember that any study of the senses must recognise that "the body is an essential part of the sensuous experience: as a sense organ in itself (including the skin), as the site of all other sense organs and the brain, and a primary tool for movement and exploration of the environment. Geographical experience is fundamentally mediated by the human body, it begins and ends with the body" (Rodaway 1994: 31). This research takes as its starting point for any understanding of the body Ingold's (2000) contention that the body does not come ready made for any particular activity, but emerges in the relational contexts of a person's involvement in their surroundings, and "are therefore properties of the developmental system constituted by these relations. Moreover these skills are literally *embodied*, in the sense that their development entails specific modifications in neurology, musculature, and even in basic features of anatomy" (Ingold 2000: 375 original emphasis). Ingold makes the comparison between walking and cycling and argues that their emergence should be situated within the same overall process of evolution, "an evolution, that is, of developmental systems which underwrite these capacities" (Ingold 2000: 376). Ingold points out that no novice has succeeded in sustaining balance and co-ordination on their first try at cycling, but that the knack once learned is never forgotten. I would argue that Ingold's characterisation of activities as embodied skills also fits the activity of bouldering, which is apparent from comments of several of the respondents. Jock[3] remarked on the difference between returning to the sport after a long break and being a complete beginner;

> If you have a layoff for a good number of years and you've got no strength, no flexibility and no stamina you can still get out and do things if they are easy enough, but if you take a complete beginner who doesn't have any background in climbing they have to think about what they're doing, and thinking about it while you're trying to hang off something ... You do need a certain amount of background knowledge just on how to move your body. You might feel completely useless if you've not done anything for a long time, but you do still have that certain knowledge of how to position your body to make it easier (Jock, transcription 27/1/07).

[3] All names are pseudonyms.

Even climbers with a lot of knowledge and skills in one particular environment may struggle if the characteristics of the environment changes, and Castle Hill is certainly unlike most other places. As Vincent noted about two visiting American climbers;

V Like you know experience wise the first time that they came to Castle Hill (name) picked up on it really quickly it was quite surprising but (name), the climber that wasn't that experienced, he just got schooled.

Int He did *The Gift* V9 quite easily though didn't he?

V Yeah that's like climbing granite though.

Int What did he struggle on?

V Anything that was Castle Hillish, anything that was low angled and slopers, dimensional climbs (Vincent, transcription 7/2/07).

This suggests that even extremely good climbers can have many skills to learn from particular bouldering areas. So, if we are to treat the body as an unfinished project that is constantly developing within relational contexts, how then should we treat the role of technology, in this case the mundane climbing shoe? Michael (2000) argues that "to explore the role of the body in the mediation of relations between humans and the natural environment is, inevitably, to consider the part played by technology" (2000: 107). Ingold's response is that tool use is also a skilled practice rather than the mechanical operation of exterior devices and that it "extends the whole person" rather than being an add on (Ingold 2000: 319). A tool's use requires knowledge of a very personal kind: "partly intuitive, largely implicit, and deeply embedded in the particularities of experience" ...and therefore climbers come into being through a process of development whereby they acquire "the skills appropriate to the particular kind of life they lead" (Ingold 2000: 369, 379). The object and subject develop in conjunction with one another through practical use to become a hybrid object-subject, at least temporarily (Michael 2000).

How does this tool use change one's perception of the environment? Ingold argues, following Gibson, that if perception is a function of movement "then what we perceive must, at

least in part, depend on how we move. Locomotion, not cognition, must be the starting point for the study of perceptual activity" (Ingold 2004: 331). Ingold goes on to suggest that

> Once this is recognised, a whole new field of inquiry is opened up, concerning the ways in which our knowledge of the environment is altered by techniques of footwork and by the many and varied devices that we attach to the feet in order to enhance their effectiveness in specific tasks and conditions (Ingold 2004: 331).

Fleshing out the 'techniques of footwork' in the particular setting of rock climbing is one of the aims of this research, because climbers were extremely alert to both the subtleties of movement required and the integral part that climbing shoes played in that movement. It is now necessary to turn from the body of the climber and the role of technology in climbing towards a focus on the senses, in particular, the haptic sense or sense of touch, and its role in perception.

b) Ecological Perception and the Haptic Sense

The study of sensory perception has been marked by a dramatic split between those who study a static perceiver in laboratory settings, whose perceptual activity revolves around the operation of the mind upon the bodily data of sense, and those who argue that perception can only be understood from the standpoint of a perceiver's embodied involvement with and movement through an environment (Ingold 2000:166). This dissertation adopts the latter stance initially proposed in the work on ecological perception of James Gibson (1983[1966], 1979, 1982), and subsequently elaborated by Ingold (2000). Gibson argues that perception is an active and exploratory process, which must focus on the perceiver's "looking, listening, touching and sniffing that goes on when the perceptual systems are at work" (Gibson 1982: 397-398 cited in Ingold 2000:166).

Gibson's ecological psychology was responding to early approaches within psychology that attempted to isolate sensory experiences from perceptual ones, and continues to be at odds with modern cognitive scientific approaches to perception. For instance, Gibson (1983) cites the

studies of Titchener at Cornell in the early twentieth century which attempted to isolate the sense of touch in several ways. First, the subjects were required to be passive and the stimulus was imposed by the experimenter. Second, the stimuli were typically small brief indentations of the skin made by a needle or a warmed or cooled metal cylinder. Third, the subjects were told to report their awareness of the impression, not of the object making it, thus "a report of the perception (what the object seemed like) instead of the sensation (what the skin felt like) was considered an error ...[however] left to himself (sic) the observer tended to report the object of his experience instead of the mental content" (Gibson 1983 [1966]: 98-99). Conversely, studies of haptic perception attempt to do the opposite; allowing subjects to obtain stimulation using their hands for active touching, and the indentations of the skin are not single and momentary but are of variable size and pattern, and move or change in pattern. The subjects are also allowed to report what they perceive, including what the object affords or might be used for (Gibson 1983 [1966]). The notion of affordances is a key idea in ecological perception and will be discussed later in this section. First it is necessary to look at the influence of cognitive science on the study of perceptual activity.

In the field of psychology, cognitive psychology emerged as an alternative to behaviourism in the 1950s. Its founding axioms are "that people come to know what is 'out there' in the world by representing it in the mind, in the form of 'mental models', and that such representations are the result of computational processes working on information received by the senses" (Ingold 2000: 163). This model has been adopted by cognitive anthropologists who have sought to account for human perception and action in terms of acquired schemata or programmes that differ from one culture to another. Ingold (2000) argues that these approaches are ultimately flawed because they are still grounded in the Cartesian ontology that divorces the activity of the mind from that of the body in the world. "Thus the body continues to be regarded as nothing more than an input device whose role is to receive information to be 'processed' by the mind, rather than playing any part in cognition itself ... What they fail to recognise is that the

processing loops that yield intelligent action are not confined to some interior space of mind, confined within the skull, but freely penetrate both the body and its environment" (Ingold 2000: 165). Cognitive scientists objected to the simplistic stimulus-response models of behaviourism by positing a mental processing device that would convert the stimulus input into knowledge. Ingold, however, suggests that there is another way out of the confines of behaviourism, and that is "to treat the perceiving organism not as a passive recipient of stimuli but as an active agent who purposively seeks out information that would specify the meaningful properties of the environment" (Ingold 2000:165).

Gibson (1979) argues that the knowledge obtained through direct perception is practical. It offers the perceiver information about what an environment offers in pursuance of action the perceiver is engaged in, and this information Gibson terms 'affordances', a noun "that refers to both the environment and the animal in a way that no existing term does" (1979: 127). What is important to remember is that an animal's environment offers a range of possible actions to it, but these must be within the capacities and limits of the animal's body. Thus, an area of flat ground affords a variety of actions to the human body such as lying, sitting, standing, crawling, jumping, which mirror the human's corporeal abilities. In the same way, a boulder affords the possibility of being climb-on-able or fall-off-able, but can be successfully climbed only if the boulderer's capacities are consonant with the difficulties presented (Gibson 1979: 127-128). It is important to remember that while the environment presents these possibilities it does not determine action, but rather suggests a range of possible actions. How are the affordances changed by the introduction of a technology that mediates the relation between bodies and the environment, such as a pair of climbing shoes?

Michael (2000) suggests that with the advent of technology, affordances;

> are not simply 'between' individual bodies and natural surfaces, but are modulated by other everyday entities – the co-presence of other human and non-human animals certainly, by the deployment of sophisticated technologies such as four-wheel drives increasingly, but also such

> mundane technologies as footwear. These reshape the affordances of nature by expanding the range of possible actions available to the body (2000:112).

Technology is seen to create a cascade of affordances, where the sock affords a more comfortable boot, while the boot affords the use of crampons, which then affords the vertical ice slopes becoming climbable, but as noted before these cascades are not determined, and Michael (2000) suggests that the affordances of any technology are always, at least potentially, ambiguous and contestable. What does this entail if we concentrate on the haptic sense?

Senses are geographical. Each sense contributes to a person's orientation in space and to the appreciation of particular environments, and they each seem to offer characteristic features to geographical experience (Rodaway 1994). Smell, touch and taste have traditionally been described as the intimate senses, while hearing and sight are described as the distant senses permitting perception beyond the body's reach. Rodaway, however, suggests that "each sense dimension operates over both intimate and distant ranges, though with different efficiency. Touch may not contact a distant movement in the environment directly, but feel the vibration generated in materials in contact with, or reach of, the body" (1994:26). So we may feel the rush of the train even if we are deaf and blind. It is also possible to extend the reach of the senses through tools invented by human ingenuity, such as hearing aids, spectacles and walking sticks.

The term 'haptic' is preferred (following Rodaway 1994) to that of 'touch' for two reasons. First, haptic avoids the superficial connotations associated with the everyday word 'touch' and in particular the assumption that touch geographies are only the sensuous experiences of the fingers; and second, haptic refers to Gibson's (1966) 'haptic system', which defines touch as a system involving the coordination of the receptor cells and the muscles of the body. Gibson (1966) notes that the word haptic comes from the Greek term *haptikos* meaning "able to lay hold of" and would therefore seem a particularly appropriate term for a study that involves holding on to cliffs. Rodaway describes haptic geographies as referring to "touch as an active sense

which is integrally involved with the locomotive ability of the body and specifically focuses upon the role of touch in the perception of space and relationships to place ... Haptic refers to the tactile receptivity of the skin, the movement of the body parts and the locomotion of the whole body through the environment" (Rodaway 1994:42).

The skin mediates between the body and the environment and is the largest single organ system in the body. It has an enormous number of sensory receptors, estimated to be 50 per square millimetre, capable of sensing stimuli of heat and cold as well as pain and pleasure (Rodaway 1994). While the skin is easily damaged, Rodaway notes that it is the only sense organ that is capable of rapid regeneration throughout most of the life of the organism, except in the most extreme cases of damage. It also performs four key physiological functions: protecting the underlying parts of the body, providing information about the environment, regulating the temperature of the body and is involved in the metabolism of fats, through perspiration of water and salt (1994: 43). Rodaway (1994) suggests that despite its importance, skin is a much neglected topic within geography, and as Montagu (1971) notes;

> most of us take our skin entirely for granted, except when it burns and peels, or breaks out in pimples, or perspires unpleasantly. When we think of it at other times, it is with a vague wonder at so neat and efficient a covering for our outsides: waterproof, dustproof, and miraculously – until we grow old – always the right size (Montagu 1971: 5, cited in Rodaway 1994: 43-44)

From skin that is thick and calloused through to skin so thin the fingerprints are worn right off, skin plays an extremely important part in bouldering because it is the interface between the boulderer and the rock, and boulderers often pay quite close attention to skin management, because lack of it is one of the things that is most likely to stop a bouldering session. Bouldering therefore provides a grounded example of how people experience their skin in relation to embodied activity.

The haptic experience is often overlaid by visual and auditory information in the able-bodied adult and tends to be overlooked unless something is particularly hot or cold, rough or

smooth, but Rodaway (1994) suggests that it can identify a broad range of detailed information. These include details that relate to: surface variation such as texture; the geometry, shape and proportions; the material properties such as rigidity and plasticity; the location of things relative to our body orientation; the energy of objects and environments, including their temperature and relative humidity; and the vibration and locomotion of objects through space and the movements 'within' objects. The boulderer is particularly sensitive to surface variation, geometry, location and energy within the bouldering environment.

While it appears intuitively obvious that we touch with our whole bodies, especially when we are lying next to someone in bed, Ingold (2004) notes that by and large "studies of haptic perception have focused almost exclusively on manual touch. The challenge is to discover special properties of pedestrian touch that might distinguish it from the manual modality" (2004: 330). Does it make a difference, for instance, that the feet and legs carry the weight of the body rather than the weight of an object? Many of the boulderers in this study could not imagine climbing at Castle Hill without paying at least as much attention to their feet as their hands, and both were completely interrelated to their body positions.

Ingold (2004) suggests that it is the legacy of classical accounts of human evolution to posit hands as the instruments of rational intelligence and feet as integral to the mechanics of bipedal locomotion, and that "the bias of head over heels in their accounts follows a long-standing tendency, in western thought and science, to elevate the plane of social and cultural life over the ground of nature" (2004:315). He argues that a more "literally *grounded* approach to perception should help to restore touch to its proper place in the balance of the senses. For it is surely through our feet, in contact with the ground (albeit mediated by footwear), that we are most fundamentally and continually 'in touch' with our surroundings" (2004:330).

Although there have been a number of studies of rockclimbing within geography and sociology (eg Lewis 2000, Robinson 2004), only a few have addressed the body, and, in particular, bodily comportment, and there has been even less attention paid to the role of the

senses. The ones that have been done tend to reproduce the argument that it is the hands that are most important to the sense of touch.

c) Climbing Literature

Most previous academic work on rock climbing has focused on the psychological or socio-cultural aspects of these activities (Williams and Donnelly, 1985; Donnelly and Young, 1988; Heywood, 1994, 2006; Kiewa, 2001, 2002, Donnelly, 2003). Some studies that have discussed the body have sometimes seen it more as a vehicle for adornment and the exhibition of brands, with only a limited discussion of the physicality of the body (e.g. Marinho and Bruhns 2005). The leisure activity of rock climbing appears to have been a popular subject for investigation, in part because it is seen to involve risky and dangerous activity that appears, at least to outsiders, to be irrational, and perhaps not surprisingly, the majority of psychological studies have concentrated on risk (see for example Csikszentmihalyi 1985, Le Breton 2000, Donnelly 2003, Robinson 2004).

Heywood (2006) suggests that risk, or what he describes as *thumos*, is one of two core aspects of climbing which is complemented by what he describes as *techne*, that is, "deliberated, embodied action on the basis of knowledge, training, experience, and technical refinement. *Techne* here includes more than just 'technology' or what climbers call 'technique'" (2006:456). Heywood (2006) argues that the *thumos* or risk involved in extreme performances can only be understood in relation to the systematic, sometimes obsessive training, dieting and flexibility regimes that almost all top climbers engage in, because this creates the embodied knowledge that makes such performances possible. There have been far fewer papers that have concentrated on the embodied technical aspects of climbing specifically, although a number have broached the topic of the bodily capacities within more wide-ranging papers looking at the gendered nature of risk and control in climbing (Robinson 2004, Kiewa 2001).

Neil Lewis's work (2000, 2001 and 2004) constitutes the most thorough engagement with the embodied and haptic aspects of climbing from a phenomenological perspective. His research, however, focuses on recreational climbers, who are often somewhat uncharitably known amongst dedicated climbers as 'bumblies'. His study, therefore, is not grounded in the experiences of those who have developed a high level of skills. He does, however, have interesting things to say about haptic perception and the hands. In particular, he suggests that "it is the sensitivity of our hands that is responsible for relaying so much of our knowledge of the world around us. Tactile navigation – the kinaesthetic moving /touching of the body – is the total embodied awareness of a body in an environment. Knowledge is made corporeal with the sense of touch replacing that of sight as the primary mode of gathering data" (2000: 71). Lewis (2000) goes on to argue that over time the practices of climbing and the often distinctive movements required to climb particular rock faces inscribe themselves into the body of the climber.

> "Through cuts and abrasions, the freezing cold and sun traps, the taut muscles and creaky joints, the practice of climbing inscribes itself on the body and, most emphatically, upon the hands. The climbing body is worked upon through the very act of climbing: it is recast , moulded and shaped , transformed and, in substance, created through the act of climbing and embodied engagement or immersion with rock. The practice of rock climbing trains and cultivates the body towards a better configuration for climbing" (Lewis 2000: 74).

It is apparent from these quotations that, for Lewis (2000), the sense of touch still equates largely with the hands, for while the body has "taut muscles and creaky joints" he is "most emphatically" interested in the hands. He appears to ignore the role that joint sensitivity plays in the perception of space and movement (Gibson 1983: 109), and all but ignores the role of the feet. This is perhaps a further example of Ingold's (2004) proposition that there has been a bias emphasising hands over and above feet. Lewis (2000) goes on to suggest that the touch of the climbers' hands is authentic while the touch of the feet is sullied because, "unlike the feet, wrapped in sticky rubber shoes, the climbers hands have an unmediated relationship with the

natural world. The engagement between hand and rock (or nature) is thus pure and direct" (Lewis 2000: 72). This privileging of the hands appears to stem from Lewis' (2000) distaste for modernity, which in his climbing world takes the form of ***sport climbing***, that he feels is destroying the character of traditional British ***adventure climbing***. As Lewis (2004) writes in a later article referencing Gibson (1979), "sport climbing appears to annul the cliff or mountain environment as a place that affords 'falling-off', as a place that affords injury" (2004:75). In Lewis' (2000, 2004) desire to keep climbing traditional, there is more than a hint of what Raymond Williams has called "the perpetual retrospect to an 'organic' or 'natural' society" (1973: 96). (For an antipodean example of this tension see Kiewa's (2002) paper on the oppressive tactics of traditional climbers at Frog Buttress in Queensland).

Lewis' (2000) distaste for 'sport climbing modernity' is also evident in his argument that "the best training for climbing is climbing" which he describes as a "well rehearsed truism" (Lewis 2000: 74). It is a truism, however, that emerged within a particular climbing culture – that of traditional British naturally protected lead climbing. While the specificity of training (i.e. training muscles in ways that are similar to the way they are used in climbing) is important, culture would appear to play a far greater role (Horst 2003). This was highlighted by Herb, a climber who started climbing in the Peak District of England, when he responded to a question about training in a way that suggests it was the climbing culture he grew up in rather than any absolute truth that affected his approach to training;

> My approach to climbing has changed a lot over the years, when I was a young lad I used to despise the idea of training and unnatural development of skill. I used to purely enjoy the feeling of climbing, and over the years, perhaps when I got too scared in the Peak and moved away from climbing and then ended up at sport climbing at Ton Sai and became more focused on the fitness element and the athletic side of it rather than the natural side of it. … I have now developed to the point where if I get on a problem and it requires a certain amount of power for a certain movement, I'm thinking of one boulder problem in particular, it doesn't happen that often, it's a very wide crank like that, so I started doing rings and stuff and a few weights, a little bit of that stuff, specific muscle group training away from the crag (Herb, transcription 8/2/07).

While Herb appears quite moderate in his propensity to train, Heywood (2006) suggests there are many who are more fanatical. As Robinson (2004) found in her study of elite level climbers, training and dieting can become both fanatical and competitive;

> The thing is. It's such a crucial thing. You lose sixteen pounds and you're ten per cent stronger. It can be really obsessive, but it does work as well. I've been ridiculously obsessive at times. I used to weigh potatoes. I'd go on a 1000 calorie a day diet (29 year old climber. cited in Robinson 2004: 119).

Robinson (2004) suggests that there is a need to differentiate the climbing body in gendered terms, particularly training regimes, dietary habits and preferred styles of climbing, and her data "revealed that some male climbers particularly associated 'slab climbing', where the style of climbing calls for balance and nimbleness, with women climbers, who were seen as more suited to this type of climbing" (2004: 119). While my study does not address the gendered aspects of the climbing body, there was little evidence of prejudice towards slab climbing among my respondents. This is perhaps because you have to be a good slab climber to get up almost anything at Castle Hill, whereas there is only very limited difficult sport climbing that is under vertical, particularly in the UK. This, again, highlights the specificity of climbing skills because often, quite burly, strong climbers can be embarrassed by their failure on what, for a slab climber are considered easy slabs.

My research seeks to expand on the limited research that focuses on the climbing body, and understand the complex ways that climbers relate to the bouldering environment. The climbing body can only be understood in relation to ongoing and at times obsessive development of embodied skills, which entail specific modifications of neurology and musculature (Heywood 2006, Ingold 2000). The study foregrounds the way climbers use their whole bodies in their experience of the sense of touch while bouldering, but in a process that often starts with their feet, this raises an important question; how should a study of embodiment be undertaken?

3) EMBODIED RESEARCH

One of the main challenges of conducting a phenomenological study of the haptic practices of boulderers is how to operationalise such a research agenda. Spinney (2006: 716) suggests that "a careful reflection of one's own movements in conjunction with accounts of movement described by others" is important for understanding the subtleties of embodied experience. In his study, in order to do this, Spinney (2006) trained his road cycling fitness to a level where he was capable of staying with recreational cyclists as they ascended 1912m Mont Ventoux, famed as a stage on the Tour de France. In the case of this research, there is not the same difficulty of keeping up with boulderers, as they often spend long periods trying the same problem. Nevertheless, to feel the holds and movement they feel requires considerable skill and fitness. As Nady describes, developing a feel for a boulder problem is dependent on your own capacities;

N ....your blind but you know where you're going, and you know the feel of the thing you are going for.

Int How quickly do you develop that feeling?

N That's a good question, oh sometimes if essentially the boulder problem is beyond you you're never going to develop the feel, and if it's an easy one you'll get the feel first time, I don't know if there is a generic answer (Nadi, transcription 10/2/07).

I have been a rock climber for the past 26 years, and first went climbing at Castle Hill in 1981, and I have been a keen Castle Hill boulderer for the last 4 years climbing at an advanced intermediate level (problems ranging from grades V6-8, see *V grades* page 80) and some of the harder problems discussed by respondents will probably never be within my capacities, but I have a fairly good understanding of what they are talking about, which a non-climber or novice could not possibly have. My interest in the haptic embodiment of bouldering developed as I noticed the specificity of movement and types of holds required for bouldering at Castle Hill that both strained and then strengthened muscles that I was largely unaware of, and even supposedly easy boulder problems could be endlessly frustrating until you did something different, like

altering the flex of your ankle, which you might not even have been aware of. I also noticed that my performance varied quite dramatically between visits so I started writing a reflective diary in 2003 recording: the weather and atmospheric conditions, the feel of the rock, whether I was carrying any injuries, or incurred them during the visit, the problems I completed and the number of attempts they had taken, those problems I had attempted and failed on, who I had been there with, and how well I felt while I was climbing. This diary has provided useful contextual and background details for the more formal aspects of this ethnographic research study.

Four of the nine climbers interviewed for this study are regular bouldering companions at Castle Hill and I had climbed with all but one of the interviewees previously at Castle Hill. I also undertook participant observation on three occasions with various groupings of my four regular bouldering companions, and recorded what I call 'bouldering chat', which I later transcribed and took notes on. This chat included climbers saying what they had just done, what they thought might work better next time, and what they thought others should do. This chat could be described as intricate discussions of the *beta* for the various problems that we as a group were trying at the time. This also allowed me to experience first hand the problems that were being talked about.

The interviewees were all male climbers between the ages of 19 and 46 with an average age of 32 years, and had been climbing for between 6 and 35 years, with most saying that their involvement in climbing had been fairly continuous. The interviewees were all keen boulderers whose abilities could be described as intermediate to advanced (V6-V11/12) and who were very familiar with bouldering at Castle Hill, although few described themselves as only boulderers with most doing both sport climbing and 'trad' climbing. The respondents' familiarity with Castle Hill and level of ability were important for this study because of the emphasis on competencies evolving through practical engagement with an activity. The study had initially intended to

include female climbers, but as there are very few women who boulder at this level and they were all out of town at the time of fieldwork, that left only male participants, which is an unfortunate limitation of this study.

The ability to interpret the subtleties of haptic embodiment are in large part dependent on one's own knowledge of the practices, or as Palmer (1996) suggests in her ethnography of French racing cyclists, it is only "by actively participating in the painful practices of [their] everyday life that the agony of cycling becomes comprehensible" (Palmer 1996: 135 cited in Spinney 2006:716). In contrast with textual interpretations (eg Nettlefold and Stratford 1999), which tend to concentrate on interpreting the textual products of climbers, such as guidebooks, this approach allowed an "embodied and participatory interpretation where my whole body was employed in understanding the meanings of the ascent" (Spinney 2006: 716).

Interviews and 'bouldering chat' were both recorded on cassette tape and then transcribed as soon as possible with notes made on the interviews. The transcribed interviews were shown to most of the respondents, who were asked if they represented an accurate record of what they had said and were asked whether they were still willing to be participants, and all agreed. The interviews and 'bouldering chat' were both coded to reveal major themes which were then re-analysed to provide the contextualised constructions of haptic embodiment that make up the remainder of the dissertation.

4) BOULDERING AT CASTLE HILL/KURA TAWHITI

In a phenomenological study of haptic embodiment, place is inextricably linked to those bodily practices that are undertaken in it; all the colours, shapes, sounds, textures and smells of the place are experienced. While this study focuses on the haptic, this is not to deny the importance of the other senses in the experiences of place, and it is therefore important to give some idea of the specificity of the place. In a phenomenological study, however, the meaning of place is not fixed and awaiting perception, but emerges in its significance as the perceiver moves through the landscape. This section begins with a brief discussion and illustrations of the bouldering landscape of the Castle Hill Basin. The techniques and terminology of bouldering are introduced and several of the international bouldering areas which are used as comparisons by interviewees are highlighted.

a) The Castle Hill Basin Landscape

The rock formations of the Castle Hill Basin 100km west of Christchurch, New Zealand are a uniquely weathered limestone that is most reminiscent of Dr Seuss (see figures 1 and 2). The area is situated in an intermontane basin at approximately 800m altitude, between the 2000m Torlesse Range to the east and the 2200m Craigieburn Range to the west, which produce a rain shadow effect from the prevailing westerly rainfall. The basin can be hot and dry in the summer and under several inches of snow in the winter, but this seldom stays longer than a few weeks.

The rock is widely described as slick, smooth or glassy, and what most climbers consider to be good holds are few and far between at most of the bouldering areas, although Flock Hill is somewhat of an exception, as it has distinctly more features (see Figures 1 and 2).

[copyright clearance to reproduce figure not obtained]

Figure 1 Climber on *Reflections* V9 in the Quantum Field, the holes above him are ***water buckets***, while the crease behind the climbers head is a ***runnel*** (Source: Speed 2005: 63).

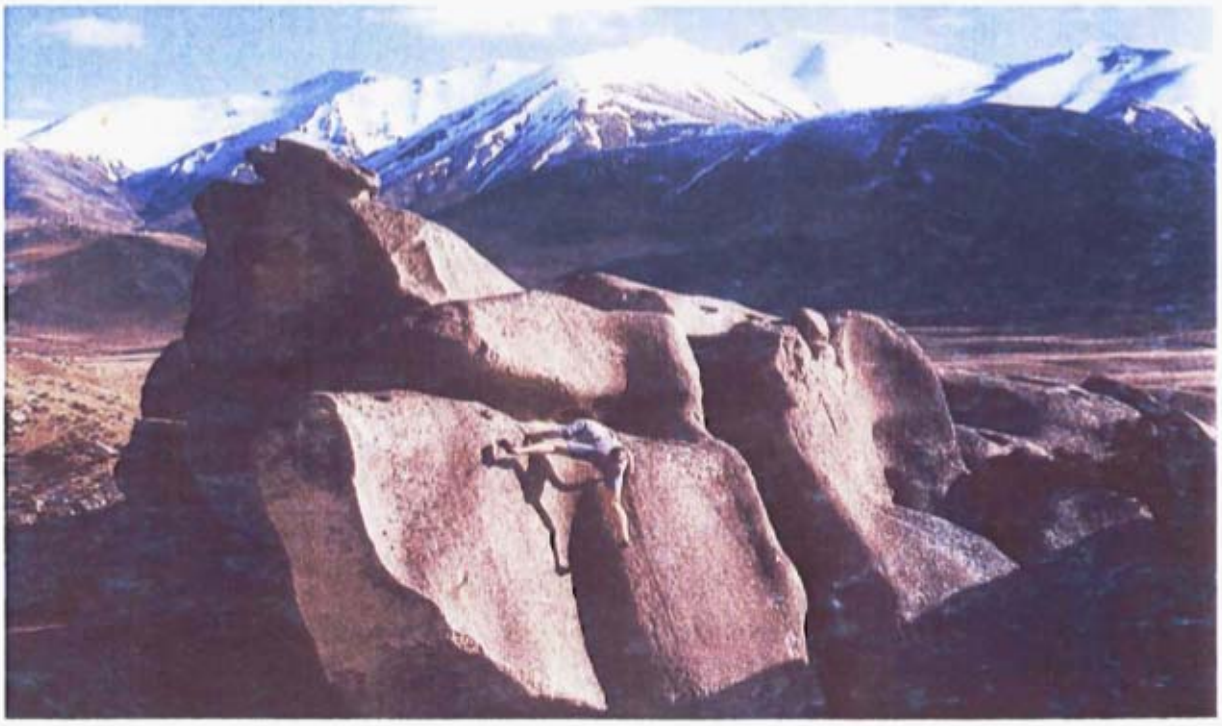

Figure 2 Rock formations and climber at the Dry Valley on Flock Hill, with the Craigieburn Ranges in the background. There is far more evidence of water runnels and erosion at Flock Hill (Photo: Tony Ward-Holmes 1997).

b) Bouldering techniques

The type of rock at a climbing area plays a large role in the types of holds that are commonly found, which in turn influences the ways that climbers use their hands, feet and bodies. There is an extensive terminology associated with climbing that describes rock features, ways that climbers use the rock, and styles of movement. There is terminology that is widely agreed throughout the English-speaking world of climbers, for instance ***crimper***, and terminology that originated in the discipline of geology, such as ***boss***. There is also limited bouldering-specific terminology, such as ***jerry start***, and some terminology which appears to be part of a distinctively Castle Hill vernacular, such as ***dimples*** and ***smedging***. A number of respondents, however, struggled to name the features that they were familiar with from bouldering at Castle Hill. As Garrick noted;

> I think a lot of the conventional language of climbing holds is a little bit exhausted when you get to Castle Hill. Basically because there is so little that is kind of really good and so much that by the standards of any other area is absolute crap, that is it's all various shades of bad basically in conventional terms (Garrick, transcription 31/1/07).

i) Handholds and handwork

A key distinction with the use of hands and arms is whether they are pulling or pushing. Pulling involves contracting the muscles of the forearms (finger flexors) and upper arm (*biceps brachii*), and the more positive, or large, the hold is, the more force that can be applied through the hold. A slopey hold (i.e. non-positive) relies more on an inward force into the rock and the friction of the entire palm surface in contact with the rock, to be able to be pulled upon. Pulling can also be primarily downward or primarily outward, as is the case with ***laybacking***, ***underclinging***, or horizontally as is the case with ***sidepulling*** or ***gastoning***.

Pushing on the rock is usually done below the shoulders or out to the side, but can also be done into a roof above one's head. Pushing is often necessitated at Castle Hill because of the

rounded tops of the boulders. The ratio of pulling to pushing at most bouldering areas might be in the order of a 95/5 split, while at Castle Hill it is possibly more like 70/30, although the importance of those pushing moves is even greater. Whether pulling or pushing, there is also immense subtlety in the ways that the fingers are placed in relation to the rock. Figures 3-8 illustrate only a small portion of the variation that is possible.

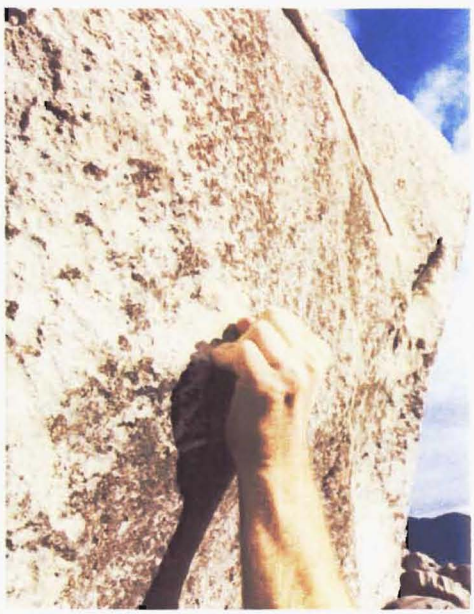

Figure 3: Crimping involves flexing the second joint and often hyper-extending the first joint of the finger, often used on tiny edges. Although there are edges at Castle Hill, they are more commonly found on sandstone, tuff, quartzite and granite, the common bouldering rock types of North America (Photo: I Lawson 2007).

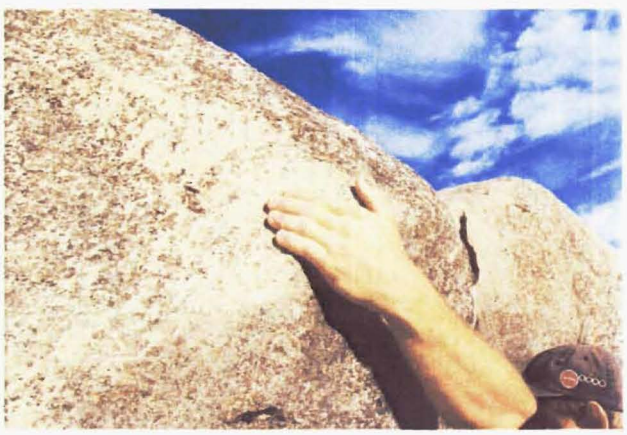

Figure 4: Sloper holds rely on the friction of the whole surface of the hand in contact with the rock. They are an extremely common feature of many boulder problems at Castle Hill and are also common at the French sandstone bouldering area of Fontainebleau (Photo: I Lawson 2007).

Figure 5: A solution pocket can provide a very positive hold but sometimes they can be extremely sharp and painful to hold. Castle Hill has far fewer pockets than many other types of limestone particularly on the European continent (Photo: I Lawson 2007).

Figure 6: A hold that is a combination of a shallow pocket and a sloper, note the slightly coarse texture of the rock. As the climber moves upward the hand is reoriented on the hold to provide a sideways rather than downwards pull (Photo: I Lawson 2007).

Figure 7: ***Palming*** involves pushing the flat palm into rock. The climber's left arm is palming down while his right hand is used as though it were on a sloper (Photo: I Lawson 2007).

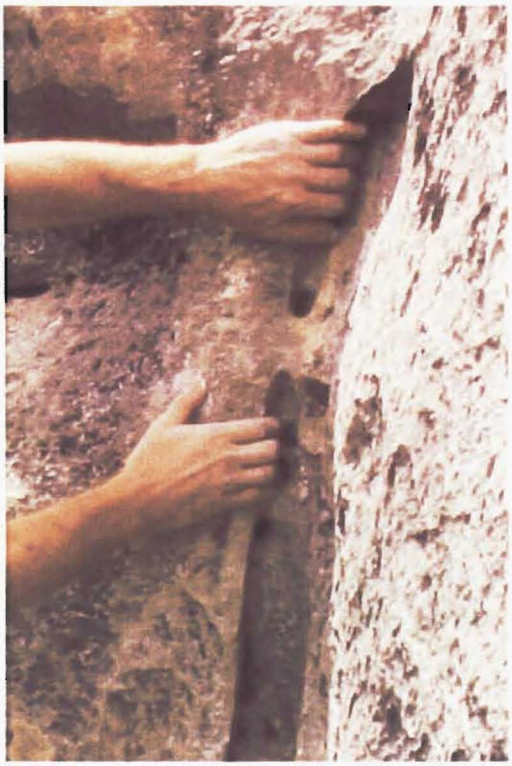

Figure 8: A flake where the lower hand is used in a ***sidepull*** position, while the upper hand is used in a ***gaston*** position. Holds this size at Castle Hill are rare and usually indicate an easy climb (Photo: I Lawson 2007).

ii) Footholds and Footwork

The ways that feet are used in climbing are infinitely varied, but a few general principles delineate the basic types of footwork. The key distinction is whether the force is being applied vertically downward through some positive feature such as an edge or pocket, or whether the primary force is inward into the rock. If the force is applied downward, the stiffness of the shoes and the strength of the climber's feet are the important variables, while force applied inward requires something to counterbalance the inward force and very significantly relies on the frictional properties of the rubber and the sensitivity of the climber to feel when traction is about to fail catastrophically. Another common footwork technique is to use the heel of the shoe as a point of contact, out to the side or above the climbers head, known as ***heel hooking***. It can be an essential way of climbing certain problems. Figures 9-13 illustrate some of these techniques.

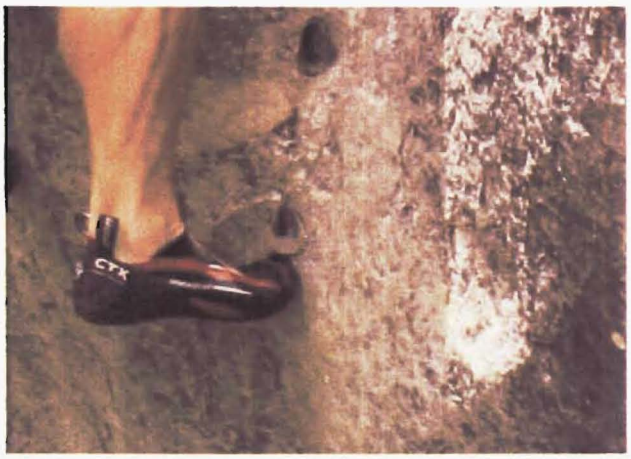

Figure 9: Using a positive foothold such as this ***pocket*** or on ***edge*** that juts out the climber is able to exert a lot of downward force through the shoe and into the rock to reach upward, therefore stiffer shoes are more effective. The climber is using elasticised slippers (Photo: I Lawson 2007).

Figure 10: When there are no positive edges or pockets for the feet the climber has to rely on ***smearing*** the sole of the shoe flat against the rock, which requires an inward pressure for the foot to stay in place as well as high friction rubber. Note that there is considerable texture in the rock, but it is often very fine grained (Photo: I Lawson 2007).

Figure 11: A cross between smearing and edging – ***smedging*** provides some feature to push down on but the footholds are quite slopey and still require a lot of care because they can ***pop*** at any time (Photo: I Lawson 2007).

Figure 12: The climber is ***heel hooking***, which involves pulling with the heel of the left leg to allow the left hand to be slapped up the rib to the next cleaned patch (Photo: I Lawson 2007).

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Figure 13: A more extreme version of heel hooking. Chris Sharma on the starting moves of the Middle Trifecta problem V 14 at Flock Hill, the hardest boulder problem in New Zealand (Speed 2005: 64).

iii) Basic movements

Many of the most common types of holds at Castle Hill often require particular types of movement. In the case of slopers, this is often a rapid sequence of ***slapping***, as none of the other points of contact is sufficiently reassuring to allow more ***controlled*** or ***static*** movement. In order to make the slapping moves, the climber often has to squeeze hard on a rounded rib or arête, applying inward force to the rock and relying heavily on friction between the hand and the rock. Often the finishing or ***top out*** holds are quite rounded; in cases where there are no positive holds at all, usually the best option is to ***mantle***, changing the hands from pulling to pushing downwards until they are straightened and locked out. From this position, it is usually relatively straightforward to put a foot on to the top of the boulder while staying in balance. If there are slightly more positive holds on the top of a boulder, a ***rock over*** may be possible, where the foot is placed up on the top of the boulder or on a hold near the top with sole down and the climber attempts to shift their balance up and over the high foot. Movement possibilities are potentially endless on boulders that are highly three dimensional but this section gives a brief taste of some of the common ones (see figures 14-18).

Figure 14: The process of slapping for a sloper. The climber has a fairly positive left hand hold but the feet are smeared against the rock necessitating rapid hand movements (Photo: R Foster 2007).

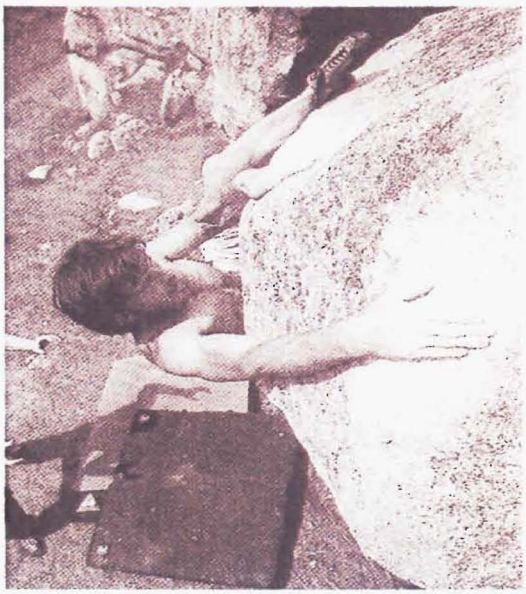

Figure 15: ***Squeezing*** two slopers together with the left foot heel hooking (Photo D. Jenkins 2002).

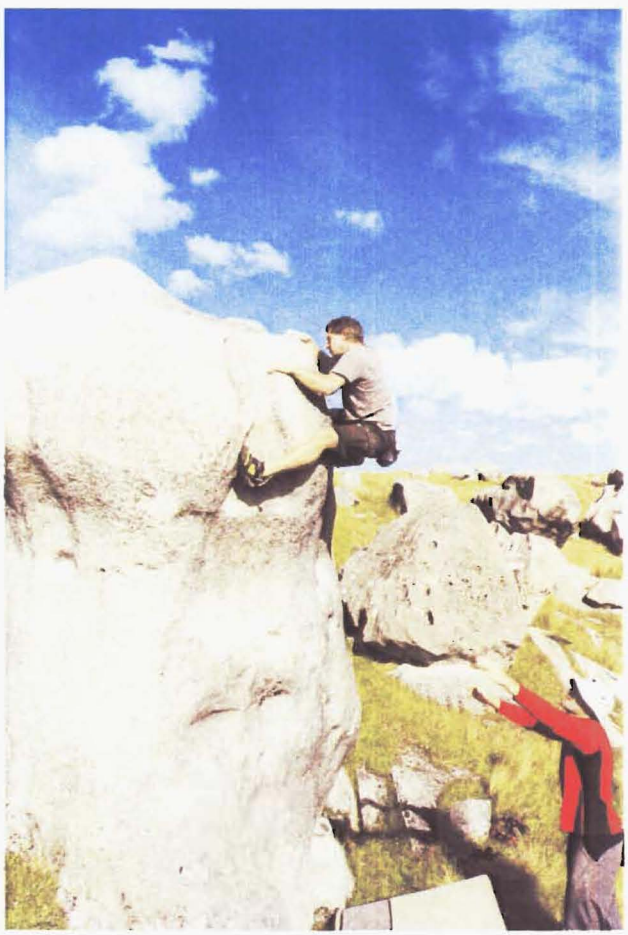

Figure 16: The rounded top of this boulder necessitates the climber ***mantling*** on to the top of the boulder by changing from pulling to pushing on the sloping top of the boulder (Photo: I Lawson 2007).

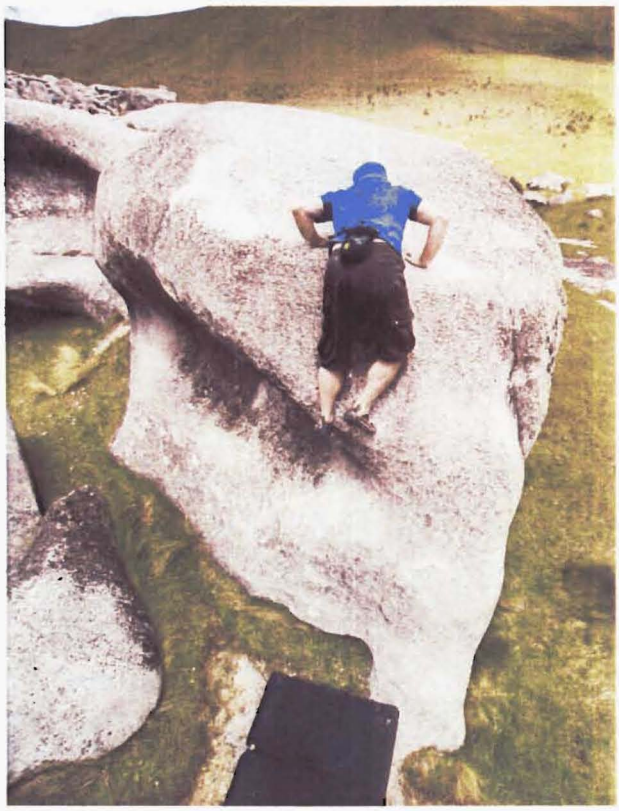

Figure 17: When the top of the boulder is completely smooth and rounded the temptation is sometimes to try and reach over the back to find another hold, doing this the climber runs the risk of becoming a ***beached whale*** where the feet are swinging freely and ineffectually and only the friction of the stomach is keeping the climber precariously on the rock. In this case the climber is ***mantling*** the lip, which although initially awkward soon allows the climber to put his foot up on to the lip of the boulder on this relatively easy V3 problem (Photo: I Lawson 2007).

Figure 18: ***Rocking on*** to the right foot. The manoeuvre, also known as a ***rock over***, involves shifting the centre of gravity over the high leg. Putting the leg there in the first place might involve a ***high step*** (Photo: I Lawson 2007).

c) International styles of bouldering

Major bouldering areas are often dominated by particular rock types which often have typical patterns of holds; North American ***sandstone***, ***granite*** and ***tuff*** are dominated by ***flakes*** and ***edges*** that yield an endless supply of ***crimpy*** holds. Contrasting dramatically with the crimper is the ***Fontainebleau sloper***. This sandstone area of glacial erratics is full of rounded boulders that presents both unfamiliar terrain and an unexpected haptic experience to someone who is used to positive holds, as American Andrew Bisharat suggests;

> It was hard yet soft. Smooth yet subtly wrinkled. The friction was impossible yet real. It was pure. I had my hand on a Font sloper. I felt like a kid with his first poodle as I touched the hold again and again. What the... what kind of sissified poetic musing was that?! It was a fricken' hold, same as any other hold I'd grabbed, chalked, crimped and pulled on ... right? Wrong. As touchy-feely New-Agey as it sounds, there are certain things you have to experience as a climber. These are simple moments in time, "firsts" that take no more than a second to occur, but decades later you will still vividly recall as seminal climbing experiences. They are defining, devirginizing moments that will return again and again to your daydreams – seeing El Cap for the first time, jamming your hands into an Indian Creek splitter, feeling the starting holds on *Midnight Lightning* ... and touching a Font sloper (Bisharat 2006: 68-69).

What the list of experiences share, apart from looking at El Cap, is a haptic connection with the history of climbing. *Midnight Lightning* V8/9 done in the early 1980s was for many years touted as the hardest boulder problem in the world and unrepeated for several years. Indian Creek splitter cracks are the smoothest, most parallel-sided and difficult cracks in the world in the desert sandstone of Utah. Fontainebleau is acknowledged as the birthplace of bouldering and has a rich history that is intimately entwined with the feel of the holds. The first touch of a particular rock type can tell much about what it will be like to climb on, and many foreign climbers probably experience similar thoughts to Bisharat, touching a Castle Hill sloper for the first time.

As many of the respondents are well-travelled boulderers, there was a tendency for them to make comparisons with other bouldering areas in attempts to explain what is unique. It is

therefore important to give a brief taste of two of the other great bouldering areas in the world; Hueco Tanks in Texas and Fontainebleau, just south of Paris (see figures 19-26).

i) Bouldering at Hueco Tanks

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Figure 19: The flaky nature of the rock at Hueco Tanks makes for many positive ***edges*** which are ***crimped***, however if there is a sizeable distance between the holds a ***dyno*** may be required. Chris Sharma on *Jingus Bells* V5 "the disconcerting all-points-off dyno above a steep rock slab sloping into a ***gnarly*** 15-foot chasm makes the problem memorable, even classic" (Speed 2005a: 75).

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Figure 20: ***Thugging***, the top hand is ***crimping***, while the lower hand is ***locked-off*** on a ***jug***. Large positive holds for the hands with limited holds for the feet enable thugging, or poor footwork may cause the need for it. When holds are positive they are much easier to apply force through, and they enable the climber to build up strong pulling muscles in the biceps, shoulders and forearms. Nate Gold on *Between the Sheets* V 10 (Speed 2005a: 72).

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Figure 21: Crimping on positive edges with positive edges for the feet on a slightly impending wall. Climbs in two dimensions seldom demand as much body awareness as the three dimensional climbs at Castle Hill. Jason Kehl on *French Tickler* V10 (Speed 2005a: 69).

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Figure 22: Heel hooking in a hueco (a large hole in the rock). Fredrick Nicole establishing *Slashface* V14 one of the world's first V14s, in the late 1990s. The importance of the ***spotter*** is fairly clear in case of a fall. (Neumann and Loskot n.d., unpaginated).

ii) Bouldering at Fontainebleau

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Figure 23: Early spring in the Royal forest of Fontainebleau, which spreads over 2,300 square kilometres and has at least 100 distinct boulder fields (Bisharat 2006: 68).

[copyright clearance to reproduce figure not obtained]

Figure 24: Positive edges on the dish plates (known as 'gratin' in Fontainebleau) and a rounded top out. Brittany Griffith on a V3 in the Bas Cuvier area (Bisharat 2006: 70).

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Figure 25: Hugging an arête. The right foot is heel hooking, both hands appear to be holding slopers. Brittany Griffith on a V3 arête at the Franchard Isatis area (Bisharat 2006: 73).

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Figure 26: Holding miracle slopers. Ben Moon on *El Pousa* V9. The slopers look impossible to hold but the extra friction of the coarse sandstone make them quite a different proposition to similar angled holds at Castle Hill (Photo R. Brooks 1992: 11).

d) The distinctiveness of Castle Hill

The distinctiveness of Castle Hill stems from the fact that although limestone cliffs are extremely common internationally, limestone boulders are extremely rare, and when they do occur they usually have too many holds to provide much challenge. The blankness of the rock, combined with the weirdness of the features, recently led the American boulderer Boone Speed to describe the climbing at Castle Hill as;

> the next level of bouldering, where you don't simply grab crimps and yank, but where you puzzle together counter pressure sequences up seemingly blank features. Working out the moves can be as much cerebral as physical exercise. Thugs need not apply (Speed 2005b:61).

"Grabbing crimps and yanking" is a particularly common style of bouldering in the United States of America, and it is most prominently on display on the steep quartzite of Hueco Tanks: (see figures 19-22), "what was once the epicentre of world bouldering near the border town of El Paso, Texas" (Speed 2005a: 68). The seemingly blank features Speed (2005) is talking about are actually covered in 'holds'; it's just that when your perception is attuned to somewhere completely different you take a while to see them as holds, if indeed you ever learn to see them as holds. Indeed, they only become holds for you if you have developed the specific capacities that afford you the use of them as 'holds' (Gibson 1979). Eddy describes just some of the things that might constitute a Castle Hill hold;

> A hold in the broadest definition is anything you can use with your hands or your feet that is going to enable progress up or along the rock, and like I was saying, a hold at Castle Hill is often simply a very subtle change in angle in the rock so it might be where you know it's any kind of crease or area where an arête or a right angle in the rock begins to form or curve, many of the holds at Castle Hill are what you'd describe as being extremely slopey so they require a non-conventional hand position to hold them and utilise them which is open-handed and causes the climber to really change the way they approach climbing. It uses different muscles and a different technique and you tend to use more muscles in your body at once than you might typically use climbing (Eddy, transcription 29/1/07).

A hold is a cultural and often an individual construction placed on the rock, in one sense, rather than having some objective reality that is obvious to everyone, that, for instance, a geological feature might be considered to have. Whether something is considered a hold is highly specific to the individual who is trying the boulder problem. There is, however, a grey area; does a piece of rock become a 'hold' the first time someone uses it as such? Vincent describes how the meaning of holds changed rapidly when they were thought about differently;

> quite often when you look at something it's not that obvious, especially when you are reaching new ground at Castle Hill, so it is a matter of experimentation, for example we had a time where we decided that if there needed to be a handhold in a certain position, but there wasn't one, we'd just put our body into that position, or our hand to the position where we thought there should be a hold and we found that this was successful at reaching another level of the climbing at Castle Hill (Vincent, transcription 7/2/07).

For many years climbers, including me, had walked past the boulders, astounded by the shapes, but lamenting the lack of holds. Yet, perhaps they were there all along, we just had to cultivate our perception and our capacities. In describing what made Castle Hill distinctive it was not uncommon for respondents to discuss the features and techniques required in relation to other climbing areas where they had bouldered, for instance Herb noted that;

> if you get a quite positive *crimper* at a place like *Hampi* or perhaps some holds at Castle Hill you can more just pull down on them right, whereas at Castle Hill you are unable to actually pull on it, it's more like using it rather than pulling on it, you do pull on it but you use it as much, it's not like you reach out and hold things, you kind of move into them and sit on them and then from that hopefully use your whole body to ooze yourself up to the next position at which to arrive at rather than going from this hold to that hold (Herb, transcription 8/2/07).

Herb makes an interesting distinction between 'pulling' on a hold and 'using' a hold, for although you are pulling on it, there is a subtlety to the force that is applied when you are using many Castle Hill holds, that is seldom required on more positive crimpers. He also introduces another

key theme of this study; the idea that the whole body is involved in experiencing the haptic. Other climbers recognised similar distinctions although they did not use the same words. Here Garrick describes the distinctions he makes between fitness, strength and flexibility and how these differ between other areas and Castle Hill;

> I think a lot of the question is not actually so much fitness but flexibility because often using the holds that are available effectively is about things other than pure strength so much as how you deploy your body. Being able to put a foot up at shoulder level rock on holds and things like that, so I guess in terms of being able to use or enjoy holds I find the flexibility for me is more important than strength, although fitness really helps, particularly on Castle Hill where the holds and features are few and far between. Getting something then pulling through on it then pressing down, all of which requires control and fitness to do that sort of thing, and general sort of body tension as much as your sheer physical ability to grab a hold and yank and press it which is the kind of thing a lot of bouldering elsewhere seems to reduce to, it's a fairly standard formula, the Castle Hill formula is as much about mind body balance as brute strength. (Garrick, transcription 31/1/07).

In this discussion between William and Keith in response to a question about how force is applied to the rock both acknowledged the importance of pressing into the rock, and the importance of texture;

> W. Generally I think force on the hold has to be more into the rock too, so you have to press into the rock instead of pulling down on the rock on most of the holds to get enough friction on a lot of them.
>
> K I would say it's a combination, you need to somehow push in and out. Castle Hill is an interesting place for climbing, skin tension and how you apply force is really important because so many of the holds are slopers, other climbing places you'll get edges and crimps, pockets and stuff.
>
> W Even when you go to Font where it is also slopers it's a lot grippier, a lot better texture, whereas Castle Hill is very smooth compared to most reference types (William and Keith, transcription (15/2/07).

So even when the geometry of the hold is similar, the texture makes all the difference, as it affords (Gibson 1979) greater frictional contact with the rock, but one can, often, only work out

what a hold affords by physically touching it and exerting force, as Nady suggests in relation to a question about figuring out a sequence of moves;

Int What is involved in piecing a sequence of movement together?

N So I think yeah having your library of moves and knowing what you have done in the past is pretty important, that's what you draw on, but obviously you start with what the rock is offering you and get down on your hands and knees if it's that sort of problem and look for the miniscule footholds, and then I typically just get on. A lot of people will just be able to figure it out from the ground and I just gave you an example of figuring it out from the ground, which for me is enormously rare, because I usually just prefer to get on and bumble my way about, not particularly analytical about it (Nady, transcription 10/2/07).

Perhaps the biggest difference between Castle Hill and other bouldering areas with more positive holds is the way the nature of the holds affects the qualities of movement. As Herb noted continuing his comparison with the granite climbing area of Hampi;

H I often find myself a lot more conscious of the whole motion rather than, .. because a lot of the time at places like at Hampi, its more like the holds are often quite positive and all the problems are quite similar so you are using a lot of momentum, if you use a lot of gathered energy you can be very fluidly powerful and you don't really have to think very hard about being super delicate with anything so you get more into the positions your body are in and you can be more dynamic there, so you're more thinking about a little bit of efficiency as well. A similar thing between Hampi and Castle Hill is also that the footholds are pretty bad, they're often eggy-shaped boulders and the footholds are bad, so you do get a bit of the same thing, but there is an obvious difference between a climbing gym and Castle Hill, and a climbing gym is probably quite close to a lot of the style at Hampi really in the way that you don't have to concentrate on every moment of the movement, more the beginning and the end of the movement ...

Int What sorts of qualities of movement are useful at Castle Hill?

H Like break-dancing as opposed to punk rock and more like that Spanish kind of salsa style than ballroom dancing, so you want a nice feminine flow and you also need to be able to get into some ridiculous positions that require some strengths at the same time (Herb, transcription 8/2/07).

'Concentrating on every moment of the movement" means paying attention to all the points of contact your body has with the rock, as well as the position of all parts of the body as you move. There also needs to be a lot of control of that movement, fluidity rather than a staccato character, and when you are unfit that fluidity is often hard to access. During my participant observation I became particularly aware of this concentration while trying an un-named V5 slab problem which I had previously been able to do relatively easily. Due to an injured elbow I had only recently started climbing and was consciously trying to focus on what I was doing while I was climbing, particularly the way smearing works;

> There are two points of contact, the left leg is placed high on a smeary sloper while the right arm palms down of a slight crease at almost the same height. The trick is to press the foot into the polished sloper while gingerly straightening both leg and arm so the left hand can walk the fingers on to another sloper above. If you move too fast you can't sustain the inward pressure on left foot or find the best position on the sloper above before the lower foot blasts off, which it does repeatedly until I decide today is not the day for it (Diary 2/2/07).

As I had done the problem previously I was left wondering what had changed this time. There are many variables but four stand out as obvious contenders; the conditions, my body, my footwear, or the rock had become more polished. I doubt the rock was more polished although it is a popular problem. The problem had been in the shade all morning and was still cool to touch which suggests there was still good friction. The shoes I was using were the same as when I had previously been successful, although I tried on other pairs which seemed even less reliable. My body was obviously the major problem, but which aspects of it were most responsible? The left foot required constant, sustained inward pressure, while the right hand needed to be able to pull down and into the upper sloper in just the right position on the hold. I got to the upper hold several times, but each time as I thought I had done the problem my body must have relaxed ever so slightly and down I went. Along with Nady I am unsure quite what the weak link was, friction or muscles;

> it's just balancing forces, and almost always the limit of the force is friction, you're going to slide off rather than fall off due to some sort of muscular failure, that does happen too, but more often.. I guess it's the muscular failure that causes you to slide. It is all about friction (Nady, transcription 10/2/07).

What does seem certain is that the whole body is involved with the haptic sense, and this is inextricably bound up with the movement that the body is undertaking. This section has outlined some of the differences in the Castle Hill landscape that make it a distinctive haptic environment, and a fairly unique place to climb. The next section looks in more detail at the haptic skills developed by climbers, specifically in relation to: the whole body, the sensitivity of the hands, and the ways that the feet are able to feel through technology.

5) HAPTIC SKILLS

This section looks at the haptic skills of boulderers at Castle Hill in more depth. The three sub-sections focus on three constituents of the whole body's haptic skills: the role of muscles in overall body tension, the flexibility of the body, and the way the whole body is positioned in relation to the rock during movement. The next section concentrates on the haptic skills of the hands focusing on their ability to distinguish texture on the surface of rocks and how this contributes to memory, the perception of energy in the rocks, and the role that skin plays in mediating these haptic experiences. The third section addresses how boulderers feel with their feet when those feet are mediated from the rock by rubber, and looks at how that has been affected by the evolution of shoe design and rubber technology and the role of wear in sensitivity of particular climbing shoes.

a) Using the Whole Body to Touch

Many of the respondents found it difficult to isolate parts of their body from one another because the foot, for instance, is connected to the ankle and the leg, which are in turn related to buttocks. The whole body is involved in climbing and you can not jettison any bits. They are all relevant to the haptic experience, which Garrick and Eddy both sum up;

> I guess one of the things that's frequently required, I think I particularly notice on the more classic problems, I think it is partly because the rock featuring is sort of curvaceous, the rock is quite remarkable for the nature of its rounded grooves and things. I think on a lot of the really classic climbs, and these can be ridiculously easy not necessarily hard, the sense of the whole body sensation of doing the moves is a really important part of the experience, simply the permutations your body goes through to get from the bottom to the top is in itself quite a rewarding and I dare say sensual experience so that you're feeling with your fingertips but a good climb you experience with your whole body and it's really a whole body experience. So good climbs are always a pleasure to touch but also you feel more at a whole body level (Garrick, transcription 31/1/07).

personally certain holds and certain types of climbs or the whole relationship between your body and the rock can be a deeply satisfying experience as a climber, when you find that moment the holds feel just right or you're taking the holds just right and the texture of the rock is nice. Climbers will talk about how particular holds are really interesting or they're a nice shape or the way you have to hold a hold in a certain way can actually feel really good, and climbers might even talk about certain holds between themselves and point out holds to each other that are interesting or that you use in a different way (Eddy, transcription 29/1/07).

Interestingly both these responses came as answers to the question "Is there anything you would like to add about the sense of touch and bouldering at Castle Hill?" I had deliberately avoided asking any questions about the role the whole body played in the sense of touch because I thought it would be too easy to be suggestive, and the idea was one of the key arguments that both Ingold (2000) and Rodaway (1994) make, and therefore, that I was hoping to test.

How the whole body is articulated in the context of a particular climb is illustrated by Vincent's description of the amount of concentration and precision required to complete a modern *desperate* :

With African Man Horse [V11] the footwork initially you have to lift your foot up underneath the bottom of the problem, this is your left foot and you smear, it's an upside down smear so once again you're flexing your foot backwards and smearing but you have to be able to get the weight on to that foot, therefore you need to have a lot of strength through your body and tension through your body to get your weight on to the bottom foot, once you've got that pressure applied you have to put your right leg up above your head by about a foot and then another foot out to the right to an edge, which you have to pull your toe completely downward and pull down, and you use it as you would a handhold but with your foot. Once you get that pressure you move your hands and you must maintain the pressure on the top foot and then the rest of your leg comes into play, your knee starts to become involved which is also applying friction. So it's a matter of with the right foot you really need to apply a sustained equal amount of pressure and if you have any tremors going through your body and if you don't stabilise the tremor by the time it gets to your foot then it's going to blow (Vincent, transcription 7/2/07).

This is a vivid illustration of the body tension required to climb a difficult boulder problem, but it is by no means only difficult problems that require body tension, and that body tension requires a broad range of muscles to be developed.

i) Muscling Up

All the respondents were quick to suggest muscles that they thought were most important for climbing at Castle Hill, although not always the same ones, which possibly reflects the specialisation of particular climbers. Several respondents suggested muscles by reference to what was sorest after a day's bouldering. William, for instance, noted the importance of "a lot of core tension too, I find that if I come back from a good day at Castle Hill my core muscles are the sorest they have ever been" (William, transcription (15/2/07). Climbers develop very specific sets of embodied skills related to muscular development that is essential to staying in contact with the rock, as Nady outlines;

> Int Do you develop or need develop particular muscles to climb well at Castle Hill?
>
> N Core body tension, so stomach muscles, thigh muscles, there are exercises that you would never think would have anything to do with climbing but you'll find all boulderers can do, like going from crouched down on one leg to pressing out on that leg. It's like what on earth's that got to do with climbing, but it's absolutely pivotal being able to deal with the full body weight on whatever limb is supporting it. It's obvious that you've got to be able to pull really hard with your arms, but it is also critical that you can press with whatever was available and then your stomach muscle has to do that stuff I was talking about earlier on, the core body tension to allow you to drive your feet into the rock a bit more, just a few more grams can make the difference between your feet flying off and them staying on, and that all comes from core body tension being able to transition whatever force you can apply with your hands to your feet (Nady, transcription 10/2/07).

As well as noting abdominal muscles Vincent suggests a wrist muscle, shoulders and nearly all the muscles in the leg, in fact everything's important, while Paul had a similar all-encompassing view;

> The other muscles that you would develop is one near to the wrist on the extensor side [he shows me a bulge that pops out on little finger side of wrist near the palm, when the palm is held flat at ninety degrees to the wrist]. That one is from slopers. Oddly enough your shoulders need to be particularly strong on low angled problems because of the top outs. You wouldn't think you'd need strong shoulders for this angle of climbing. I think that has got to do with the type of handholds quite often, because of the friction and because of the positions you end up needing a lot of shoulder power too. So around the shoulders, the top of the abs, and the feet, if your feet aren't strong because everything comes from the feet, then so you definitely need to develop strong calves, it helps especially on long climbs or the longer boulders, and a lot of muscles around the hips as well I think is really handy. As I was talking about before that flexibility range you need to be able to hold your legs up high or out really wide, these muscles here [points to quads] need to be really strong, strong legs are good, everything's important (Vincent, transcription 7/2/07).

> Yeah it feels like you need to develop all your muscles, all your climbing muscles to climb well at Castle Hill. Climbing at Castle Hill will give you strong calves, strong fingers, strong forearms, I found that when I first started to climb at Castle Hill regularly I needed to do a lot of press-ups to develop my triceps, which would enhance my performance on mantles and also countering the effects of pulling quite hard on small holds which were giving me pains in my elbows and it seems like people who climb well at Castle Hill seem to have pretty strong chests, that kind of squeezing, clamping pushing motion is quite common. If you wanted to climb all the problems at Castle Hill then you need a strong chest, and strong shoulders are essential (Paul, transcription 29/1/07).

The muscles in Vincent's wrists look like a freak of nature, but they are an example of physical changes that accompany embodied skill. They were developed while pulling down hard when the palms are at ninety degrees to the wrists, while over the top of a flat-topped boulder, and are therefore likely to be an extremely rare development, but are exactly what Ingold (2000) would predict to happen given the level of specialisation involved. Paul also illustrates Ingold's (2000) point that "the human body does not come ready-made for anything, but undergoes continuous change throughout the life-cycle as it is pressed into the performance of diverse tasks" (2000: 376).

General body tension based primarily on the muscles of the torso was widely agreed to be important for bouldering, but Vincent suggested that there were different types of body tension and that some were more important than others;

> In the legs it's really important, I don't think you need, yeah it's really important right through the body, but there is a style of body tension that you don't need at Castle Hill, which is the Cave style or the gently overhanging granite where you need lots of long tension like this[stands up and reaches high and out backwards] it's just a tension as opposed to controlling a bone, you don't need to control a rigid tension, it's just a tension, if you don't have a strong rigid tension it doesn't matter you just need to be able to hold tension and isolate your tension yep ... Ummm ... I guess on steeper rock the tension often comes from the top and goes down, whereas on the rock that's a lower angle the tension comes from the bottom and up, so you have to produce the tension to go through to your feet when it's steep, and when it's not steep then the tension comes from your feet and up through your body. (Vincent, transcription 7/2/07).

The sort of tension that Vincent is talking about is often the focus of Yoga, where strength is developed through being able to isolate particular muscles and draw them on to the bone to create compactness. Having practised Yoga for fifteen years (at times sporadically), I have noticed an immediate improvement in my climbing ability whenever I have been practising Yoga regularly. Another goal of Yoga is to lengthen the muscles, which is commonly regarded as flexibility.

ii) Flexibilities

The respondents were somewhat mixed in their responses to questions about the importance of flexibility to climbing at Castle Hill. I have already mentioned how for Garrick flexibility was more important than ***strength***, and this possibly reflects his recent regular yoga practice, which allowed him to see the difference flexibility makes more clearly. For others, like Eddy it was not as important as ***power*** because "at the end of the day with bouldering it doesn't matter how flexible or how strong you are or whatever at the end of the day if you can't hold a hold or move off a hold then you're not going anywhere" (Eddy, transcription 29/1/07). Similarly Nady could

see the advantages of some types of flexibility but did not think it was as important as it was at other climbing areas;

> I'm trying to think of examples where you need lots of flexibility, so being able to step up and that's flexibility, getting your foot really high on to a positive hold that, I'm pretty sure that helps, because sometimes there are actual definite edges or features that you need to get to, but I'm actually not sure that flexibility is a big one for Castle Hill, cause flexibility counts when you have got huge features that are a long way apart so you need to stem really really wide, I can't remember ever doing that on Castle Hill because if you do things like stemming really wide the forces on your feet are going to be huge, Castle Hill doesn't have those huge features and if you do start putting your feet way away from one another and they're just going to pop off whatever hold there is, so high steps yeah (Nady, transcription 10/2/07).

Both Jock and Vincent agreed that flexibility was important for bouldering at Castle Hill, but not without a certain amount of strength and power, but not just generic power, the power needs to be usable at each end of the range of flexibility. Jock also noted that the requirements of flexibility are very climb dependent, and this can lead to inflexible climbers avoiding problems that require lots of flexibility, in the same way that weak climbers avoid problems that require lots of power;

> V Yeah with footwork if you have a lot of range in your ankles you can, it helps you to push or pull or hold really unusual positions to keep your body in the right balance, so I think flexibility can make a substantial difference in what's available for you to do, but what's also important with having this flexibility, it's really good to have power at each end of the range so having that power in the middle of the range for the flexibility is okay, but when you're flexible but you can't get the power out of that flexibility in your feet then you can't get the pressure.
>
> Int Do you mean if you step high and you can't push a lot of power through the high step?
>
> V Yeah, or if it's out wide, if your feet are out really wide and you're turning or flexing your toes inwards, your turning your feet inwards, if you can't pull on your foot at the maximum range then you can be as flexible as you want but you can't get that pulling power, you can't get anything out of the footwork (Vincent, transcription 7/2/07).

> J It's very dependent on the climb I would say. You can compensate for lack of strength with flexibility and you can compensate for lack of flexibility with strength, I'm not as flexible as I could be but it has generally been a strong point. It enables you to get hands off rests in places where you couldn't if you were stiffer. There are wide bridging problems you just

can't do if you aren't flexible, you do need a certain amount of strength to go with the flexibility like high step-ups, it's all very well being able to put your foot there but if you can't push down it then there is no point in putting it there, so it's definitely an important factor, but on its own it can be wasted. You can see plenty of people that are flexible that can't climb very well. But plenty of strong climbers would be helped, in many instances, if they were more flexible. Everything is important but the most important thing is knowing how to put it all together, and knowing what you're capable of (Jock, transcription 27/1/07).

Again, the recognition that it is the capacities of the whole body that are important and that these can not easily be separated. Keith was the only climber who talked about deliberately stretching to do a particular problem, but this is perhaps not that unusual within the wider climbing community, particularly on lead climbing routes at the higher end of the spectrum, because you may need to get into some really awkward positions. Also, as Jock noted, it can make awkward climbs easier if you can use your flexibility to take your hands off. William, while acknowledging that flexibility is important, thought that he might steer away from certain problems, although this does not sound like a particularly deliberate decision on his part. He also noted that the reason flexibility is important is that there is often only one sequence of moves that will work to get up a problem;

W I'm really unflexible I find, I think it is important, maybe I steer away from things I need to be flexible for.

K Have you tried *Seppuku* [V6] it's in the project area, that climb I did it because I did a whole lot of stretching on the day and was able to get my leg up high, I had to just keep streeeeetching my leg up by my head. In that case stretching was the difference between doing it and not doing it, or doing that first move any way.

W I guess it would be because moves are so specific up there, and there aren't many problems you can do differently, like several different sequences to some of them, whereas some of them you have to get your foot up there to do the problem (William and Keith, transcription (15/2/07).

The relevance of muscles and flexibility to the haptic sense is that they contribute to the boulderer's "practical bodily engagement with the world around them" (Ingold 2000: 283), and extend the limits and capacities of a boulderer's body, so that they are afforded a greater range of possible actions (Gibson 1979: 127). They also allow the boulderer to put their body into particular configurations as they move.

iii) Positioning the body

There was broad agreement amongst the respondents that body positioning was more crucial at Castle Hill than practically any other climbing area because of the three dimensional nature of the rock, and the unpredictability of what will actually work as a hold. Eddy explains what body positioning is at a basic level and suggests that it is this aspect that inexperienced climbers most struggle with;

> Body position is about positioning your body in a way that makes the most of a set of holds, hand holds and foot holds that you are using. One way of thinking about body positioning I suppose is where you're putting your hips in relation to the rock and in relation to the angle and sometimes you might be trying a boulder problem and failing simply because your bum is too far away from the rock, whereas if you suck your hips into towards the surface it creates quite a profound change in the way you can hold the holds and enables you to make the most out of those holds. You might think of body positioning in terms of taking a set of holds and then instead of just locking off and reaching for the next one you might actually reposition yourself before you reach for the next hold and it's these subtleties of body positioning that often inexperienced climbers fall short on so they don't think intuitively to, they don't think collectively what their whole body is doing while they're trying to climb and it's something that tends to come with experience and that you learn the more you climb. Body positioning is quite a complex issue (Eddy, transcription 29/1/07).

Body positioning is not something that is particularly easy to visualise, it requires 'hands on' practice because it is completely interrelated with movements that are being undertaken. As Herb noted earlier "you have to concentrate on every moment of the movement", but as Garrick suggests this is not always a particularly conscious activity, although as Herb goes on to suggest, it often becomes more conscious when you get closer to the limit of your abilities;

you know with a lot of these harder things it's more stuff about body tension and the whole geometry of the exercise and to some extent you can visualise it but you have to actually get up there and physically feel the right position and you get the different sections worked out, not even so much, some of it's conscious, but some of the stuff is at a more unconscious or subconsciously finding the right way to use a combination of holds to make progress (Garrick, transcription 31/1/07).

Often you become more conscious of how you climb closer to own grade, to your own abilities, the closer you get to the limit of your abilities then you become conscious of everything a lot more don't you, you're in four places at once, five places at once because a lot of it's about your bum, shifting your bum about and stuff like that, it's all about your bum, little hip thrusts and counter pressure (Herb, transcription 8/2/07).

Castle Hill certainly retains its affordance as a falling-off-place, and in my 26 years of climbing all around the world, remains the place where you are most likely to fall off a boulder problem that is half a dozen grades below what you are normally able to climb after a few goes, and where *flashing* problems is a rarity that is all the more treasured. I would agree with Vincent, that it is the body positions required on these easy climbs that are most likely to undo a climber;

V Basically even on easy climbs if you don't put your body into the right positions, whether it's standing still or doing a movement if it's slightly off it can make things really difficult and make it really easy to fall off. It can be the difference between, at the harder end, it's the difference between getting to the end and not, and those positions can be a matter of centimetres or even less.

Int Do they have to be continually adjusted with each move?

V Yeah so you adjust those, those body positions are quite related to your tension in your body, so once you move you adjust your tension. This really is interesting, it's things I haven't thought about before and ... yeah sometimes the positions come naturally between the movements, sometimes, I guess when I say naturally it's by feeling that you do the next move and you sink into the position that feels to be the position that suits the least amount of mind control and power (Vincent, transcription 7/2/07).

Vincent struggles with the question of whether body positions are arrived consciously or based on underlying patterns of movement that the body has learnt through practice. As Herb suggested before, we are more likely to be conscious of these movements when the boulderer is at their limit and struggling to learn new rhythms, while on less difficult problems as Vincent suggests "you sink into the position that feels to be the position that suits the least amount of mind control and power". How are these movements remembered, do we remember them in the brain or in the entire body?

b) Feeling the Rock

Climbers develop enhanced haptic skills at finger positioning, and for distinguishing both rock types and particular holds and sequences of holds on problems they had tried a lot, but all these aspects tended to vary among respondents. The art of finger positioning, or tactile navigation using the hands (Lewis 2000:71) is required to elicit the best grip or leverage on the hold, and frequently the hold is out of sight. Respondents varied in what they considered to be "reaching blindly for a hold". For some if they had seen the hold at all they were no longer reaching blindly, while for others the fact that they could not see it from where they were made it blind.

Differentiating rock types by touch alone was something I expected climbers to be fairly good at because, over years of climbing, most climbers' hands would be in contact with the rock for hundreds if not thousands of hours. It was, therefore, unsurprising to me that some were adamant that they could distinguish between several different types of limestone scattered around the country by touch. Others were less sure that they could make these finer distinctions based on texture of the rock alone, however. They were all sure that the differences between the major rock types (granite, schist, ignimbrite and limestone) would be immediately apparent to the touch. These differences appear to reflect the age and climbing experience of the respondents. Those with most experience of different climbing areas were most certain, while those with more

limited backgrounds were less likely to be sure of themselves. This makes sense as you are unlikely to say you could distinguish a rock type if you had only been there once of twice or not at all. The respondents' memory for sequences or for the feel of particular holds also varied with several prefacing their comments with 'I've got a terrible memory', before preceding to give detailed explanations of how their memory works, while others said they could remember the holds on thousands of problems. The following sub-section explores boulderers' sensitivity to atmospheric conditions and the temperature of the rocks, while the third sub-section looks at skin management.

i) Tactile navigation

A number of studies that have looked at enhanced haptic skills have focused on blind or poorly sighted people and how they initially compensate for lack of visual cues, and develop a 'constitutive' knowledge of their surroundings (see for example, Hetherington 2003, Rodaway 1994, Ingold 2000). My research focused on whether sighted people could also develop a similar haptic acuity through their practical engagement with a specialised activity.

When asked "how often they were reaching blindly for holds" respondents had two interpretations of the question. One group felt that if they had seen the hold at all then they were not reaching blindly for it, and would often go to the top of the boulder to check the finishing holds to avoid having to reach 'blind', so they tended to feel that it did not happen that often. As Paul noted; "I try not to make it too often" (Paul, transcription 29/1/07). The other interpretation talked about reaching 'blind' from the point of view of the climber actually on the rock. Vincent felt that reaching holds was a particular problem for the feet, while Eddy felt that the tops of problems were often blind;

> Quite often with your feet, a lot of the time when you're reaching with your feet it's often blind, also if you're. Usually on a harder problem at least one move is going to be blind, it's gonna feel blind at the harder spectrum and usually when that's the case some people like to tick the rock and

some people have a person that tells them when they are getting close to the hold (Vincent, transcription 7/2/07).

At Castle Hill you do often end up groping blindly for holds because they might be over the top of a slopey top of a boulder problem. You can make it easier to find a hold by putting a little dot of chalk, which then washes off in the rain or you can brush off afterwards or you might look for a natural feature that enables you to identify where the position of the hold is like a patch of different coloured lichen or a change in the shade of the rock can enable you to see where a hold is (Eddy, transcription 29/1/07).

Both Eddy and Vincent discuss the use of visual cues to assist the boulderer finding the hold, and some climbers will draw long chalk lines to the hold to assist in the accuracy of their movement, but often the problem at Castle Hill is that the general area of the hold is not hard to find but there is a lot of subtlety to finding the best way to hold a particular area of rock as both Vincent and Garrick elaborate;

Int How often are you feeling or slapping for the best part of a hold?

V Desperately all the time. Once again at the harder level you're slapping on one particular hold, you could make three movements before you find the position that is suitable and you're ready to pull on it, then if don't do this at the right time, then if you don't .. you learn to move when you're slapping, you learn to feel the right thing and then when you find that over time you learn to move off it rather than readjusting, often the readjusting is what makes you fall off (Vincent, transcription 7/2/07).

G .... something that is quite common is where you have basically a hold that is at the bad end of the spectrum, where you are simply trying to ensure that your hand is on the best part of it, that's quite a common thing actually, again something where you are really just palming the edge of something and trying to find the place that has got the best friction on it, or find some slight subtle dimples because that's a very common thing ...

Int How sensitive are your fingers to finding those changes?

G Getting more so actually, because on all these new school things it's very very common. I think like the different rock up at Wuthering Heights I really notice that too, you'll often have some sort of area and then even if you might be feeling around like running your hand over a larger area and even if you find the optimum area then you are moving your fingers around in that area to try find the best little dimples and depressions to get your fingertips into, I find that most intriguing because you can even end up with situations where you've got really something you wouldn't imagine would be a reasonable hold, but actually turns

out to be quite good because you've optimised your fingertips, your whole hand and then your fingertips within that so you've actually got something that turns into a semblance of a hold that you can pull quite hard on (Garrick, transcription 31/1/07).

As Vincent notes there is a learning process involved; where you "learn to feel the right thing" and you "find that over time you learn to move off it rather than readjusting". Vincent is describing haptic skills that are inextricably linked to the movement of the whole body. As Garrick noted, even with more than 30 years of climbing, his fingers are getting more sensitive to the subtle changes in the rock, and I would suggest that often it is because the boulder problems he is trying have been developed by boulderers who have already acquired those haptic skills. From finding holds we now move on to distinguishing rock types and the role that surface texture plays in the memory of movement.

ii) Surface memory

Different rock types have different surface characteristics and textures, particularly related to the grain size. I suggest that, blindfolded, everyone could distinguish between sand and clay, but perhaps not everyone could distinguish between Golden Bay sand and New Brighton sand, while few people apart from potters could distinguish between different clays by touch alone. Identifying rock types is more like different types of sand, but older climbers were quick with their responses;

Int If you were blindfolded do you think you would be able to recognise the different rock types from around New Zealand?

G Oh yeah I definitely think so ... I guess even the different types of young limestone areas, for instance Castle Downs where we were is very different to Castle Hill. The types of features you find or don't find, all the ripples and layering of the Golden Bay limestones, the young limestones of Elephant Rocks and Duntroon where it is much more soapy sandy, it really has quite a different character to Castle Hill and even within Castle Hill I think the lower, finer grained slightly ***chossier*** textures like at the lower parts of Kura Tawhiti

compared to the higher parts and of Flock Hill, but generally I think would have a pretty good chance of identifying them by touch. (Garrick, transcription 31/1/07).

N Oh definitely totally, is it granite? Is it Castle Hill limestone? Is it marbleised limestone? Yeah for sure no problem at all I think (Nady, transcription 10/2/07).

E Absolutely yeah I mean every different kind of rock has got a different texture, its got a different feel, it might have a different temperature, some rock is particularly dense and slippery other rocks have got a much more open porous structure and I guess one of the essences of rock climbing really is about how certain kinds of rock feel underneath your hands. Certain kinds of rock feel better than the others, like rock that is really knobbly and sharp generally won't give you as satisfying a climbing experience as something that is dense hard and perhaps a little bit smoother, you know like climbing on granite is a particularly satisfying experience as a climber because the texture of the rock and shape of the holds and often the colour of the rock or the crystal in the rock gives you a deeper sensory experience (Eddy, transcription 29/1/07).

This compares with the more reluctant assessment of haptic skills from William who had the least climbing experience of any of the respondents;

W Some of them apart, there are definite different rock types ... I think there is more texture at Golden Bay, so you'd feel for that as well. The Hill would be the smoothest rock out of all of those (William, transcription 15/2/07).

In relation to the memory of holds on particular problems there were also some startlingly assured answers where boulderers described their 'personal catalogue of thousands of holds' and of becoming 'deeply involved with a problem', however, for Vincent it is the feeling of the position and the movement that come before the feeling of the hold;

Int If you were blindfolded would you recognise the starting holds of a project you had been trying?

E Yeah I'd say so absolutely, personally I've got a catalogue of thousands of holds stored away in my mind and they have become so familiar through the years of using them that I know exactly what they feel like and I could probably tell you which problem they are from (Eddy, transcription 29/1/07).

P In the past I would have been able to say yes, recently that hasn't been the case, but I've definitely been lying awake at night feeling the holds. Yeah I've got to the point where I can mime the sequence on the ground and anywhere I am I can draw you a map of the route with holds described and positions, you tend to get deeply involved with a problem when you've made it a project and you've developed a relationship with it, and that relationship tends to, by necessity, become deeper when you try harder and harder things, you need to know more about the problem and you need to remember more about the problem (Paul, transcription 29/1/07).

While both Eddy and Paul appear to have good memories and rely to some extent on visual cues for recreating the route in their mind, Vincent is convinced that his memory is poor and therefore relies far more heavily on haptic and kinaesthetic cues;

V I've got a really bad memory when it comes to this kind of thing, so it's definitely I remember holds .. sequences through feeling mainly, the longer I've been climbing I don't rely on it so much, but definitely in my mid climbing career most of my sequences were through feeling.

Int How does that work?

V I would get on a climb and I would be familiar with the feeling of the position, therefore when I'm familiar with the position then I'd move to the next move then that would help me recall what I have to do next.

Int Do you recall how to hold particular holds?

V Let me think about that, often the movement comes first, I find that once I've done the movement and got to a hold ... some holds will make you feel what you need to do next but some holds don't. Sometimes it's the movement that makes you think about what you need to do next and sometimes a particular hold, especially if it's tricky, if you need to move, say for example, the handholds are fiddly and you don't have it right the first time you get it the second time and then you go ahhhh this is perfect and you remember what you need to do next. So if you find that the first time you struggle, like when you're working out the problem and then when you do work it out you struggle to do the move, or to get the hold, then you get the hold and then you jump off and that is sort of logged in your memory so maybe it could be two days or maybe a couple of weeks later or even sometimes a year later you can get into that same position from that initial go. That adjustment on that handhold will help you recollect what you need to do next (Vincent, transcription 7/2/07).

If Gibson (1983) is correct then it is Vincent's joints that are allowing him to sense space and movement and not the muscles;

> In short, we detect the angles of our joints and not the lengths of our muscles. It is not often realised, even by anatomists, that it is the function of a joint not merely to permit mobility of the articulated bones but also to register the relative position and movement of the bones (Gibson 1983: 109).

Gibson (1983) argues that the evidence shows that muscle receptors register strain, while the appropriate receptors in the joints explain kinaesthetic sensations, and he states that "kinaesthesis cuts across the functional perceptual systems. The discrimination of body movement from non-movement is too important for the organism for it to have been wholly entrusted to any single group of receptors" (Gibson 1983: 111). It appears that just as there are learning styles in education, there are learning styles for bouldering, and Vincent would appear to be a 'kinaesthetic'.

iii) Energy in the rock

Using Rodaway's (1994) divisions of haptic information, energy includes both temperature and relative humidity. All respondents were in total agreement that temperature played a big part in how easy things were to climb, the hotter it got the harder they became, which is why most of the hardest problems have been done on cold winter's days. Some climbers like Herb were very methodical in the way that they approached problems they knew would be hot during the day;

> A lot of the problems I was putting up over last summer required early mornings cause they're in the sun, the reason they have often not been climbed is the fact that they're not in a perfect position perhaps, often getting the sun, I have a list of things I wanted to try you know, nice features, but they would always be in the sun unless it was crack of dawn, sometimes in the winter when it's cloudy and cold it doesn't matter, but crack of dawn is important for that stuff in summer (Herb, transcription 8/2/07).

Although respondents did not necessarily know the physics of why hotter rock was harder to hold they had all experienced the negative effects of high temperatures. A more subtle question related to effects of the moisture content in the rock. While it is raining, with the rock

completely wet, climbing is all but impossible, but several respondents suggested that extremely dry rock wasn't very good either; Vincent especially noted the effect of a dry nor-west wind;

> If it's windy the day before the rock feels really waxy, if it's rained the day before sometimes the rock can feel really waxy, sometimes it can feel really good, but often the wind will make a huge difference, like you can feel it the day after it has been really windy, it's not very nice because it feels slippery... Waxy ... Kind of like a box, some boxes have a really waxy finish and this is what it feels like after it has been quite windy, then you get the boxes that have more of a paper finish and that's the difference between the effects of a windy day and a not so windy day. ... yeah it's a dry wind, so I wonder if it has got something to do with the moisture in the rock yeah it could be that, it wicks all the moisture away, it must dry the hell out of the rock and make it too slippery, that must be what it is (Vincent, transcription 7/2/07).

Vincent had to think through what effect the wind had had, going from grounded knowledge he was able to figure out what the previous day's wind had altered in the rock. The temperature and atmospheric conditions play a part in almost every bouldering trip to Castle Hill. You are either waiting for a problem to go into the shade because it is too hot, or hoping the sun will warm you on a bitterly cold day. Rain also plays a part; washing away accumulated grit, rubber and chalk, and gradually eroding the surface of the boulders, it can make the boulders more pleasant to touch. Boulderers have 'cultivated' (Ingold 2000: 283) their haptic skills in relation to the energy in the rock and can make rapid decisions about whether a problem feels worth trying, or whether it will pay to wait for a colder day. They also make similar decisions about the state of the skin on their fingertips, because as it gets worn out, it becomes painful and the chances of ripping a hole in it increase.

iv) Skin care

Skin is at the interface between your body and the rock, and is subject to a lot of stress. On really coarse or sharp rock it can wear through really quickly and become too sensitive to climb with. Although Castle Hill is, on the whole, a fairly smooth and fine-gained rock, there are enough

sharp, coarse or ***crozzly*** holds to make skin management an issue for climbers as Keith and William discuss;

K ...the immediate surface of your skin is going to have an impact on pain but you do need to maintain that skin tension to hold on to the holds, you do try and look after your skin more when you're going out to the Hill, it's going to get worn out if you go there climbing for a few consecutive days, but if you have worn out your skin then you don't go to Castle Hill you go somewhere else because it's going to have an impact on your climbing. I think it is important.

W I find that you can't climb once you've ruined your skin, I feel mainly because of pain, I'm not sure about friction wise.

Int Do you try and get really hard skin for particular problems?

W I haven't found that I've tried to get hard skin, I think quite supple skin is probably better, like you don't want flabby hands ... I think moisturising your hands is quite important

K You don't want really calloused hands cause it means you can't feel the subtleties in the holds, because so many of the holds are so subtle there's like a tiny little dimple that could make the difference, if you have really calloused fingers or really thick skin which limits your ability to feel those subtleties then it's not going to help you at all, so you do want to keep your skin soft and well kept which isn't that good for making it last longer, but it is important for the nature of the holds, the surface at Castle Hill (William and Keith, transcription 15/2/07).

Both William and Keith suggest that supple, well cared for skin is important for climbing and William even suggests that moisturising them is quite important. The reason Keith gives is that there are so many tiny dimples which thick skin limits your ability to feel, and that could make a difference to how well you can hold a hold. There is also another reason to avoid having really thick skin and that is the likelihood of tearing a flapper which goes into the deeper layers of skin and takes far longer to heal than a simple puncture of the tips, which might only stop you climbing for a day or two.

Respondents were divided on the effects of having athletic strapping tape on your hands. Those who taped finger tendon injuries often felt naked if they didn't have tape on, while those who did not regularly use tape would often prefer to stop climbing rather than have to use tape.

This suggests that fingers can become accustomed to something in the same way that not wearing a seat belt or a cycle helmet feels strange if you usually wear one, while if you never have used one it feels just as strange to put one on for the first time. This applies to tape around the lower joints to protect joint weakness, however, tape on the actual fingertip can be really quite debilitating;

> Using tape on your fingers can be a negative experience when you are climbing because tape doesn't tend to grip rock as well as your skin does. Skin is elastic and flexible and the texture of it means that the rock bites into your skin quite nicely, if you've got tape on your fingertips then you don't get that same bite, particularly if you split a fingertip open or you've got a cut on your fingertip and you need to put tape on it, especially if it's on that pad on the last joint of your finger then it can make it impossible to hold certain kinds of holds (Eddy, transcription 29/1/07).

While maintaining the skin on a boulderer's fingers is seen as essential, and covering it with anything nearly always decreases their effectiveness, the feet are nearly always covered with climbing shoes. This does not mean, however, that sensitivity is no longer important.

c) Feeling through Technology

Nearly all serious rockclimbers use climbing shoes of various kinds, with an extensive range from the lightest slippers, often used for bouldering, through to heavy stiff-soled shoes for aid climbing on 1000m high big walls. But this hasn't always been the case, as Garrick noted in response to a question about what smearing entailed;

> Well I think firstly there are a lot of things that go into it. The big thing these days is that there is a lot of extremely good shoes available which have made a huge difference in the last twenty years in terms of what's feasible and enjoyable in terms of stickiness and sensitivity and so basically a lot of it starts with having the right footwear for the particular job at hand (Garrick, transcription 31/7/07).

I vividly remember that before I got my first pair of 'proper' rubber soled climbing boots, known as EBs, posted over from England in 1980, I experimented with my mother's smooth rubber-

soled, fur-lined carpet slippers at the crags on Mount Maunganui - but not for long, and quickly reverted to my Para Jets (the cutting edge sandshoe technology of the time). I very quickly learned that not all smooth black rubber is created equal, and the comfort of sheepskin is best left at home, as Hetherington noted "we enter our houses through the front door, we enter our homes through our slippers ... our encounter with certain objects is more obviously tactile than it is visual" (2003: 1939).

The feeling of rock on bare feet is quite distinctive if only a rarely felt phenomenon. Some climbers have toughened their feet enough to climb difficult boulder problems and Sherman (1994) discusses the legendary Skip Guerin, who strengthened his toes specifically so they could fit in small pockets, however, I suspect that most climbers would echo Jock's sentiments about climbing bare feet;

Int Do you ever climb in bare feet?

J. Well today climbing around taking photos there was a lot of the boulders there that had enough friction that I could push in with my bare feet and feel it and feel quite comfortable, whereas further down at the shinier rock at the Homestead I probably wouldn't have climbed the same thing even if it was the same geometry but a smoother surface on it. I wouldn't have been going up in bare feet, but it felt quite comfortable at Flock Hill.

Int Do you ever try and climb harder problems barefoot?

J. No, not if they involve any footwork, pockets might be the only thing you would have an advantage on because you might can shove your big toe in it, the main thing that would put you off though is falling off or jumping off. It would be interesting toproping in bare feet I'm sure (Jock, transcription 27/1/07).

It appears that in the case of climbing, the effects of gravity and having the entire weight of the body on only small parts of the feet, as Ingold (2004: 330) ponders, does make a difference and this difference is most closely associated with pain, unless the feet have been thoroughly toughened and even then the feet will never have the frictional qualities of sticky rubber, although they may have far more dexterity. The friction of the shinier rock at the Homestead that Jock describes, does feel completely comfortable in sticky shoes.

There are over a hundred different models of climbing shoes on the market internationally and there has been a significant degree of specialisation in what shoes are designed to do. A recent review (Rock and Ice 2005:84) of climbing shoes on the market in North America noted that five years ago there were 'just' 69 models from 11 manufacturers, now the editors noted that you could choose from 125 designs from 16 manufacturers. Climbing shoes are arguably the only really essential piece of equipment to boulder at high levels of difficulty, although *crash mats* and *chalk* are nearly always used as well. It is therefore not surprising that climbers pay considerable attention to the types of climbing shoes they buy; as Paul noted, climbers not only develop favourites, but these favourites might be quite different for different styles of climbing;

> Int How important are climbing shoes?
>
> P Well opinions differ on this. I reckon they are pretty important, I think that having the wrong shoes can hinder your performance. It's not necessarily a killer blow to your climbing, like people have done incredible things in horrible shoes or what many people would call horrible shoes and I think in some quarters the necessity of good climbing shoes is over-rated and kind of used as an excuse for under-performance but having good shoes are pretty nice to have, and if you've found a pair of shoes that you can perform well in then you tend to stick with them until the company stops making them.
>
> Int Do good shoes vary with the type of footholds you're using them on?
>
> P Yep definitely, most climbers tend to have three pairs of shoes, one for gym, one for hard edging and one for smearing and that would be true for most people in Christchurch, at least. If you were a climber living in say Taupo then you might have a shoe that was suitable for pockets as well. (Paul, transcription 29/1/07).

i) The effects of wear on sensitivity

Climbing shoes often have quite particular qualities depending on whether they are brand new or well worn. All the respondents were aware of these changes through the life of the shoe and some were quite fanatical about it. Nady remarked on the negative effects of the square cut edge of a new pair of shoes, while Keith laments the fact that shoes "are often the best just before they're about to blow at the toe";

Int How does wear affect shoes?

N Oh yeah I hate having new shoes out there, it's the stiffness you've lost a lot of, if the shoe is really stiff and brand new you're not going to get that much friction out it. But also you end up rolling off your feet a lot, so you start on a hold in one position with your ankles down I guess and then as you get higher on it you're raising up on your ankles more and more and sometimes you're almost pointing on to it as you're about to step off because you have finally reached something you're wanting to get at and if you have got new shoes that have got that abrupt edge on them which makes that rolling transition really abrupt and sharp as you hit the edge, the edge will fold and collapse and you will shoot off, so I definitely like worn soft shoes at Castle Hill and I guess that's why (Nady, transcription 10/2/07).

K It really annoys me sometimes because your shoes are often the best just before they're about to blow at the toe or something or break through, they're at their supplest, they're so good for slabs then they bust. So you need, when I'm climbing at the Hill a lot I try to have three pairs of shoes on the go, all at slightly different levels, one which is just about to go, then one which has got a little more thickness and then one real thick so I gradually wear them in, so then I get my shoes resoled. (Keith, transcription 15/2/07).

The importance of having supple well worn in shoes at Castle Hill is that you need to do a lot of smearing; where as much of the sole of the shoe is pressed flat on to the rock. Almost the opposite is true for edging, where a stiff new pair of shoes with sharp edges allows you to trust your weight on a tiny edge. All the respondents struggled to explain exactly how smearing worked because there are so many factors involved, but all agreed on its importance, as Vincent suggests;

Int Could you explain a bit more about what's involved with smearing?

V Smearing initially feels a little bit unnatural, I think the key to smearing is being able to, the reason it's unnatural is because when you're smearing on a hold you feel like your body needs to come forward and close to the rock and once you break that sort of reflex, you learn to stand away from the wall. Once again it's a matter of keeping moving it's similar to using a sloper, you feel the sloper and if you feel it too much then your foot will slip off so

after a bit of experience you put your foot on the hold visually, you pick up on it visually and then it comes down to feeling, you have an idea of how long a smear will last and how much pressure you can apply on a smear depending on the temperature, the temperature can make a smear last a lot shorter if it's hot, if it's cooler then you'll be able to use the smear a lot longer. There's more to it though.

Int Is it about the pressure that is applied through it?

V Sometimes with a smear you can feel your foot slowly sliding off it and you get to know that timeframe so you have to work out what your next foot is going to do, and you feel it sliding but if you remain relaxed then the smear will do it's course and with smearing I find it is quite important to have the right shoe so you can get the feeling through, between you and the rock and the shoe. If you have a shoe that is too tight then you can't get the right amount of pressure in the right position on the rock. But not only that if you have a thick shoe with lots of rubber you can't get the sensation into your toes, you can't feel what the, if you've got your foot on to the right place on the rock in the right position because it can be a matter of a couple of millimetres. If you can't feel this then you don't have the confidence in the smear (Vincent, transcription 7/2/07).

The importance of wear on climbing shoes, and its effects on sensitivity were discussed by nearly all the respondents. As Garrick noted worn shoes work well on smearing but they don't provide enough support for other kinds of footwork;

> it was interesting climbing last weekend in really sensitive worn out sticky shoes it was actually really nice for smearing, but on the other hand at other times it's nice to have something that is a bit stiffer to be able to put a bit more force into foothold, so it's the right shoes for a particular climb (Garrick, transcription 31/1/07).

The feet can become more expressive inside thinner soled, more comfortable shoes, in which the feet have more flexibility to move around in. Vincent suggests some of the things sensitive shoes can offer;

> you can wrap the holds with your feet so you can move your toes in the shoe or you can let the rubber start to mould and bend into the rock, you can change the position of your feet, because the rubber is only applying friction, if you have a shoe that is too tight on these low angled climbs then you can't really feel what's going on with the hold (Vincent, transcription 7/2/07).

William summed up what the suppleness and sensitivity of shoes provides by suggesting that the feet were able to be used more like the hands

> It lets you use your feet more like you use your hands on the rock, so you'll concentrate on certain points with your hand and when you have a more supple shoe you are able to concentrate on different points of your foot, like more to your little toe or big toe or push with certain toes some more and just feeling the rock, and moulding into it (William, transcription 15/2/07).

So although footwear mediates the climber's experience of the rock, it does not eliminate the haptic perception climbers receive through their feet. Indeed, as the footholds get smaller the climber's pedestrian haptic perception needs to become more refined. As Ingold suggests, the use of technology is a skilled practice that "extends the whole person" (2000: 319), and temporarily produces a new organism that is a hybrid object-subject (Michael 2000).

6) CONCLUSIONS

The broad turn in human geography, away from representations towards more practical and performative aspects of everyday life has led to a concomitant move away from focusing on the ocular and visual towards studies of how the world is multiply sensed. This study aims to contribute to this ongoing project by exploring the ways the embodied movements and practices of advanced level boulderers have aided the development of their haptic skills in the relational context of the limestone boulders of the Castle Hill Basin. This research has taken as its starting point the lived experience of the body, which is grounded in the phenomenological approach put forward by Merleau-Ponty (1962) and elaborated on by Tim Ingold (2000, 2004), and James Gibson's (1979, 1983) proposition that perceptual activity is based on the intentional movement of the whole being in the environment.

The results of this study strongly supported the proposition (Gibson 1983) that the whole body is involved in haptic perception, which includes an assessment of what the environment affords, and this perception is intimately related to the capacities of the perceiver. A number of the respondents explicitly suggested that touch was a property of the whole body where; "you're feeling with your fingertips but a good climb you experience with your whole body and it's really a whole body experience" (Garrick, transcription 31/1/07). Boulderers develop their capacities to use their bodies within the relational context of a particular environment, and because that environment is quite unique, the bodies of climbers often develop in distinctive ways that you would be unlikely to develop for any other reason, for instance the wrist muscle that Vincent has developed from continually placing his hands on the top of flat boulders with his wrist at ninety degrees. These developments are not a given, they need to be worked at and continually refined. As Ingold (2000: 375) suggests such skills are literally embodied as they "entail specific modifications in neurology, musculature and perhaps even basic features of anatomy". Boulderers at Castle Hill have more highly developed pushing muscles in the arms and shoulders than is common for most other types of climbers. This embodiment continues long after the

activity has been stopped. As Jock noted, it is quite different coming back to climbing after a long lay-off than starting for the very first time, although the very young can be highly intuitive climbers, as evidenced by my partner's two and a half year old grand daughter. So, once skills are gained they are never completely forgotten but they can go stale without practice.

The potential of the haptic sense to contribute to memory was suggested by the certainty with which most respondents felt they could identify various rock types, even between different areas of young limestone. I would suggest that the memory of the texture of a rock type can stay with you a long time, for instance the feel of a Fontainebleau sloper is still with me although I have not been there since 1991. The ways climbers remembered sequences of movement varied, but for some the memory definitely appeared to be kinaesthetic, where the "adjustment on that handhold will help you recollect what you need to do next" (Vincent, transcription 7/2/07).

Boulderers have a highly cultivated haptic perception, and this increases with their experience of the area. In particular, they are sensitive to the 'energy' in the rock (Rodaway 1994: 48), which included being able to feel yesterday's wind, because of the way this reduces the moisture content in the rock and makes it feel 'waxy'. This heightened haptic sense means that climbers will often go to great lengths to optimise the conditions in which they climb.

My research also attempted to flesh out Ingold's suggestion that "our knowledge of the environment is altered by techniques of footwork and by the many and varied devices that we attach to the feet in order to enhance their effectiveness in specific tasks and conditions" (2004: 331), in the grounded situation of sticky rubber climbing shoes. Although the feet have a mediated relationship with the environment they are no less important to a climber's haptic abilities. Indeed, because many of the boulder problems at Castle Hill are slabby and under vertical the feet are often more important than the hands and need to be used more like the hands might be. So while the technology of the shoe extends the whole person it does not obliterate the competencies of the feet but rather refashions them. The feet are still sensitive but they have a thin coating of rubber on them that increases their frictional capacity.

As an exploratory study there were a number of topics that came up which merit further exploration. A number of climbers discussed how pain and injury affected their haptic climbing experiences; some suggested pain made them avoid certain problems while others suggested that they just put up with pain in their fingertips if they wanted to do the problem badly enough. The way injury impinges on our haptic perception is potentially a very large topic, and I suggest that both these topics could easily be the focus of further research.

All of the respondents were keen to be involved in this research and were extremely knowledgeable about the topics, even if it was the first time they had really thought about some of the questions, and I would suggest that they all had very a rich understanding of what it means to be embodied and the importance of haptic perception to that embodiment.

7) GLOSSARY OF CLIMBING TERMS

This glossary is split into three sections, the first describes rock features and geometry, the second includes climbing terminology for ways of holding rock, while the third includes terminology describing styles of movement.

Rock Features, Bouldering Areas and Geometry

arête an outward rib of rock that is often quite rounded at Castle Hill.

big water buckets large depressions at the top of boulders that may be full of water after rain and sometimes constitute the finishing holds.

boss a rounded knob of rock. A geological term.

broken flakes exfoliating flakes usually due to freeze thaw action, but sometimes from climbers pulling on them.

bulgey overhanging from below with often a blank slab above.

choss loose unstable cliffs that may fall down or break off at any moment.

crimper a flat positive *edge* that allows a lot of downward force to applied by the climber. Name comes from the technique of *crimping*.

crozzle roughness on the surface of an flat area of rock, which may provide a little more texture for the climbing shoes to *smear* against.

curvaceous many of the boulders are extremely rounded but unusual shapes.

dimples small pitting in the surface texture of the rock that allows slightly better purchase for both hands and feet, individual fingers are often placed in individual dimples in unique configurations to improve the chances of holding the feature.

dishes larger indentations in the rock but often quite rounded and shallow

divot slightly larger indentations in the rock than *dimples* but not as big as pockets

depressions similar to *dishes*.

edges areas of rock that jut out from the face and provide positive footholds and handholds, although often only big enough for the fingertips.

flakes a thin flat section of rock standing away from the main face, which sometimes allow fingers behind them.

Fontainebleau a sandstone bouldering area just south or Paris famed as the birthplace of bouldering where Parisians first started climbing over a hundred years ago, and where world standards were pushed, for instance *Marie Rose* Font 6a (V2) in 1946.

granite a metamorphic rock that is dense with a coarse texture. Primarily occurs in the Darren Mountains of Fiordland in New Zealand, but very common overseas.

gritstone a coarse grained sandstone with many slopey holds, commonly associated with the Peak District of Northern England.

greywacke a sedimentary rock that makes up the majority of the Southern Alps, while there are some very solid areas most of it is a tottering pile of *choss*.

Hampi an extensive area of egg-shaped granite boulders, with mainly positive edges, in Southern India, made popular by Chris Sharma's *Pilgrimage* DVD.

Hueco Tanks an area near El Paso Texas with extremely positive flakes, with very steep bouldering on powerful *crimps*.

ignimbrite a volcanic rock found mainly in the Central North Island, it often provides pocketed climbing on gas *pockets*.

incut a really positive *edge*, virtually non-existent at Castle Hill.

jugs a really positive large hold that can be gripped with security, from jug handle.

limestone a sedimentary rock made of compacted marine animals, it's solubility in water leads to various types of water features such as *runnels* and *solution pockets*

line originally usually a crack-line, but now often just a line of possible holds that might make a route or problem

lip can refer to either the lip of a *pocket*, or the lip of a *roof*

low angled a relative term although usually means less than vertical, similar to *slabby*.

overhanging rock that is steeper than 90 degrees

pits erosional features in limestone where the surface is pock marked.

pockets holes in the rock that range from large *jugs* to shallow *divots*

polished pertaining to holds that have either been cleaned to vigorously with wire brushes or from overuse as footholds, particularly with muddy climbing shoes.

ripples water features on limestone that are like small waves on a pond.

roof a rock feature that juts out horizontally from the cliff face, quite often found in conjunction with *overhanging* climbing. Most roofs at Castle Hill do not have enough holds to be climbable.

rounded an overall quality of the rock at Castle Hill but also of individual holds.

runnels water features in limestone created where water flows off the top of boulders.

rusty lumps small extrusions of ironstone sometimes found at Castle Hill.

scallop indentations in the rock.

schist rock found around Central Otago, which has a fairly predictable layering of quartz that creates very positive *incut edges*

slabby low-angled rock often climbed mainly using the feet and relying on friction alone because of the lack of handholds.

sloper a piece of rock that is slightly less steep than the surrounding rock, often tenuous to hold as they primarily rely on friction and can only be pulled down on not outwards.

solution pocket a limestone feature caused by water, at Castle Hill these are often shallow and non-positive.

top-out holds the holds at the top of boulder problems sometimes marking the finish of a boulder problem, but often at Castle Hill marking the start of desperate *mantle*.

tuff I a light, porous rock formed by the consolidation of volcanic ash, it is frequently steep and has positive flaky edges. A rock found in the Bishop bouldering area of Northern California.

water grooves really large versions of *runnels* that the whole body can fit into.

vertical a 90 degree cliff separates more arm oriented *overhanging* and less steep slabby climbing, essentially vertical climbing with positive edges or pockets prevailed in New Zealand from the 1970s till the mid 1980s when steeper climbing, also with positive holds, become popular, ironically slabby climbing with few handholds took until the 1990s to become popular at Castle Hill.

Climbers' Terminology for Ways of Holding Rock

bomber either a *hold* or piece of *protection* that is considered easy to hang off or very reliable.

boulder problems a short sequence of moves up a small rock face that may require repeated attempts to climb up.

bridging a technique used in wide fissures, either with feet on opposite walls or between your back and feet.

bulgy physical stuff overhanging climbing that requires strong back and shoulder muscles.

Castle Hill crimp a technique for holding a sloping handhold where the fingers are *crimped* but the base of the palm also provides friction.

catch in *dynamic* climbing the process of holding the hold you have lunged for.

chalk magnesium carbonate or gymnasts chalk is widely used to dry up sweat on your hands, and may be used to *tick* holds. Washes off in water unlike *pof*.

chossy loose, flakey or otherwise unreliable rock.

condition usually refers to how easy a climb will be to do, often related to weather and temperature, although can refer to the amount of polish, or if unclimbed for a long period the amount of dirt and lichen on the route or *boulder problem*.

crash mats also known as boulder mats and sketch pads, they take some of the punishment out of falling off repeatedly, but require careful management so that they are in the right place when you fall off.

creep a term related to *smearing* where the climbing shoe very gradually slides off a hold until it finally *pops* off.

crimp, crimping a grip position used on positive edges where the joint closest to the fingertips is extended while the second joint is strongly flexed. A powerful way to grip a hold it is also extremely stressful on joints and tendons in the fingers.

crozzly a rough surface that can be an unpleasant texture to use as a handhold.

dimensional not just a flat surface of rock, often requires a greater range of climbing techniques to ascend.

first joint a common way of describing the size of an edge or depth of a pocket.

fly dynamic climbing that is difficult to control, the opposite of ***deadpoint.***

foot scumming often when the feet are under a bulge and out of sight the shoes are repeatedly pushed against the rock relying on friction, to provide the slightest bit of extra upward momentum.

friction what sticky rubber used in climbing shoes is used to provide, it is especially important for *smearing*. May also be important for hands holding *slopers*.

gaston a way of holding a vertically oriented hold in a thumbs-down position. Can be an extremely powerful hold to sustain purchase on.

gnarly something that has the potential to hurt, a lot!

grabbing grasping a hold rapidly and perhaps carelessly, seldom a successful option at Castle Hill.

greasy the feeling of hold on a hot day, or if there is water seepage on the holds.

grip a generic term that defines a way of holding the rock, e.g. ***pinch*** grip or ***open hand*** grip.

heel hooking using the heel of the climbing shoe to pull the body into the rock and reduce the weight on the hands. Heel hooking can be done out to side of the climber and above the head.

high step when there are limited footholds one foot may be placed at waist level or above, the climber then has to *rock on.*

hold can be seen as any feature of the rock that is used to make progress, or as a distinctly positive feature of the rock which is obviously used for climbing ie. a climber might say "it's got no holds".

hop-up a technique for starting undercut boulder problems where one foot and one hand are on the rock and you push dynamically off the ground with other foot to try and get to higher handhold for the second hand, a common feature of Castle Hill boulder problems. Deemed as somewhat less pure than a ***pull on***, but better than a jump start.

jamming wedging hands, fists, fingers, ***tips***, arms, knees or legs into a crack

jerry start a way of starting a climb that allows more climbing to be done on a problem by hanging beneath starting holds that are closer to the ground than you could reach standing upright, but there aren't enough holds to do a *sit-start.*

latch catching a hold, usually dynamically.

laybacking a technique for climbing corners with cracks in the them, where the hands pull horizontally and the pressure of the feet smearing on the wall.

lock-off holding the bicep in fully contracted position, as though at the top of a chip-up, but with only one arm.

manky unpleasant holds or unreliable *protection.*

mantles a technique for gaining the top of a boulder or rounded ledge on a climb where there are scant holds beyond what you are trying to mantle onto, and is descriptive of what a person would have to do to get on to a mantelshelf above a fire place, which involves going from pulling on the holds to pushing down on them, and can involve expending huge amounts of energy to make very little progress. It is also probably fair to say that Castle Hill is the undisputed world capital of mantles.

open-handing a technique for holding small edges that does not bend the fingers in the extreme way that crimping does and is therefore less likely to cause injury, but is difficult to use on sharp *incuts* and but often seems harder to apply power through. "It's also the grip preferred by arboreal apes for locomotion" (Robinson cited inHorst 2002: 77)

paddling a term describing footwork where the feet are continually sliding down the rock and continually being replaced higher up by the climber, often seen in beginners.

palm down where the hold is below shoulder the climber pushes down on the hold with their palm.

pinch a way holding a rib of rock between thumb and fingers

placements usually refers to *protection* in lead climbing using ropes but is sometimes used to talk about where hands or feet are placed on the rock.

preparation this runs the gamut from full-on gardening operations to brushing a key hold with a tooth brush to get excess chalk off. Preparing a new boulder problem may also involve washing dust off with water. Climbers also talk about their mental and physical preparation prior to attempting particularly difficult problems for them.

press, pressing pushing down on holds, often done in conjunction with *mantling*.

pulling the main action of the arms in most conventional climbing situations, and still extremely important at Castle Hill, but what you are pulling on is usually more subtle and hard to hold on to.

pull-on the start of a boulder problem where pulling off the ground with both hands on the rock may be the hardest move on the problem.

purchase the ability to get some traction on a hold.

pushing similar to *pressing* but may also involve pushing against rock above one's head.

rocking on, rockover once you have placed a foot above waist height rocking on involves getting weight over your feet and in balance in order to do a one-legged squat

sharing using the same hand hold for both hands, may be required in order to swap hands on a hold.

sharp an often unpleasant characteristic particularly if you are required to pull hard on the hold.

sidepull a vertically oriented hold that is held in a thumbs-up position, in contrast with *gaston.*

sit start a way of maximising the climbing on small boulders similar to *jerry start*, sit starts are usually done on undercut boulders and are often much harder than the problem done from standing.

slap a somewhat out of control dynamic manoeuvre where you have no positive handholds and must rely on retaining the counter pressure of two similarly poor holds.

slippery the feeling of the rock on very hot day or if it is damp.

slopey rounded non-positive handholds.

smearing a footwork technique that relies on rubber contact to provide friction.

smedging similar to *smearing* but with slightly more positive but rounded edges.

squeezing usually done up rounded *arêtes* and requires strong *pecs*.

stack putting fingers on top of each other on a small edge to provide more power.

stick can refer to either holding a hold that you've moved to *dynamically*, or whether your climbing shoe is staying put.

stickiness the main distinction in climbing shoe rubber, stickier rubber is softer and usually wears out quicker.

thumb sprag a way of improving a tenuous handhold by wrapping a thumb over some small protrusion.

topouts the finish of the boulder problem, often involve some of the most awkward moves if the problem ends with a *mantle.*

traction friction between the climbing shoe rubber and the rock allows the possibility of upward momentum.

traverse climbing sideways, can provide a way of doing a long climb without getting very high off the ground.

underclinging a hold where the palm faces up and pulls out on a crack that is under a roof with the feet smearing.

waxy the feeling of the rock after a hot Nor-west wind has completely dried out the rock.

Body and Movement

abs short for abdominal muscles, which are essential for maintaining body tension in the torso

adventure climbing also known as traditional or trad climbing, it involves using ropes and placing removable pieces of *protection* in cracks, a style of climbing that has vocal adherents who are particularly opposed to the use of bolts in *sport climbing*.

balance of fundamental importance to climbing as subtle weights shifts dramatically alter how easy it is to hang on to the rock.

beached whale a situation where the climber has only stomach in contact with the rock usually while attempting to *mantle* on to the top of a boulder. Precarious and unsettling.

beta knowledge about the *holds* and *sequences* of a climb that sometimes makes problems much easier to climb

body tension the ability to be able to tense the body in particular positions. On low agled climbs the tension comes up through the feet and legs, while on steep climbing the arms and trunk muscles are more important.

control, controlled climbing smoothly without sudden jerky movements.

core strength primarily of the abdominal muscles but all the trunk muscles play a part.

deadpoint a *dynamic* move used when both holds you are going from and going to are hard to hold, the aim is to catch the new hold at the still point of the upward movement before gravity takes hold.

desperate a problem that is at the cutting edge of difficulty at a particular area.

dynamic a style of climbing involving rapid body movement, usually contrasted with *static* climbing, and often done when the holds are reasonably good but far apart.

dyno a *dynamic* lunge upward to a hold that you can not reach *statically.*

fiddly of *holds*, tricky to arrange your fingers on them, of *sequences*, involving a lot of small movements in the right order, of *protection*, hard to place

finger power the ability to launch off and *catch* small *holds*

flagging having one leg swinging around behind you to improve *balance*.

flash to do a climb the first time you try it, often with *beta* or having watched someone else climb it. Not quite as impressive as an *on sight* flash

flexibility the ability to stretch your body into awkward positions, lack of it can be a limiting factor on some boulder problems

fluid a style of movement that can be easy to achieve on problems that are easy for you, but much more challenging when the problem is at your limit.

grovelly unpleasant *thrutchy* climbing.

humping similar to a *beached whale* where you are relying on the friction of large parts of your anatomy to get over holdless bulges or ridges and you're too scared to try and get your feet on to the rock.

jumping a way of starting some problems at Castle Hill when there is a good hold some distance off the ground, may be a standing jump but often it requires running hard at the rock and thrusting a foot on to the rock to launch upwards

lats *latissimus dorsi* muscles are under the armpit and are required to exert force when the arm is outstretched to the side at shoulder height, important at Castle Hill because holds can be quite widely spaced out to the sides of the *line*.

margin being able to climb something quite easily with power to spare

marginal of holds, barely usable, of *protection* poor and unlikely to hold a falling climber.

momentum using movement generated from lower holds to continue up a climb with only slight assistance from poorer holds above.

onsight doing a climb without falling and without prior knowledge beyond what the guidebook says about it, *beta* or pre-inspection eliminate the chance of an onsight, which is a highly valued way to climb if the problem is hard.

opposition a style of climbing where all the limbs play an important part in maintaining contact with the rock and often have to be move sequentially.

pecs pectoral muscles of the chest allow the arms to squeeze together in front of the chest in *opposition* to one another.

power a product of the force and the distance through which the force acts. Therefore power is the result of *strength* and speed.

protection devices (natural protection) that are placed in fissures in the rock that rope is clipped to and then removed by the second climber, or bolts that are left permanently in place.

sequence the order that particular holds must be used in.

sketching making rapid movements that are barely in control.

skutching probably a hybrid between *sketching* and *thrutching*

sport climbing the use of permanent bolts drilled into the rock to provide *protection* in roped climbing, adherents tend to emphasise the physical difficulty and athletic aspects of climbing rather than risk.

spotter a person who stands beneath a boulderer and attempts to direct a boulderers fall towards the safety of the *boulder mats*, and allow them to land on their feet and not their head. Particularly important on overhanging problems, often less essential on slabs.

static ironically, not as the word suggests, no movement, but slow controlled movement that is the opposite of *dynamic*.

strength the force a muscle group can exert in one maximum effort, the ability of a climber to pull a single hard movement or grip a small difficult handhold is a function of their maximum strength.

tenuous a problem or move where very little is keeping you in contact with the rock.

thrutching often done in wide or flaring cracks, or surmounting *mantles*, it involves doing all sorts of ungainly manoeuvres.

thugging climbing powerfully on good hand holds with little or no footwork, almost never a good option at Castle Hill.

trashed of ones body, physically exhausted, of the fingertips, extremely thin skin or punctured *tips*, of a climb polished, chipped or in some way defaced.

V grades an American system of bouldering grades developed by John 'vermin' Sherman originally for Hueco Tanks in Texas. It has been adopted in most parts of the world outside Western Europe

where Font (Fontainebleau) grades are used. V grades range from V0- V16 worldwide with the hardest problem a V14 put up by visiting American Chris Sharma in 2005. Probably only a dozen or so New Zealanders have climbed V10 or harder.

visualisation rehearsing the sequence of moves and holds in your mind prior to attempting a problem that is difficult for you.

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