

# Bodily Orientations around Mobiles: Lessons learnt in Vanuatu

**Pedro Ferreira**

Mobile Life @ Stockholm University  
Forum 100, 164 40 Kista  
Sweden  
pedro@mobilelifecentre.org

**Kristina Höök**

Mobile Life @ SU & SICS  
Forum 100, 164 40 Kista  
Sweden  
kia@sics.se

## ABSTRACT

Since we started carrying mobile phones, they have altered the ways in which we orient our bodies in the world. Many of those changes are invisible to us – they have become habits, deeply engrained in our society. To make us more aware of our bodily ways of living with mobiles and open the design space for novel ways of designing mobiles and their interactions, we decided to study one of the last groups of users on earth who had not been exposed to mobiles: the people of Vanuatu. As they had so recently started using mobiles, their use was still in flux: the fragility of the mobile was unusual to them as was the need to move in order to find coverage. They were still getting used to carrying their mobiles and keeping them safe. Their encounters with mobile use exposed the need to consider somaesthetics practices when designing mobiles as they profoundly affect our bodily ways of being in the world.

## Author Keywords

Embodiment, movement, experience, interaction, ethnography

## ACM Classification Keywords

H5.m. Information interfaces and presentation

## INTRODUCTION

To most of us, who have incorporated mobile telephony in our everyday lives, it is hard to see the role that this technology plays in our everyday practices. As the mobile evolves and becomes increasingly pervasive, society and individuals adapt, creating new social rules or modifying bodily behaviors. The ways in which we place our mobiles on our bodies or on the environment, how we hold them when engaged in different activities or how we situate and orient our bodies when in conversation, are all part of the ongoing process in which people, society and the technology, through the ongoing interactions, adapt and exert mutual influence. But has shown by Shklovski et. al. [17,18], it is sometimes easier to expose practices when they are in change – as in their studies on how electronic communica-

tion practices change when one moves to another house. As Shklovski et.al put it: “*It is through this experience of being unsettled that we explore the processes of behavior adjustment*” [18]. Another example would be the way we realize how much our everyday practices revolve around a mobile or the Internet much more intensely the day we are suddenly deprived of them. In certain parts of Vanuatu, their practices were in such a flux, as they were exposed to mobiles for the first time – their use was therefore changing, adapting, and in some sense more accessible to study.

We conducted a 2-month long, design-oriented, explorative fieldwork study in the islands of Vanuatu, where the mobile scenery was very diverse, ranging from high penetration in some islands, to no penetration whatsoever in other places. We looked for ways in which the mobile related to life in the areas we visited, concerning bodily orientations, the need to change physical behaviors, physical environment and implications for cultural values. Our main focus in this report will be on the bodily aspects of interacting with mobiles in one particular area, The Banks islands, where mobile telephony had emerged just days before our arrival.

In this report we will look at issues of the fragility of the device in that setting, and how *ni-Vans* are dealing with it. Afterwards we will go through issues of mobility and the implications brought about by new invisible landscapes. We will then develop these themes in a more detailed analysis.

## PREVIOUS WORK

Our aim with the work presented here is to provide inspiration to design for novel *bodily orientations and interactions* with/through mobile technology. Originally, HCI spun off from ergonomics through its focus on the cognitive aspects of interaction. With the turn to third-wave HCI and its focus on experiences [2], we are now in a sense turning back to considering the body in interaction. But contrary to the main focus of ergonomics, instead of documenting and altering routines, finding error-free ways of involving operators in the complex beast of man and machine as a unity, or measuring how the body has its limitations, this turn back to bodily interaction entails a new focus. The renewed HCI interest lies in designing for *experiences* – beyond efficiency and task completion [5,13]. Although in some respects ergonomists were, and still are, more sensitive of the body than HCI, given their concerns on the integrity of the body and integration of function and movement.

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Recently, we have started to see other studies where HCI researchers attempt to observe different cultures or communities of practice, for insight on how to design for novel bodily experiences. There are ethnographic studies about hunting culture [9], skaters and golfers [23], horseback riding [7] to citizens constrained by electronic surveillance bracelets [24]. These studies repeatedly tell us that bodily experiences have been undervalued in ICT design and that there is little knowledge on how to address them.

The study by Tholander and Johansson [23], on skaters and golfers show that those practices do not distract their users from being in the world together with their skateboards or golf clubs. Tholander and Johansson convincingly argue that interactive technologies that aim for physical interaction too often force users to interact through some type of screen interface, taking away focus from the environment. Instead of interacting with others around us or with the surrounding nature, we focus on the screen

The study by Höök [7] provides a rich account of how horseback riding involves all our senses, at moments involving us in centaur-experiences – feeling as one with horse and environment. Her point is to show both how impoverished interaction with many of our interfaces are compared to the sensory richness of riding, and also how impoverished our descriptions of interactions are, the lack of an agreed upon language for describing interactions.

Troshynski and Dourish, in their study on paroled sex offenders who are required to wear a GPS tracking electronic bracelet on their ankle [24], show how this technology constrains their bodies in ways beyond that of the original intent of the technology. A considerable amount of work is put into preserving the technology intact during everyday routines like showering, and their mobility in the environment is considerable constrained, among other implications.

All of these studies point to limitations in the ways we think of today's wearable and mobile technologies and their impact on bodily behaviors and practices. Often missing out on designing for much richer experiences. Some even claim that the technologies we wear today treat our bodies in a negative way [10]: *“Electronics, robotics, and spintronics invade and transform the body and, as a consequence of this, the body becomes an object and loses its remaining personal characteristics, those characteristics that might make us consider it as the sacred guardian of our identity”*

But all bodily experiences with digital technology are not impoverished, limiting or painful. There have been attempts to design for various aesthetic experiences: Schiphorst's soft(n), where design of physical interactive artifacts is done from a somaesthetic perspective [16], Sundström et. Al.'s eMoto, where SMS is enriched with emotional cues through gesturing [22], or Moen's design for the joy of moving in her BodyBug system [14], to just name a few.

A major issue for both the design work and the studies of bodily experiences lies in exposing and articulating bodily

experiences. As Höök expresses it after trying to describe her horseback riding experiences: *“I [have] tried to provide an account of exactly how I was sitting, which muscles were tensed, how I balanced on my sitting bones, the direction of my head and vision, the position of my legs and the tension in arms and hands. Still, the experiences I am trying to describe are wordless, and putting detailed descriptions of them still fails to cover the complexities and the uniqueness of my embodied experience.”* [7]

In our Vanuatu study, we will only scratch the surface of the bodily experiences, re-orientations and changed practices the people we met were experiencing as they started to use mobiles as part of their everyday life.

## RESEARCH SETTING AND METHODOLOGY

The whole of the research project was conducted during 2 months in the country of Vanuatu. In particular, the results presented in this report, focused on The Banks islands, in Vanuatu a northern group of Islands part of the Torba province (see Figure 1). The choice of site was based on locally obtained information where we looked for a place where mobile telephony was just becoming a reality.



Figure 1 : Map of Vanuatu

Vanuatu is, since 1980, a sovereign, independent nation located in the South Pacific. Prior to that it was a territory jointly ruled by the French and English, in a setup that was known as Condominium [15]. Until that time Vanuatu was known as the New Hebrides. Vanuatu is populated by around two hundred thousand *ni-Vanuatu* [1] (or *ni-Vans*) spread out throughout approximately eighty islands. Vanuatu's cash economy is largely dependent on its main export, copra, the meat of the coconut intended for oil, and tourism.

The capital, Port Vila (located in the island of Efate), is one of the two only urban areas in Vanuatu (along with Luganville in the island of Espiritu Santo). In both places, the penetration of mobile telephony is high [20]. There are two companies providing mobile telephony in Vanuatu: TVL<sup>1</sup>,

<sup>1</sup> Telecom Vanuatu Limited: The old telecommunication monopoly. One of the two main players in the Vanuatu mobile scene.

the former communication monopoly, and Digicell, which is commonly known to have been the driving force of this modernization by challenging TVL's monopoly.

The place this reports refers to, The Banks is a group of islands, part of the Torba province. The local capital is Sola, located in the island of Vanua Lava. Cargo boats do not come here often and people often feel that they are the last in Vanuatu to experience change and novelty.

Around the time we arrived in Motalava, a TVL tower was installed and GSM service was launched. This tower was meant to serve the whole Banks group, although its coverage is still far from reaching all places. We spent a little less than 2 weeks in the island of Rah, which is very close to the island of Motalava (almost being one and the same, Motalava often referred to as "the mainland"). We then spent some days in Lalntak and Sola, in Vanua Lava.

The fieldwork was done with a combination of methods. We conducted ethnographic observations; taking notes, pictures and video whenever we could (sometimes the weather conditions or lack of assuredness that it was acceptable to take pictures or videos, limited these last two data collection methods). We conducted short formal interviews along with many informal ones. The notes are direct citations from what we were told, when in Bislama or French translated into English. In here, we will focus on observational data alongside of fragments from informal interviews often in the form of narratives [12], since they come closest to describing the richness of the kinds of bodily descriptions we aimed to capture. To illustrate the findings we describe specific encounters. We found these to be representative, and a solid basis for a detailed analysis, of what each theme may suggest and imply for mobile design.

The Banks is a group of islands of varying dimensions (Figure 2). Everyday bodily practices have evolved within this environment. Crossing over water in a dugout canoe or diving to catch lobster might not be an everyday mundane activity to most of the readers. It is so in The Banks though.

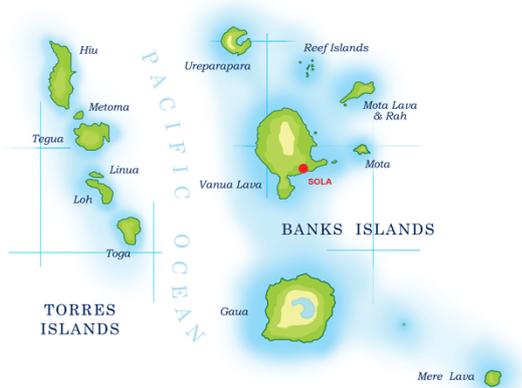


Figure 2: Map of the Torba province

We will look at four different themes in which it is relevant to understand how the mobile fits in this setting: the act of crossing over water, the everyday bodily practices involv-

ing a decision of going in the water and the unpredictability of finding oneself inside the water. We will then look at similar issues but this time beyond the water.

### On the water

Being on water is an everyday mundane activity for people in Rah and Motalava. Crossing back and forth between the two islands, for instance, is very common. From children going to school and back twice a day (because of lunch time), men and women going to meet family members, to buy and sell something or to take care of any other business, this is a basic activity, especially for inhabitants in Rah, given the reduced demographical and geographical dimension of their island and the presence of the airport in Motalava. Most of the crossing between the two islands was made using a dugout canoe, which was locally known as a "Taxi". The canoes mentioned, or "Taxis", are built from a single tree trunk, and for reasons of stability, most of them were balanced using a lateral log, tied to the main one with the help of auxiliary logs and rope (Figure 3). We will now look at some encounters between the mobile phone and these practices.



Figure 3 : Dugout canoe

One day, crossing with a 'Taxi' from Motalava to Rah (Figure 4), Brian crossed paths with Brian's younger brother Suva who was heading in the opposite direction. Brian made some gestures to Suva, in a seemingly mocking way, as they would be often 'pulling each other's leg' in a friendly way. Suva stood up on the canoe and screamed with a challenging tone, then throwing one of his Croc's (the famous brand of rubber sandals) in the water, close to the canoe where Brian was probably in the hope of hitting him with some of the splash from his Croc in the water. The shoe hit a couple of meters from Brian's canoe, he immediately used the paddle to maneuver the canoe around and intercept the fallen shoe. As he was approaching the shoe, floating in the water, he stopped paddling taking the paddle inside the canoe, just letting it "glide" with its existing momentum. He stretched his body in the direction of the floating shoe, leaning over the side of the canoe. He held on the canoe with one hand while his other arm reached out for the shoe.

At the time, his mobile phone was hanging around his neck, and was still inside the canoe, but as he stretched out, the phone was pulled higher and higher against the inner wall of the dugout and was now facing a possible dip in the water, which Brian did not seem to be realizing at the moment. Suva, who was half standing on his canoe, looking at the whole situation, yelled out something to Brian, which made him sit back in a very sudden move, causing the boat to rock slightly. They both screamed to each other with a smile, as if saying “*that was a close one*”, Brian holding his phone and looking to check if it was wet. Brian told me “*oh, I was lucky*” with a smile.



**Figure 4 : Brian crossing from Motalava to Rah on a ‘Taxi’**

Brian had apparently completely forgotten the presence of the mobile phones hanging down from his neck, which was an extremely common way for people in Rah to carry their phones around. He was engaged in an everyday activity. As Jorege put it at one time: “*sometimes we just lean over to look at something, or to get some water out of the canoe [...] we forget that we have the phone on our chest [laughter] and then the phone goes in the water [followed by generalized laughter]*”.

Brian’s example and Jorege’s statement are examples of how the practice of wearing the mobile phone hanging around the neck has been at odds with their everyday practices. It also shows how their practices and attention has already begun shifting in a way that it accounts for this presence and protects it.

#### **Everyday activities in the water: fishing and swimming**

Being on water is not the only way that harm can come to the mobile phones. Being in the water was equally an everyday mundane activity in Rah and other parts of Vanuatu, as you can see in Figure 5. Fishing was often done by plunging all the way inside the water, sometimes in the evening, with the help of battery operated, waterproof, flashlights, sometimes during daytime, depending on the kind of catch they were aiming for.



**Figure 5 : Group of people walking from across from one island to the other**

At one time, while we were by the water together in a group talking and watching over Brian as he was repairing his canoe, someone came to call Brian, as he needed to attend to some issue elsewhere. Given the work he had been engaged in he was feeling sweaty and dirty, and decided to go for a quick swim, telling us to wait a second. He threw off his flip-flops and then proceeded to run towards the water. As the water level reached his knees, and water was splashing all around due to his running, it was clear he was getting ready to jump right in. All of a sudden he broke his step, turned around and ran back towards, while at the same time removing the phone from around his neck. He then handed me the phone, smiling and said: “*I almost forgot!*”

Another incident was narrated to us by Father Robert, concerning Jorege: “*people’s life here involves fishing. This is the food that we have and we get it every day.[...] We are lucky to have this many resources [...] [he continues into a criticism of the lack of respect that new generations have of this natural advantage][...] but people here they do not pay attention to what they are doing, like my brother here [pointing at Jorege] [pause, looking at Jorege, while Jorege looks at me with a guilty smile] how many times he goes running in the water with the phone on his chest, and often I have to shout for him to stop? [Pauses] how many times has this happened? [people around, Jorege included, burst into laughter and snapping their fingers against each others’ in a typical ni-Van way of doing when something funny has occurred]*”. Before Father Robert told me this story, Jorege himself had complained about the fragility of the mobile devices by saying: “*sometimes I run in the water and remember in the last minute [slaps his forehead] oh! The phone! [pause] then I have to go back and leave the phone someplace else.*”.

Whether for a long period of time, like J.G.’s fishing, but also for just regular split seconds dives like Brian’s the possibility that the phone would be irreversibly damaged was most likely as the mobiles they had been given were not of very high quality or water-resistant. These are activities that are part of everyday life and to which they dedicate themselves to without much preparation and to which they attend to in a very quick fashion. This attitude clashes with the fragility of the device they are now carrying with them.

The acts of avoiding letting the mobile dip into the water – as in the canoeing examples above - have to be seen not as isolated bodily behaviors, but in a larger context of also changing the ways they engage in mundane activities around water. Arguably just leaving the mobile on the sand, at the shore, is a bad idea, since the sand, or an animal, such as a crab, may cause damage to it. Having the mobile present becomes a central concern causing practices to evolve around it.

### Unpredictable water encounters

In Rah, Brian had already told a story in which “*one day, a fat woman was crossing with a bag of rice, and when she was coming out, the canoe tipped over [everyone started to laugh] and her phone and rice got full of water [...] the phone was not working anymore*”. This made us particularly aware of those situations in which one does not intend to and in fact does nothing to have to go in the water, but the circumstances so dictate.

Our own exposure to the environment made it easier for us to emphatically experience how living surrounded by water, in your daily life, exposes our electronic equipment to so many risks. We were also carrying a wide selection of electronic equipment, ranging from digital cameras, Dictaphones, video camera, mobile phone, and chargers.

One encounter occurred when some children took us to the other side of the island, to show us how big (or small) the island was, as well as to show us how the island, outside of the village area, was. Once we arrived to the other side, the water level had already changed and was slightly higher. The children immediately suggested that we should return to the village by going back in the water, which was around a meter deep, and walking around the island, as that would be now easier and faster than trying to take the same path back. The children did not have a mobile phone or any other type of electronic equipment with them. I<sup>2</sup> had brought my digital camera along to document this trip. What happened was that I found myself holding the camera on my hand, away from the water, to keep it dry, while maneuvering my way over the reef. To walk on the reef one requires balance, especially when the water is still relatively shallow. Although *ni-Vans* had an extraordinary balance, when compared to us they were still vulnerable to the reef as the many wounds on their bodies witnessed. Falling on the reef can be extremely painful and most often results in skin cuts. The sharp and slippery nature of the reef means that one’s full bodily focus typically goes into not falling and hurting oneself as that is usually the main priority. To do that one must walk carefully, trying to feel where the bottom is good enough to stand on, while at the same time using your arms to keep the balance.

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<sup>2</sup> Here, the term ‘I’ refers to the personal experience and personal camera of the first author.

The problem was that now, a part of one’s body, in my case the hand that was carrying the digital camera, is somehow restricted. This part of your body can also not get wet. This results in having to split attentions between not getting that specific region wet, and keeping yourself from hurting yourself. In my case, the fear of wrecking the digital camera, alongside with the documentation still in it kept my focus on the hand while sometimes it was almost impossible to resist the temptation of getting that hand wet in order to stabilize myself and facilitate the balance.

What all these episodes show is that one cannot always plan when to get into the water. There is a need to be ready for situations as they occur and to have one’s body free to do full-body activities. In certain environments, such as everyday life in a place such as Manhattan, one can reasonably expect not to be plunged into water. Of course other restrictions follow from the environment, such as placing the mobile in a place protected from pickpockets for instance. What this implies is that in one setting a group of places emerge as “safe” to incorporate a mobile: pockets, neck lanyard, backpack, amongst others. But, in settings where the same assumptions cannot be made, then the same “safe” behaviors do not follow. This is not merely a one-way relation between the environment and what behaviors it allows for, but equally what the technology is and what behaviors it affords or constrains.

What is aimed at, with the narration of these encounters, is not to say that a water-proof mobile is the solution to all the problems, although it would probably be a welcomed feature by people in Rah. First, water is not the only danger around as we will see in the next example. Secondly, merely adding a waterproof layer to the mobile would only be addressing some of the concerns one might have regarding bodily orientations around mobiles.

### “A World where things get easily broken”

As we mentioned earlier, water was not the only danger in regards to the mobile phones. To work in the gardens is a big part of the everyday *ni-Van* life. With the exceptions of the urban areas, where people dispose of little or no land of their own, in all the other islands of Vanuatu, people have land, sometimes relatively far from their homes, to which they walk to and back regularly and where they cultivate. These lands are called gardens.

Garden work is hard, physical work. It involves cutting branches and trees. It involves cleaning of the cultivated areas. It involves climbing trees to gather fruits. People will have to carry what they collect for long distances, back to the villages. All this is very demanding, and is done in a setting that is harsh on mobiles.

Jorege showed us his garden, carrying his mobile in his hand. In gesturing, he almost lost it (its neck-strap got stuck on a bush) and we asked Jorege why he did not have his phone in his pockets? Jorege was wearing shorts at the time which had two pockets on the sides and two on back, as well as two lower in the legs. He answered: “*if you... you*

*put the phone in your pocket [...] then it can fall [he bends over to illustrate himself doing garden work, close to the floor, such as cutting lower weeds with a machete] you are like this, [continues to make hacking moves], then the phone falls down [making gestures with his hand coming from his pocket and down to the floor, showing that by bending over, as it is often required of garden work, that the phone could just slip out of the pocket]*".

The nature on the islands was not always soft as the sand. We experienced this when we were climbing up a hill, close to an active volcano, in Lalntak (Vanua Lava). At some point the path was crossed by many rivers of hot sulfuric water. This water came down on the rocks creating a polished effect on these rocks, giving them different shiny colors, but also making them extremely slippery. I crossed with the help of the boys, but they would mostly just jump and run from rock to rock. Suva, one of the boys who had come from Rah to take us to Lalntak, was jumping around quite often, with his mobile phone always in his hand, trying to call Rah, every time there was a bit of network along our way. At one point he slipped on one of the rocks, while hopping over one of the streams, and his leg went back, making him fall to the front. As he felt he semi-opened his arms falling on his chest, keeping the phone in his hand, with his arm stretching out from his body, keeping the phone safe throughout the fall. He did not seem hurt and screamed in success displaying his intact phone.

The best way to sum this up, in the words of Father Lewis: "*this is a world where things get easily broken*". To this world, *ni-Vans* were accustomed to. Their bodies were in general very strong and they possessed a great amount of balance in that setting. Their adaptation is of course not perfect or risk-free. The mobile may at times introduce extra fragility, as they will have to add it to their own bodily fragilities. In order to protect the mobile, as the example above shows, Suva risked hurting himself.

These encounters bring to the forefront the effort that must be put into caring for this fragile extension of ourselves. The lack of experience with this device forces people in Rah to adapt their bodily postures, in order to protect it, stiffening their bodies in different and unusual ways. At the same time it shows us the value that is put onto this new technology, as they reflect and pay attention to the ways in which this novelty is to be preserved.

#### **MOBILITY**

"*The mobile phones are making people lazy*", said Father Robert during one of our meetings, "*the young ones do not want to help their parents in the gardens anymore, all they want is to make play-play<sup>3</sup> with their mobile phones*". Father Robert also said that people were spending money

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<sup>3</sup> "*Play-play*" is Bislama for an attitude of what some might call "playfulness" that is playing without the implication of rules or goals.

superfluously on calls when they could just walk over to each other as they are so close: "*these two [pointing towards Jorege and Joe.] they waste 1000 Vatu<sup>4</sup> in two days [...] they bought their phones at the same time, and so they only remembered each other's [phone] number [this is because one's number was obtained by adding 1 to the other's number and vice-versa] so they were always calling each other. [Both started laughing along with the crowd] They are laughing, but this is serious, they waste money just to call the other and ask 'is the kava ready' and the other replies 'yes it is ready' and they are just some short distance from each other, sometimes they even see each other while they are talking [...] only because they do not want to move*".

This cost issue could be considered a serious threat to their very low-income level and existing economy. We are not putting a value on calling a friend for asking about *kava* or when to meet next. Neither is there anything wrong with making calls without any specific grand purpose in mind. Perhaps the issue here is more to do with dealing with a habituation to the rate and charging system of mobile telephony. In the long run, they will know where and when they will be able to do this given the costs.

Another more straightforward way to interpret these encounters is by concluding that given the mobile's possibilities for far reaching conversation, without the necessity of physical mobility, it brings about, as a consequence, a situation where people tend to move less and become more sedentary. What we saw though, and what we will look at next is a different story. One which shows a number of examples of mobiles actually promoting moving around, sometimes creating the necessity for physical movement itself, sometimes by allowing for new possibilities which themselves entail physical mobility.

#### **The work of looking for reception**

Coverage was far from global in The Banks. Depending on where you were, geographically, in relation to the tower installed by TVL, you would get different qualities in the reception. Weather conditions were also of great importance as Frelal points out "*sometimes, if it's cloudy, we don't get reception at all, for days*". It was very common to have people going around looking for reception in the most varied ways.

One illustrative way in which this is relevant, happened when a group of men were playing cards by the beach, sitting in a circle and using a mat as table, and Jorege got a call. He stands up, and reaches for his phone. He looks at it to try and identify who is calling him, clicks on the answer button using the other hand than the one he was holding the phone with, and places the phone next to his ear: "*Hello?... Hello?*" and then after a small pause with a significant higher volume of voice "*Hello? Yes! Kaspa!*" it was his

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<sup>4</sup> 1000 Vatu at the time of our stay was around 10 USD.

brother in Port Vila calling. He places his free hand on the other side of his face, covering his eardrum with one of his fingers and starts walking away from the card game and towards the water. He then starts speaking in local language (Motlav), which I did not understand at all. He wanders by the water, going back and forth speaking very loudly, seemingly unconcerned with the environment around him. Everyone could distinctly overhear the conversation. He had a short conversation, at times he would lower the volume of his voice significantly and, at other times he would speak loudly again. Sometimes he would drift further away where we were, and sometimes he would just wonder freely relatively close to our position. For more than one time, the call was abruptly interrupted, this was noticeable at a distance by the amount of times he would shout “Hello?” louder and louder, and then looking straight at the mobile in front of him eventually pressing the necessary buttons to realize a new call or waiting for his brother to call again. He finally hung up the phone for good and headed towards me. After telling me that it was his brother, he reiterated the complaints he himself had persistently made clear to me regarding the quality of the reception: “*You see? I call and ‘Hello! Hello!’ then nothing*” Jorege complained, “*I call again, and again... sometimes I call ten times just to say ‘how are you’, but then I spend ten calls*”. This was a result of the uneven spread of coverage throughout the island and beach, creating this behavior of walking around, looking for reception and spending some extra money in the process.

But finding reception was sometimes much more difficult. Jimmy lived in a place that was just opposite from the side of Vanua Lava that can see Motalava, and hence on the opposite side of the island where reception exists, which he claimed to not be a big problem: “*here we are very lucky, we get reception not far from here [...] in some places people do not get reception at all*”. As our phone did not pick up any reception at all in the whereabouts, we asked what he meant: “*well, on top of the hill [pointing to the direction] we can get very good reception, we just walk there and make our calls from up there [...] we go there almost every day*”. We asked about the distance to that hill, to which he nonchalantly replied: “*oh, just about 2-3 hours walk*”.

Climbing on a coconut tree is, on a physical level, a very demanding task. Children up to a certain age seem fitter to do so: “*me, I do not climb so much anymore, the ‘pikinini’ oooh [making a gesture of admiration] they do it all the time, with no problem*”, said Brian regarding climbing up coconut trees, “*if you want to take a picture, I can do it, but since I am older [he was around 28] I don’t do it so much, I am more heavy*”. Most often children or young people would do the climbing. To climb is similar to climbing a pole where there are no hooks for the hands and feet. One must embrace it with the arms and legs and then perform a snail like movement up, where the arms hold the tree while the legs move up and vice-versa until you reach the top. If you were carrying a bush-knife, as was the case when Jerry

did itto cut out some leaves (the coconuts you could twist them around their attachment until it wore off and broke), then he would add, to the sequence of movements described above, the act of successively stabbing the knife higher and higher up on the tree trunk. In Rah we heard that in other islands in the Banks, where the reception was not as good as in Rah, people were climbing the trees to get reception: “*they climb the coconut tree just to talk on the phone*”, said Jorege while others around laughed at the situation, “*when they are up there they can talk, but they cannot drop the phone*”, this lead the others to laugh even more and snap their fingers together, in the Vanuatu way.

We saw that people start moving through their available landscape in different ways, such as climbing the trees or walking up hills to get reception. We write ‘available landscape’ because climbing up trees or walking, on a daily basis, 3 hours up a hill are not part of the available landscape to most. As mobile telephony settles in, people discover and orient themselves vis-à-vis this new superposition in landscapes, between the geographical landscape and the invisible coverage landscape. With better coverage, these orientations might decrease, but from our own experiences, we know that they always persist to some extent.

## ANALYSIS

We do not want to propose packaged solutions to the apparent mismatches between existing practices and the incorporation of a new device, that have become clear in the encounters described above. Instead, we want to expand and open up for reflection and inspiration to design on both the form and interactions with/through mobile technology from a bodily perspective. We do not want to provide simplistic design implications that would narrow down the design space [6], but draw attention to some of the cracks and creaks in the interaction that we may want to revisit in our design processes.

Also of note, and to make this clear, we do not want to suggest that ni-Vans represent pre-mobile civilization as a whole. For our aims, Vanuatu simply represents a place where exciting things happened, when mobiles were introduced, which we found relevant to analyze. We also want to stay away from judgments on the value of mobile technology in Vanuatu, apart from noting that it seemed desirable, for most people, despite the high financial costs.

Above we identified the four following themes:

Fragility: adjustments to mobile fragility – in particular in relationship to our own fragile bodies

Somaesthetic implications: tensions in posture or muscles from wearing mobiles

Coverage landscape: discovery and orientation vis-à-vis the invisible coverage landscape and its relationship to the environment

Competing for bodily space: wearing the mobile requires finding a ‘space’ on your body where it can be worn

**Fragility.** It seems obvious that the *ni-Vans* need more robust mobiles, preferably waterproof ones. But this will only take us so far. Their mobiles will still require care to have their battery loaded, not lose their mobile in the sand when running into the water, or getting smashed against a rock. *Ni-Vans* are used to adapting their movements to a, in parts, fairly rough environment with rocks, thorny bushes, uneven sea bottom, and so on. The mobile will move focus from caring about their own bodies to caring about an object, as if caring for a fragile being like a baby. We see this in the way we react when tripping with a laptop in our hands, for example, and the way we orient our bodies to protect it. It seems to us that the design of the mobile was never created to nurture that kind of relationship.

As we all know, the shape of an object will evoke certain understandings, and bring about certain behaviors— it entails affordances that we may take advantage of in our design processes. But it will also evoke certain experiences and sensual connotations. As pointed out before [8,16,21], we need to cultivate a deep understanding of the materials we use to build our artifacts from. Only then can we design for experiential qualities arising in the interaction, as it unfolds over time and space – its dynamic gestalt to quote Löwgren [11]. In this setting, we see a need for design that purposefully exposes the mobile device’s fragility to evoke feelings of caretaking. But that design needs to take the totality of the mobile shape and material qualities, such as network coverage, cost, or address book, into account. It is not only the outer physical shape of the mobile that needs to change in order to make it wearable. In addition, a new design needs to consider the experiential qualities as they unfold in settings as the one we see here, in Vanuatu.

**Somaesthetic implications.** Somaesthetics [19] is, according to Richard Shusterman, a pragmatist philosopher, the study and understanding of how to improve our bodily, or somatic, agency. His view is that we need to focus on, become more aware of, train and find a sensory-aesthetic appreciation, similar to how we must study any other subject at which we want to excel. He discussed how certain movements, brought about through critically aware somatic training, are good for us. Schiphorst has tried to translate his insights into design: “*In the context of interaction, somaesthetics offers a bridging strategy between embodied practices based in somatics, and the design of an aesthetics of interaction for HCI.*”[16]

In this study, we may note how people in Rah sometimes had to perform movements that clashed with their everyday bodily practices, when canoeing, fishing or bathing in the sea. The rigid body postures required in order to stop the mobile (dangling from a string around your neck) from dipping into the water, brought about experiences of fear, rigidity of posture and sudden muscle tensions. Similarly, the painful posture of stretching one arm above your head while swimming creates for an uneven, asymmetrical movement.

For many bodily practices, we need to train our bodies, strengthen certain muscles or stretch limbs to make them able to freely move in certain directions. Some of that machine-like training may harm our bodies in the long run and needs to be better addressed in the design process, in particular by the field of ergonomics. But perhaps our aim should not only be to avoid designing technology that harms us, but to move beyond that, and design for somaesthetic experiences. By exposing the bodily practices that the mobile device brings about, we can see that some of them are not, (and will not be even after substantial co-evolution with the cultures norms and practices) somaesthetical movements. In our view, we can see that this is true also in more mature bodily practices around mobile devices. By explicitly addressing the somaesthetics in the design process, through, for example, studying practices such as yoga, Alexander-technique, or Feldenkrais, as proposed by Shusterman [19], we may end up with better, more aesthetically pleasing, bodily practices around mobile devices.

**Coverage landscape.** The seams in network coverage, has been discussed extensively in the HCI literature. Some have seen lack of coverage, signal strength, GPS coverage, etc., as resources to design rather than problems. It has been named seamful design [3,4] – the idea being that by explicitly exposing seams one can create novel exciting functionality. But what is interesting in this case is how willing *ni-Vans* are to go to places which for most of us would be inaccessible, in order to enjoy mobile interactions.

In the formation of seamful design, this kind of enforced movements, making people climb a hill for 3 hours in order to reach a point where they can make a phone call, is never really discussed. Obviously, any technology that is brought into cultural, social and bodily systems of practices will generate a different evolvement of the whole that might take some time before some of the main awkwardness in the interaction fades away. Having to climb that hill to get to a point where there is reception seems similar to the situation where a landline phone would be on top of that hill, which contrasted with the enthusiasm of people who already had access to nearby landline phones but were still happy to walk the distance in order to use their mobiles. What we want to challenge here is the assumption that mobile communication in itself augments the readily available landscape, rather it superimposes other layers of different landscapes (coverage, socially accepted places, private places), that we should consider in the design process, not as mere limitations but as resources for design.

We have focused on the types of evolvements that some of the everyday bodily practices in Rah will undergo due to the introduction of this technology. And to make it clear, this is not meant to be a negative assessment of the introduction of this device in any way, if anything, the contrary. The mobile phone enables a kind of proximity with geographically far away family members, which before was difficult and sometimes impossible. It enables new business opportunities and dynamism in coordinating with other

business partners, such as in the sales of kava, or being more interactively updated on when ships might come to export a variety of local goods, such as kava, copra or handcrafts. It allows for coordination with tourism offices and tourists themselves in order to better accommodate them when they come to Rah for a visit. All of these represent fundamental sources of income for people in Rah, and the importance of the mobile phone in the development of any of these points should not be underplayed.

What we want to point out instead, is that the mobile phone results in a deep transformation of existing concepts and structuring of time and space constraints, in an unprecedented way. It reshapes social, economic and bodily practices in Rah. The whole pattern of movements and ways of being in the world can be drastically changed. At the same time that the mobile phone allows people in Rah to be in proximity with far away relatives and friends, enlarging in some ways their available landscape; it also shortens it by forcing them to be in specific places in order to get reception. In the same ways, phones allow any of us, mobile phone owners, to call friends while miles away, but it also forces us at times to remain on the same physical place while our phones are charging, or to switch rooms inside our homes to improve the quality of reception.

**Competing for bodily space.** The bush-knife is a pervasive tool in Vanuatu. Carrying it at hand is a very common way of dealing with it, whether to cut through the bush, to go work in the gardens, it is the one tool people in Rah seem to carry with them at most times. Carrying it in pockets in their backs was sometimes observed but only rarely. The most common way one would see the knife would be hanging down as an extension of one's arm. Even small children are seen carrying knives, sometimes by demand of their parents when the knife is not in reachable distance and they ask the children to bring it. Sometimes the children are only barely bigger than the knife itself.

This idea that *ni-Vans* are already habituated to carrying around a physical artifact with them most of the times, by growing their whole lives around it, brings out the question of how do they find space on their bodies for another one? This idea perhaps accounts for some of the placements that we observed as well as for some added awkwardness in appropriating this device into their practices.

One inspiration that one can take from this, is how then, to think of mobile as more than a handheld? As something different than an artifact which requires dominant hand usage? Perhaps one thread of thought that can arise from this is to think about non-dominant hand usage or non hand usage at all. Possibly in ways that can free our hands for other purposes, such as balancing as in some of the examples seen above, or engaging with other artifacts which have already claimed that bodily space.

**Looking at these results.** Our aim in this paper is to leave our findings open enough for others to reflect and build upon, and yet practical enough that implications for design

can be immediately withdrawn. For example fragility appeared as one of the issues in this paper, but instead of simply arguing for a more robust build of the mobile, we suggested that other alternatives were possible, such as creating designs which afford different ways of caretaking for the mobile. And yet this is just one of the many views that can arise from the themes under discussion.

**Further thoughts.** Our attentive reviewers have highlighted the importance of connecting issues of social order in relation to somaesthetics and somaesthetic practices, and the fact that somaesthetics is in itself a culturally grounded lens to understand these practices. Although these are issues of major importance, we feel they would be too broad to address in this work of limited scope. We nevertheless wanted to acknowledge these remarks as they are of undoubted important for a future, in-depth look at these and other somaesthetic practices.

## CONCLUSION

All this said, we want to reinforce the idea that the specific ways in which mobiles are being adopted in Rah is a secondary concern of this paper, compared to exposing the ways in which everyone in and outside of Rah, needs to adjust their bodies and practices around this device. The encounters in Rah help expose some of these adjustments.

We need to better understand how technology, like mobiles, alters our bodily ways of being in the world: the movements of our body, the stiffening of certain muscles, the way we move through the landscape, how we appropriate it, wear it and find bodily and social space for it. Obviously, this process is developing over time – we get a socio-digital material (or socio-*bodily*-digital material) that is over time, more or less, fitted to the setting. But, by altering the design, we might alter body schemas to be better adjusted to social norms, bodily practices, but also better adjusted to what is somaesthetically pleasing – giving rise to better experiences with the device.

Driving forces such as the miniaturization of technology and the starting metaphors of fixed phones and the personal computer, to some extent, as well as business considerations, have been much more relevant to the design of mobile technologies than studies on the relationships between these technologies and our bodies. This study suggests that there are lessons to be learned, and even practical design implications, if we address mobile design from a bodily and somaesthetic perspective. These, in turn, might add a great deal of value to the user.

By studying early stages of adjusting to a new technology, or when technology use is in flux for some other reason, some of these processes are more clearly uncovered. Later they become engrained with our behaviors– becoming harder to see those adjustments, and address them in design.

In a sense, we are proposing a move back to the ergonomics careful and considerate care for our bodily ways of being in the world, but without putting a machine-like perspective

on what the body is or could be. Instead, we have exposed the need to consider somaesthetics practices when designing wearable technologies in general and mobiles in particular.

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#### REFERENCES

1. *2009 National Census of Population and Housing*. Vanuatu National Statistics Office, Port Vila, Vanuatu, 2009.
2. Bødker, S. When second wave HCI meets third wave challenges. *NordiCHI '06: Proceedings of the 4th Nordic conference on Human-computer interaction*, ACM (2006), 1–8.
3. Chalmers, M. and MacColl, I. Seamful and seamless design in ubiquitous computing. *Workshop At the Crossroads: The Interaction of HCI and Systems Issues in UbiComp*, (2003).
4. Chalmers, M., Dieberger, A., end\_of\_the\_skype\_highlighting, K.H.B., and Rudström, Å. Social Navigation and Seamful Design. *In Japanese Journal of Cognitive Science, Special Issue on Social Navigation*, (2004), 171–181.
5. Dourish, P. *Where the Action Is: The Foundations of Embodied Interaction* (Bradford Books). The MIT Press, 2001.
6. Dourish, P. Implications for design. *Proceedings of the SIGCHI conference on Human Factors in computing systems*, (2006), 541–550.
7. Höök, K. Transferring Qualities from Horseback Riding to Design. *Proceeding of the 2010 Nordic conference on Human factors in computing systems*, (2010).
8. Isbister, K. and Höök, K. On being supple: in search of rigor without rigidity in meeting new design and evaluation challenges for HCI practitioners. *CHI '09: Proceedings of the 27th international conference on Human factors in computing systems*, ACM (2009), 2233–2242.
9. Juhlin, O. and Weilenmann, A. Hunting for fun. *Proceedings of the 2008 ACM conference on Computer supported cooperative work*, (2008), 57–66.
10. Longo, G.O. Body and Technology: Continuity or Discontinuity? In *Mediating the Human Body: Technology, Communication, and Fashion*. Lawrence Erlbaum & Associates.
11. Löwgren, J. and Stolterman, E. *Thoughtful interaction design: A design perspective on information technology*. MIT Press, 2007.
12. Matthews, B. and Ross, L. *Research Methods: A practical guide for the social sciences*. Pearson Education Limited, 2010.
13. McCarthy, J. and Wright, P. *Technology as Experience*. The MIT Press, 2004.
14. Moen, J. From hand-held to body-worn: embodied experiences of the design and use of a wearable movement-based interaction concept. *TEI '07: Proceedings of the 1st international conference on Tangible and embedded interaction*, ACM (2007), 251–258.
15. Peck, J.G. and Gregory, R.J. A Brief Overview of the Old New Hebrides. *Anthropologist* 7, 4 (2005), 269–282.
16. Schiphorst, T. soft(n): toward a somaesthetics of touch. *CHI '09: Proceedings of the 27th international conference extended abstracts on Human factors in computing systems*, ACM (2009), 2427–2438.
17. Shklovski, I., Kraut, R., and Cummings, J. Keeping in touch by technology: maintaining friendships after a residential move. *CHI '08: Proceeding of the twenty-sixth annual SIGCHI conference on Human factors in computing systems*, ACM (2008), 807–816.
18. Shklovski, I.A. and Mainwaring, S.D. Exploring technology adoption and use through the lens of residential mobility. *CHI '05: Proceedings of the SIGCHI conference on Human factors in computing systems*, ACM (2005), 621–630.
19. Shusterman, R. *Body Consciousness: A Philosophy of Mindfulness and Somaesthetics*. Cambridge University Press, 2008.
20. Sijapati-Basnett, B. *Social and economic impact of introducing telecommunications throughout Vanuatu*. Pacific Institute of Public Policy, 2009.
21. Sundström, P. and Höök, K. Hand in hand with the material: designing for suppleness. *CHI '10: Proceedings of the 28th international conference on Human factors in computing systems*, ACM (2010), 463–472.
22. Sundström, P., Ståhl, A., and Höök, K. eMoto: affectively involving both body and mind. *CHI '05: CHI '05 extended abstracts on Human factors in computing systems*, ACM (2005), 2005–2008.
23. Tholander, J. and Johansson, C. Design qualities for whole body interaction - learning from golf, skateboarding and bodybugging. .
24. Troshynski, E., Lee, C., and Dourish, P. Accountabilities of presence: reframing location-based systems. *Proceeding of the twenty-sixth annual SIGCHI conference on Human factors in computing systems*, (2008), 487–496.