Chapter 5
Touch Presence, Absence and Connection

Abstract Technologies are intrinsically linked to the ways in which physical, temporal and emotional distances are thought of and managed. Likewise, social relations and communication technologies mutually shape each other as they are developed and maintained. This chapter explores the social connections that digital touch technologies are beginning to shape, with a focus on the related experiences of presence and absence through mediated touch and the questions this raises for the design space of interpersonal relationships, that is, the mediation of touch between people. We first consider how these concepts have been defined and addressed in the literature on communication technologies in general, and touch technologies in particular. We then use three extended examples from InTouch case studies to explore and reflect on these concepts. We consider how touch technologies might challenge us to think about the interaction between human and machine. We close with a consideration of design implications and possibilities for future research.

Keywords Connection · Absence · Presence · Distance · Social relationships · Interpersonal · Isolation · Tactile emoticon · Bio-sensing · Parent-Infant Interaction

5.1 Introduction

Technologies are intrinsically linked to the ways in which physical, temporal and emotional distances are thought of and managed. Likewise, social relations and communication technologies mutually shape each other as they are developed and maintained. Baym (2015) refers to this as the 'social shaping' perspective (cf. Mackenzie and Wajcman 1999), a middle ground between technological determinism (technology influences society) and social constructivism (society influences technology). She argues that new or emerging media offer 'fresh opportunities' for social and cultural reflection, allowing us 'to think about our technologies, our connections, and the relationships amongst them' (Baym 2015: 1). And '[t]he very

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existence of interactive media that connect people across space gives rise to new connections' (ibid: 172).

Communication at a distance has advanced in speed, ubiquity and importance since the advent of modern communication technologies and in light of a global and increasingly (albeit unevenly distributed) mobile economy (Dimmick et al. 2011; Stafford 2004). The affordances, practices and evolving social relations emerging through and shaped by social networking sites (e.g. Facebook) and audio-visual communication platforms (e.g. WhatsApp, Snapchat, Skype or Facetime) have been brought into focus.

In this chapter, we explore the social 'connections' that digital touch technologies are beginning to shape, with a focus on the related experiences of presence and absence through mediated touch. We first consider how these concepts have been defined and addressed in the literature on communication technologies in general, and touch technologies in particular. We then use three extended examples from InTouch case studies to explore and reflect on these concepts. The InTouch project and case studies are introduced and outlined in Chap. 1. They include people's interactions and responses to a series of artistic technological provocations designed to enhance feelings of connection and tackle isolation in the Remote Contact exhibition; the social aspects of sending and receiving digital touch as a form of tactile support, drawing on our study of people's use of a prototype tactile emoticon; and parents' use of the Owlet Smart Monitor (OSS), a bio-sensing baby monitor and app, which we conceptualise as a form of mediated touch in the context of parent-infant interaction.

This chapter brings into focus the questions that touch technologies raise for the design space of interpersonal relationships, that is, the mediation of touch between people. We also consider how touch technologies might challenge us to think about the interaction between human and machine. We close with a consideration of design implications and possibilities for future research.

5.2 Connecting at a 'Distance': Questions of Presence

Within HCI, research on 'social presence' (also 'mediated social presence' or 'social telepresence' (Biocca et al. 2003: 459) has largely focused on the relative success of individual technologies to mediate human interaction, and on finding appropriate psychological or behavioural measures to assess this. Specifically, social presence theory has dealt with ways in which 'the "sense of being with another" is shaped and affected by [individual] interfaces' (ibid: 456), the perceived 'social richness' a medium might provide, or the extent to which it can generate key social measures, such as involvement, immediacy or intimacy (ibid: 465). According to Dimmick et al. (2011), social presence in mediated communication first received attention from researchers in the context of teleconferencing (Short et al. 1976), with a view to assessing 'how technology provides filters that add or subtract [verbal or nonverbal] cues found in unmediated social interaction' (Biocca et al. 2003:

472). It was the telecommunication context itself that problematised the notion of presence and absence as binary oppositions, making room for a 'continuum in which mediated others could be more or less present' (ibid: 460). This was also in parts influenced by Goffman's notion of 'co-presence' which, in social-interactionist terms, not only referred to physical presence but to the impact that presence (and 'the reception of embodied messages' (Goffman 1959: 15) had on individual actors' behaviours, and their assessment of the intentional states of others. Accordingly, co-presence did not simply refer to the 'sense of being with another' but its social and interactional implications (e.g. responses to social cues).

As Biocca et al. (2003: 456) explain, within HCI social presence theory, 'the other' can refer to 'either a human or artificial intelligence', as long as there is that sense of '*intelligence* suggesting broadly the notion of intentionality and intelligent behavior relative to the environment and the self' (ibid: 463, original emphasis); 'just the copresence of a body may not be a good definitional basis for social presence, but rather we could say that the body is a set of cues for an "intelligence" that animates it'.

Human communication is core to media and cultural studies scholars who broaden perspectives of mediated social presence to the social connections or relations that shape and are shaped by media technologies. Here, the notion of 'connecting' with others across distance (in its multiple connotations) opens up wider considerations of mediated, synchronous or imagined presence. That is, the ability to 'connect' with someone or something is understood to work on an emotional-intellectual level and does not need to be physical or even reciprocal. In the context of long-distance relationships, connection has often been discussed as a sense of 'togetherness' and the means by which to achieve this; people connect, technically, via a range of communication technologies to generate a feeling of human connectedness, of being 'together and to build on a form of togetherness via shared imagined future moments' (Cantó-Milà et al. 2016: 2409). Here, too, different communication technologies afford different ways of connecting. For instance, Licoppe (2004: 135f) evidences a gradual shift in which 'instead of being used […] to compensate for the absence of our close ones, [they] are exploited to provide a continuous pattern of mediated interactions that combine into "connected relationships", in which the boundaries between absence and presence eventually get blurred'. An example is the change from longer domestic landline conversations to shorter, more regular interactions via mobile phones. He sees in this the emergence of a 'connected presence', in that the ongoing 'flow of irregular interaction helps to maintain the feeling of permanent connection, an impression that the link can be activated at any time' (ibid: 141). Similarly, Baym discusses O'Hara et al.'s (2014) description of 'everyday dwelling' where '[p]artners left video chat open ritualistically to hang out, eat together, watch TV together, or watch each other fall asleep' (Baym 2015: 158). She notes how 'kissing and sex, not surprisingly, worked best in person, although mock-kissing had its charms' (ibid), highlighting the physical restrictions of audio-visual communication technologies that have given force to imaginations of mediated touch, as outlined in more detail below. The nature and quality of connection in its technical sense still matters for communication, with

bad or interrupted connections (e.g. latency issues or distortions) potentially leading to miscommunication or communication break-downs.

Beyond the notion of connected presence and 'co-presence by proxy' (e.g. visual content retrieved through social media), Madianou (2016) argues that it is multifaceted and dynamically negotiated 'polymedia' environments (cf. Madianou and Miller 2013) that facilitate a 'new, hybrid type of indirect co-presence', that is, 'ambient co-presence' (Madianou 2016: 187). She defines this as the 'increased awareness of the everyday lives and activities of significant others through the background presence of ubiquitous media environments' (ibid: 183); which relates also to 'ambient intimacy', coined by Hjorth et al. (2012) and discussed in Lambert (2016). Here, connection and presence (or absence) go beyond the nature and significance of individual communication interfaces or moments of mediated interaction to refer to the phenomenological experience of 'feeling' in touch (in this case, without actually touching) and to an imagined presence. This is akin to a more abstract notion of connecting that goes beyond establishing and maintaining contact to refer to people's ability to imbue connections with personal meaning at moments of co-located or remote interaction or imagining. In terms of this 'emotional' connection or connectedness, we might not only connect with people near and far but also with objects, ideas, or times, by becoming aware of and attributing meaning to them.

5.3 Connecting Through Touch

Touch has a special role in relation to human connectedness, and increasingly so as mediated social-sensorial experience. It has been seen as the 'point of connection' itself that helps us to 'know both the self and the other', and to differentiate between the two: '[i]n differentiating the other from ourselves, we are able also to connect knowingly with that other' (Cranny-Francis 2011: 468). From this perspective, connection is 'engagement', or a form of 'being with', that can be physical (through contact), emotional (feeling, empathizing), or intellectual (in terms of understanding or knowing) (ibid: 470). The three might overlap, as in the sense of excitement of touching an object from the past, that is, something that is personally, socially or culturally meaningful and 'links or connects us to that past' (ibid: 469). Museum-based research suggests that touch can establish essential connections of social, cognitive and therapeutic value (Chatterjee and Noble 2013), help visitors to build narrative connections with objects via their own experiences and memories (Jewitt and Price 2019), with visitors reflecting how touching artefacts provides a 'strong sense of their body meeting that of another person over an immense time and space' (Candlin 2010: 65).

Paterson (2006) extends this to interacting with virtual objects, exploring how (physical) distances both collapse and become differently meaningful through feelings of 'presence', 'co-presence' and 'immersion' (Paterson 2006: 691). To him, the immersion that is achieved through the collocation of haptic and visual feedback

when touching virtual objects via haptic devices (e.g. the PHANToM) – of making the intangible (digital, virtual) quite literally tangible – gives a sense of realness and presence that vision alone cannot achieve (ibid: 698). It 'brings the distant into an almost phenomenologically felt near-space of proximity, while also maintaining that distance' (ibid: 703), allowing users to feel the "active presence of absent things"' (a quote attributed to Paul Valéry, see Thrift 2000: 222, in Paterson 2006: 697). A sense of distance remains because we know or imagine there to be physical distance, as in the case of the first 'virtual handshake' (actually an attempt at collaboratively manipulating a virtual object from both sides of the Atlantic),(Kim et al. 2004). But this 'distance is brought to life' (to paraphrase Josipovici, Paterson 2006: 696) through the tactile interaction with the haptic device. In the case of the virtual handshake, this was proof of achieving a sense of 'co-presence' (Kim et al. 2004) which, if extended to other relationships, may foster 'feelings of nearness and intimacy' (Paterson 2006: 693). In this context, the greater the fidelity of the haptic feedback/sensation, the greater is the sense of presence or co-presence.

To Paterson, writing at a time when haptic technologies were even more emergent, the feeling of touching the virtual object is so real, in fact, that he evokes Walter Benjamin's (1936) notion of 'aura', hitherto a quality integral to, or reserved for, original artefacts (rather than their copies/reproductions). 'The distances involved', Paterson writes, 'do not qualitatively affect the feeling of the manipulation process, the sense of presence of an object or copresence of another person' (Paterson 2006: 702). In other words, it is as though we felt the object (the original) itself, rather than its representation. Arguably, this is more complex an argument than Paterson suggests – not least because virtual entities do not necessarily need to be copies or representations of an 'original'. It is also questionable if the sensorial experience of the haptic device at hand (its own feel) can be completely ignored, no matter how high the fidelity of haptic sensation or how convincing the illusion of virtual touch. What is invoked, however, is the feeling of connection as immediate and intimate, suggesting an ability to actually grasp a thing at hand, or to 'feel' and make more 'real' and tangible the presence of a (distant) other.

Presence and immersion are key concepts in Immsersive Virtual Reality (VR). Specifically, immersion refers to the experience of spatial presence in the digital environment where the media contents are perceived and treated as real (Madigan 2010). Touch is seen as a critical element in achieving a high degree of presence in VR environments: 'Haptics is at the core in the way we interact with the our surroundings, and without it we will be never fully embodied in a virtual world' (Abrash 2015 in Parisi 2018: 188 loc.). In VR presence involves a sense of being there (in the virtual) and being able to act and interact in the virtual world in a way that is not only non-disrruptive but it is also experienced as real. In Social VR – where users are virtually embodied in the same virtual world – presence can take different forms in a spectrum from co-existence to connection. Connecting through engagement is a common activity in the virtual space (e.g. watching films together, playing games collaboratively and co-constructing virtual objects). However, the potential for connection in social VR can be violated (e.g. Harrassement) which raises the need to define and regulate unwanted touch.

Presence in VR refers mainly to the virtual space and emphasizes the bypassing of the physical space however, it also presupposes a physical body which experiences (multimodally and sensorially) the impact of actions and its presence in the virtual world. A critical element of VR presence is therefore the creation of a connection – at a conceptual and emotional level – between this physical body and the virtual world. Kozel (1994:3) notes of this connection: 'The famous claim associated with virtual technology is that the body is futile, replaced by an infinitely enhanced electronic construct. If this is so, then why did nastiness or violence enacted upon my image hurt? How could the body be futile yet still exert a basic visceral control over my movement?'. Digital mediation of touch in VR adds a physical dimension (e.g. feeling the touch between two avatars or the explosion of a bomb) to the sense of connection. The physicality of the mediated tactile experience is envisaged to produce a high-level (near complete) absorption of the physical body into the virtual world and in doing so, virtual touch has the potential to expand the range and the novelty of felt experiences.

As (Puig de la Bellacasa 2009: 305) argues, '[t]ouch technologies and dreams of being in touch match well', feeding into a market that reaffirms connecting and longing at a distance. At the time of writing this chapter, the majority of long distance relationship gadgets on the market involve some form of remote touch, from the transmission of lovers' heart beats (e.g. Apple Watch, Pillow Talk), via haptic devices for tactile messaging or gesturing (e.g. hugs, kisses, holding hands), to the use of connected sex toys (e.g. Lovense, Kiirroo, Vibease, see LastingTheDistance.com 2019). While some remain at the proof-of-concept or crowdfunding stages, others are becoming commercially available (e.g. HEY, Kissenger). The makers of Pillow Talk argue that being 'able to *feel* connected to our loved ones' is needed where 'emoticons and pixelated video calls just don't really cut it' (http://www.littleriot.com/pillow-talk/).

Recent research in affective digital touch, elsewhere refered to as 'affective haptics' (Eid and Osman 2016) or 'mediated social touch' (Huisman 2017; van Erp and Toet 2015) has highlighted the complexity of unpacking and digitizing touch for remote communication, demonstrating ambiguities in research results and limitations of existing solutions. Much focus has been on the effectiveness of transmitting specific types of touch and emotions (e.g. Obrist et al. 2015) or its role in multisensory/−modal communication (e.g. Park et al. 2016). Across these approaches, there is always – implicitly or explicitly – the underlying design challenge of touch as an embodied physical experience, addressing (parts of) the body as the locus of touch or integrating body location (e.g. different parts of the arm) in the touch recognition pattern.

In this context, 'social presence' has been aligned with interfaces' ability to create and convey touch convincingly and meaningfully, be this in the aforementioned context of interpersonal relations, gaming, collaborative working, or human-machine and human-robot interaction. With regard to the latter, van Erp and Toet (2015) cite a study on toddlers' interaction with a humanoid robot (Tanaka et al. 2007) which found that 'social connectedness correlated with the amount of touch between the child and robot' (van Erp and Toet 2015: 6), while another study noted

that the 'warmth of a robotic hand mediating social touch contributed significantly to the feeling of social presence' (ibid 2015: 6), indicating the importance of 'human' touch qualities. Our InTouch case study on the Tactile Emoticon approached the area of affective or supportive touch exploratively in terms of the social aspects and relations at play in mediated touch communication. Here, focus was both on optimizing a touch interface and the ways in which participants imagined and made sense of remote personal touch through the device. As such, it was akin to a socio-technological probe study.

5.3.1 Tactile Emoticon

The *Tactile Emoticon* case study involved the development and qualitative exploration of a communication prototype for the transmission of touch through the synthesis of three tactile subcomponents – temperature, pressure and vibration – across two remotely connected devices. The devices were designed t send, receive or amalgamate touch messages. Six groups of two to three participants were invited to explore the device for purposes of supportive touch in relation to three scenarios: romantic love, pain and social rejection. While questions of connection, presence or absence were not always explicitly verbalised (as concepts), these were observed to be in play – at times, playfully so – across participants' tactile interactions and related discussion.

Participants' attempts to enable touch communication *as* connection – i.e. successfully transmitting and conveying a tactile message – was key to many interactions, with the physical distance between dyads of teams and the lack of other sensory cues creating challenges for interpretation and, conversely, a sense of disconnection: '*let's try to decode what they are saying… It is difficult to use this on its own, I could use it while speaking on the phone… I could support it with my body language, or words.*' Participants actively 'connected' and 'disconnected' through the device by the very placement and removal of their hands; to some, the presence and absence of communication partners became the clearest tactile 'message' transmitted through the device.

However, 'connection as presence' was not straightforwardly 'presence as connectedness'. Participants tested the device's affordances through 'disruptive practices', for instance by using extreme cold to communicate not wanting to be touched or to interrupt a specifically unwelcome tactile message (e.g. vibration or too much heat in acute pain or social rejection). While there is an element of looking for extremes to understand the device's functional limits and boundaries, participants' communicative choices (e.g. cold) indicated an attempt to transfer known sensory-social meanings into the digital touch context, thus maintaining and differently shaping communicative norms and social relations. This sometimes meant that embodied associations of touch moved from the activating/receiving hand to imagined whole-body interactions. For instance, pressure came to denote containment (as in a hug), and raised temperature was used to convey the warmth of holding somebody.

Part of emerging digital touch practices here was also the use of provocations (e.g. 'too hot' messages) to infer presence from the reaction of the others, in that no reaction signalled absence: '*I don't think they are there. Or if they are there, they are not moving their hands*.' Significantly, absence was not simply the lack of touch associated with the presence or absence of specific subcomponents (e.g. lack of vibration). It was also associated with seemingly undifferentiated (repeated or unchanging) messages, as though there was an element of 'absent-mindedness' akin to the mechanical reproduction of communication patterns.

Across the case studies, questions of presence and absence became key to interpreting both the workings of digital devices and instances of tactile communication. Importantly, the devices themselves became 'present' through their affordances and materiality. This is partly due to their relative novelty as a medium for communication, with participants having to work out rules and opportunities for the creation of patterns or recognizable signs. It is also linked to the sensorial interface itself that, for some, seemed too rubbery, 'synthetic' and 'artificial'. While a design aim might be to more directly, intuitively and conclusively mediate tactile messages, participant reflections on how best to communicate intent also highlighted questions of presence and absence as less on a continuum and more associated with specific acts of imagining the other, for instance in terms of 'by proxy' whole-body interactions (a touch of the hand evoking a hug) or touch partners' 'absent-mindedness' as indicated by the repetitiveness of touch patterns.

Besides the technical challenges of replicating human touch for affective support, the case study led us to reflect on the qualities and boundaries of touch in new ways. How do we signal unwanted touch in the absence of other cues? What does it take to authenticate the touch of a loved one? How do we know it is real? How easy would it be to replicate it, and to what consequence? The repetitive touch pattern itself may not only have suggested absent-mindedness but the absence of a body on the other end, with the machine continuing to entertain the mere illusion of presence (cf. Lombard and Selverian 2008: 319, who address adding physicality to the avatar of a deceased). Indeed, if it is part of a touch interface to make touch particularly 'real' or 'convincing', what stops it from becoming manipulative or fostering unwanted connections? Biocca et al. (2003: 469) mention the political implications of producing distance communication technologies that are *too* successful at social communication, in the sense that they might influence/persuade in the context of commerce or government propaganda. Similarly, Cranny-Francis warns that '[t]he connection generated when the human touches the machine might constitute the human as member of a technological assemblage, from which he/she derives power' (Cranny-Francis 2011: 469f) but 'where it occurs without full knowledge of the individual subject it may be harmful and disabling.' (ibid: 470). This is the case if tech users become 'incorporated into a technological entity or assemblage of which they may have limited knowledge and understanding' (ibid). This raises questions over how immersive, real or authentic we want touch technologies to be – or conversely, how transparent in their workings. We return to some of these issues in Chaps. 6 and 7, in relation to the sociotechnical imaginaries and ethics of digital touch.

5.4 Beyond the Interface

The intricacies of familiar interpersonal touch as they are known by those close to us came into focus in the *The Art of Remote Contact* case study. The touch provocations in the Remote Contact exhibition were designed to encourage particular forms of touch in co-located spaces, stretching notions of touch and rendering touch itself *present* – by making it visible, audible, graspable, and preservable. Significantly, visitor interaction and imagining engaged with presence, abence and connection beyond the affordances of the interface or specific moments of mediated touch interaction.

5.4.1 Remote Contact

The premise for the *Art of Remote Contact* case study and exhibition emerged out of the longing to connect in a context of perceived dis-connection – or reconfigured connections – brought about by the challenges of dementia. Invisible Flocks' creation of touch-based artefacts or provocations built on conversations and encounters with people living with dementia and their carers, in which touch had surfaced as central to communicating and being with each other (described in Chap. 1).

The exhibition partly encouraged the coming together of bodies, through physical contact or joint touch movements, and a range of ways of connecting through touch, sometimes quite literally so, encouraging touch between strangers or people who knew each other but were not used to holding hands, enabling people to be together differently. Visitors reflected on the experience of interacting with the *I wanna hold your hand* gloves and 'rain' exhibits, for example, describing the act of holding hands as 'quite romantic', or alternatively 'quite bizarre', noting that as friends they 'never hold hands', laughing uncomfortably at holding hands with a work-friend or stranger, or explicitly reflecting on the discomfort of holding hands or withdrawing from the act out of embarrassment at having sweaty-hands, as well as the power of doing so (Fig. 5.1):

> I work in care homes and people hold your hands a lot and can hold it for quite a long time, and you sometimes feel quite uncomfortable because you worry that you shouldn't be holding hands because they are not somebody who you know that well…A lot of people I work with you don't really have conversations, so handholding can be a real point of communication, you don't necessarily speak.

These reflections often led to discussions of imagining new forms of digital touch and how these might ameliorate or reconfigure them. And further, it played with the notion of the mutual shaping of technological, social and sensory touch connections.

Beyond touch connection as physical and technological 'contact', three themes emerged as central to our discussion here.

Fig. 5.1 The *I wanna hold your hand* gloves and 'rain' artefacts prompted visitors to the Remote Contact exhibition to hold hands, often with strangers. (Photo credit: Ed Waring)

Fig. 5.2 Visitors using the *Motion Prints* artefact engaged in playful touch with therapy putty, themselves and one another as a way of being together and connecting through touch and shared memories of tactile experiences. (Photo credit: Ed Waring)

First, the exhibition opened up questions of presence, absence and connection through emphasizing the temporal and emotional kinds of distance that can also be negotiated through touch. It resonated with visitors who had come to the gallery with personal and professional connections to people living with dementia. Visitors commented on being able to imagine using the *Motion Prints* artefact in (care) homes as a playful, tactile and intuitive way of being together and re-connecting where someone (or someone's previous identity) had felt absent. This was largely because it overcame perceived linguistic barriers. At the same time, visitors made relevant how the activity of working with the therapy putty evoked, and thus made present, memories of related, perhaps past creative practices, such as kneading dough or crafting (Fig. 5.2).

Second, in relation to the above, touch became part of connecting beyond the mediation of human-to-human touch and through the sharing of touch experiences, movements and memories. A sense of wanting to preserve and revisit the shared 'memory' and experience of touch moments lay the foundation for *I wanna hold your hand*. Within the context of the exhibition, the sensor-equipped gloves became an artefact for visitors to interact and document touch with; as they wore the glove, moved and flexed their hands, touched themselves or others, sensor data was displayed on screen and, at the push of a button, printed on a piece of paper which visitors could display in the gallery or take home. This made touch present and 'graspable' as a tactile (and visual) memory object. Similarly, touch became differently present through its translation (transduction) into other modes, such as sounds and light (*Water Synthesizer*) or sounds, visuals and joint movement (*Rain*).

Third, Remote Contact brought to the fore the role of the whole body – or different bodies – in seeking out or resisting social, sensory and emotional connections. For some, touch got in the way of social connections by foregrounding the presence of one's awkward body. This highlighted the need for touch technologies to be responsive to the diversity of bodily feeling and related social sensitivities of touch. Others found in *I wanna hold your hand* new ways of connecting with one's own body, through encouraging movement and self-touching, and again through making visible and present (through plotting and printing) what would otherwise remain invisible, albeit felt in differently embodied ways.

5.5 Touch Connection as a Bodily Way of Knowing

Touch as multifaceted mode of communication and bodily way of knowing through connecting were key themes emerging from our engagement with the Owlet Smart Sock (OSS) as an instance of digitally mediated touch. Questions over caregivers' presence and absence – and the managing of proximity and distance – are inscribed into discourses around baby monitors more widely. Here, they are partly amplified in the smart socks's potential to directly disrupt with a range of tactile interactions and connections with one's child. In this context, we approach the smart sock's skin contact and wireless transmission of physiological data to parents' smart devices as a form of remote touch, akin to some of the wider embodied practices caregivers use to check their baby's well-being: the hand on the chest to sense breathing, or moving across baby's body to assess their temperature, feeling baby's muscle tone through holding, and manipulating limbs to test baby's movements and sensations (Leder Mackley et al. under review). The *In Touch with Baby* case study contributes to an emerging body of research that seeks to get to the ontological experiences of parents and babies in understanding bodies and maintaining social relations through touch (Lupton 2013), with a focus on how these may be shaped at the introduction of a touch technology.

5.5.1 *In Touch with Baby*

On one level, 'connection', in the context of the OSS, meant something very practical or technical: positioning the (sufficiently charged) smart sock correctly on baby's foot to establish readings; remembering to turn on the base station to enable alerts; connecting smart sock and base station to transfer data via Bluetooth; sending data from base station to smart phone app via Wifi. These largely 'invisible' connections are vital to the successful functioning of the device. They can also be understood in relation to people's perceived sense of digital-material connections and flows as these are encountered and imagined as part of the home (cf. invisible architectures of which digital flows are a part, Pink et al. 2016). Walls and bodies could interrupt these flows, leading to a lack of technical and social connection.

On an interpersonal level, technical connections mattered, not least when they were difficult to achieve or interfered with existing parenting routines and touch interactions. In one case, handling the device itself led to stressful touch interactions with the baby, which jeopardised the overall goals of soothing the baby ready for bed. That is, while parents were present and interacting with their baby, their simultaneous interaction with the technology disrupted a sense of connecting or bonding through touch. The baby also seemed bothered by the material presence of the sock on their foot, seeking to kick it off. For this family, 'dis-connections' and resultant alerts led to interrupted sleep (Fig. 5.3).

Conversely, we observed parents establishing new interpersonal and experiential connections to their babies through a form of co-located remote touch. In unpacking parents' experience with the OSS, we found touch an important communicator of parental presence (and, with it, reassurance, love and protection – *'he likes to know you're there'*). It was also a significant part of soothing parents' own, at times anxious bodies. Touching one's child was a way of making their (healthy, breathing)

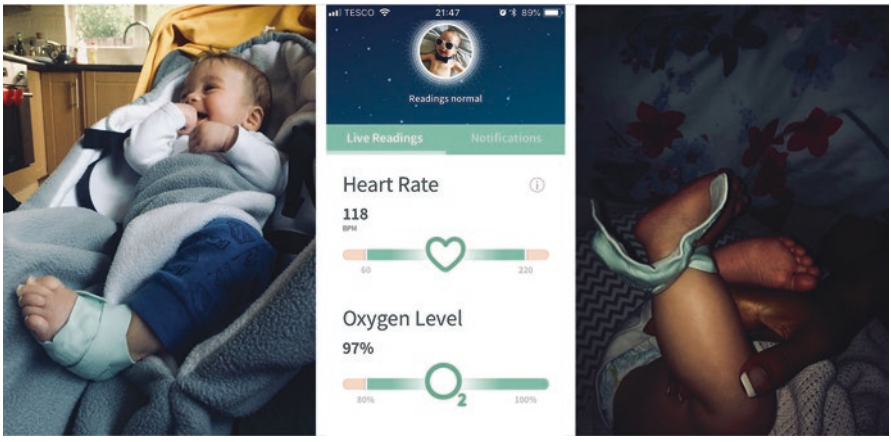

Fig. 5.3 Connecting parent and baby by positioning the Owlet Smart Sock correctly on baby's foot to establish readings on the app|On the right: an example of night time disconnections

bodies present. For one participant, Becky, who had lived with postnatal anxiety, the OSS was transformative in taking on a co-parenting (co-touching) role in this context. Initially, it meant that Becky did fewer physical checks on her son, which provoked mixed feelings. Later in the study, touch practices were resumed but had changed in their timing and quality; based on sensor readings, Becky trusted her baby to be well before going to check on him, hence reducing some of her anxiety. Getting more sleep had an overall positive impact on her and her baby's well-being and, by extension, their relations with each other. Through her monitoring and interpretation of readings, achieved through a form of digital touch, Becky found her son to be a 'good' baby in his ability to get to sleep on his own accord, which Becky saw unfold in his dropping heart rate as displayed on the Owlet app.

This is comparable to the experience of another mother, Susan, who saw in the OSS an opportunity to monitor her son's heart rate for quasi-diagnostic purposes (cf. Wang et al. 2017). This was a particular concern for her family as an older sibling lived with severe epilepsy; extreme fluctuations in baby's heart rate potentially indicated the same underlying condition. Here, a new sense of presence and absence, that of symptoms and related medical conditions, became pertinent to sensing baby's body through touch technology. As with Becky's new insights into the workings of her son's body (and similarly to Remote Contact's sensor-equipped glove), this form of digitally mediated touch made present bodies and bodily workings in new ways. However, there were moments when Susan's engagement with readings and the virtual representation of her baby led to a feeling of dis-connection with the baby that was, physically, present next to her. As these illustrative examples suggest, the OSS case study demonstrates the complexities of 'remote touch communication' in (near) co-located interaction, as at once interfering with social-experiential connections, and at once creating new ones.

In the case of the OSS, the significance and complex distribution of proximity and distance related to and influenced notions of presence, what is made present and absent for the user. The quasi-tactile engagement with babies through the Owlet sock and app made present what would otherwise remain hidden. Or rather, what would otherwise require near-proximity and a combination of visual, auditory and tactile checks (e.g. attending to blue lips, sunken chests, rapid breathing or heart beat) was now available more immediately, perhaps preventatively, on the app at some distance, reconfiguring both temporal and spatial dimensions. As was the case with Susan and Becky, of course, proximity and distance were relative; they could be near and feel distant, or (relatively) remote and feel close. The Owlet raises questions which are also pertinent to other forms of 'telecare' (e.g. remote surgical interventions). Here, Puig de la Bellacasa (2009) asks what happens when the rules of co-relationality and touch reversibility change and patients cannot attain who touches them, and she argues that new forms of connection can both produce co-presence and absence, and can redistribute, rather than reduce, distance. The experiences created by the balance and inter-relation of these different factors needs to be understood to design a sense of connection through digital touch communication.

5.6 Conclusion

In this chapter, we have discussed concepts of presence, absence and connection as these have been addressed in the communications and touch technology literature, and we explored how they manifested themselves across three InTouch case studies. Illustrations from the case studies demonstrate how 'connections' can be significant technologically, socially, communicatively, sensorially, emotionally and imaginatively. The case studies also show how people, technologies, bodies and memories can be differently present and absent in and through our interactions with digital touch technologies, and that such concepts as presence, absence and connection can change in valence. For instance, 'the potential to elicit feelings of social presence' because of its associations with 'physical interaction and co-location' (van Erp and Toet 2015: 2) is not straightforwardly a connecting presence, in the positive sense of human connectedness. While this significantly opens up the design space and scope of what we might mean by producing 'presence' and 'connection' through digital touch, this also suggests the need to attend to the situated social and sensorial meanings that emerge through interaction moments of which digital touch is a part.

Similarly, we see a number of tensions running through the literature and case studies which, rather than easily resolved, might serve as important considerations for design. First, there is a tension between the creation of presence/absence and connection through the successful transmission of tactile messages or the 'replication' of human touch on the one hand, and the idea that these concepts can also function on a symbolic and imagined level, or indeed may give rise to new forms of sharing, experiencing or knowing through touch. A related tension is one between the significance of individual touch interfaces – their materiality, sensorial affordances, social connotations and functionality – and the idea that these might move into the background and function as 'mere' mediators or enablers of digital touch communication.

Interfaces can be transformative or reductionist, depending on how advanced or situationally appropriate they 'feel'. And they are strengthened by being sensitive to differently situated and experiencing bodies.

Finally, insights into existing (distance) communication technologies suggest that emerging touch technologies will not exist in isolation; 'to understand how a given relationship might be shaped by communication technologies, one needs to take into account the way the management of a given relationship will rely on the whole available technoscape' (Licoppe 2004: 135). Inspired by the same literature, we might ask whether 'ambient touching' is as possible as 'ambient dwelling' or viewing, or whether the OSS, for instance, is an example of a new bio-sensing 'connected presence'.

One issue we have not discussed in depth but which is relevant across the above case studies is the way in which our mere engagement with touch technologies may connect us, bring us closer to (or indeed disconnect us from) other people, near, far, living, deceased, and imagined. This is already the case for such 'imagined' digital communities (Appadurai 1990) as health trackers, virtual reality gamers or, more controversially perhaps, users and proponents of sex robots. What will become

embodied acts of digital touch may both be felt and observed as such by others, thus becoming meaningful in their own right (cf. our chapters on social norms and wider discourses). Engaging speculatively with these wider relations, connotations and aspirations is part of understanding socio-technical imaginaries of digital touch, as we discuss in Chap. 6.

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